Adolescent Health and Adult Education and Employment: A Systematic Review

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abstract

OBJECTIVE: Poor health in adolescence has the potential to disrupt education and employment pathways. This study is the first systematic review of the literature examining education and employment outcomes in adulthood of poor adolescent mental and physical health.

METHODS: We conducted searches using a standardized search protocol in 8 electronic databases: PsycINFO, Medline, Embase, ERIC, British Education Index, Australian Education Index, Social Sciences Citation Index, and CINAHL Plus. We identified studies that longitudinally compared adult education and employment outcomes of those with an adolescent chronic condition of clinical severity with healthy controls. We conducted meta-analyses using odds ratios (for dichotomous variables) and Cohen's d (for continuous variables) as our main summary statistics.

RESULTS: We identified 27 studies incorporating 70 relevant analyses. Our meta-analyses suggested that overall, poor health in adolescence was associated with poorer education and employment outcomes in adulthood. However, evidence was much stronger for mental health conditions than for physical health conditions, for which less evidence was available and mixed findings emerged. Compared with mental health conditions, we identified few studies investigating the long-term outcomes of physical health conditions. Age and follow-up times varied considerably across our studies, which potentially resulted in some heterogeneity in effect sizes. The majority of included studies were conducted in the United States, raising questions about the generalizability of the results internationally.

CONCLUSIONS: Health in adolescence contributes to adult attainment and life chances. The results suggest that investment in health may improve life chances and that policy interventions may improve outcomes for those with adolescent chronic conditions.

FREE

Education, economic activity, and socioeconomic status (SES) are recognized as key social determinants of health.[1,2] Recent reports highlight the health burden of periods of economic inactivity and poor educational outcomes. Unemployment is associated with social disconnectedness, low well-being, substance use, and obesity. In the UK, the majority of cases of unemployment are due to illness and disability.[3] Secondary school noncompletion is similarly associated with poorer health outcomes including higher mortality, poor mental health, and increased health risk behaviors.[4] This health burden is additional to the economic costs of poor education and unemployment at the end of compulsory schooling, with lifetime economic burden of economic inactivity in young adulthood estimated at US$750 000 per person.[5]

Although the importance of education as a social determinant of health has been subject to substantial empirical investigation and policy focus, a potential role for health in childhood and adolescence as a determinant of poor education and employment outcomes has been much less studied. Adolescence is a critical developmental period associated with role exploration, development of skills and interests, and the transition to working life.[6] Both physical and mental health problems have the potential to disrupt acquisition of skills and transitions into the workforce, and there is evidence from a number of studies that poor health in adolescence predicts a range of poor adult outcomes, from low educational status to unemployment and receipt of government assistance.[7–10]

The impact of health on these outcomes almost certainly differs across health conditions, with mental health problems likely to impair educational and employment

outcomes through different mechanisms from those of physical health problems. Outcomes are likely also influenced by factors such as severity and age of onset of health problems. Yet there has been no systematic examination of the impact of health in adolescence on later educational and employment outcomes.

We conducted a systematic review and meta-analysis to investigate longitudinal associations between health in adolescence and later education and employment-related outcomes in adulthood, and to explore differences between types of chronic conditions in regard to the direction and strength of association with adult outcomes.

METHODS

The systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[11] The review question is, "what are the impacts of health in adolescence on education and employment outcomes in adulthood?"

Eligibility

Publications were deemed eligible for the review based on a number of a priori criteria. (1) We considered articles that were peer-reviewed and published in English since 1980. (2) Studies were eligible if they were longitudinal studies assessing the association between long-term health conditions in adolescence and education and employment-related outcomes in adulthood.

Adolescent health was defined as any long-term health condition of clinical/diagnosable severity, including chronic physical illness or mental health disorders, assessed between age 10 and 19 years. Education and employment outcomes in adulthood (defined as age ≥18 years) included any outcomes relating to time in and completion of secondary and

postsecondary education, adult occupation, unemployment, social class, adult income, and receipt of income-contingent public assistance/benefits. Because of the overlap between the adolescent health and adult outcome age ranges, we specified a follow-up time between health measure and outcome of ≥24 months. Only longitudinal studies that compared adolescents with chronic conditions to healthy controls were eligible for inclusion.

Search Strategy

We used a standardized search protocol (Supplemental Table 1) to identify eligible studies. This search was conducted in 8 electronic databases: PsycINFO, Medline, Embase, ERIC, British Education Index, Australian Education Index, Social Sciences Citation Index, and CINAHL Plus. Screening was conducted initially based on article titles and abstract. Full texts were sought for articles that met the eligibility criteria or any for which it was impossible to make a decision based on title and abstract alone, after which the final selection of included studies was determined. The initial search protocol identified 11 007 studies. Screening based on title and abstract eliminated 10 937. The majority were excluded because they did not assess associations between health and adult outcomes. Of the 70 articles for which full copies were retrieved, a further 43 were excluded, leaving a total of 27 articles included in the review (see Fig 1).

Data Extraction

We used a standardized data extraction form to record information about each study, including sampling procedure and sample characteristics, context, country, age at adolescent and adult assessment, adolescent health measures, adult outcome measures, control variables, and stratification of analyses where applicable.
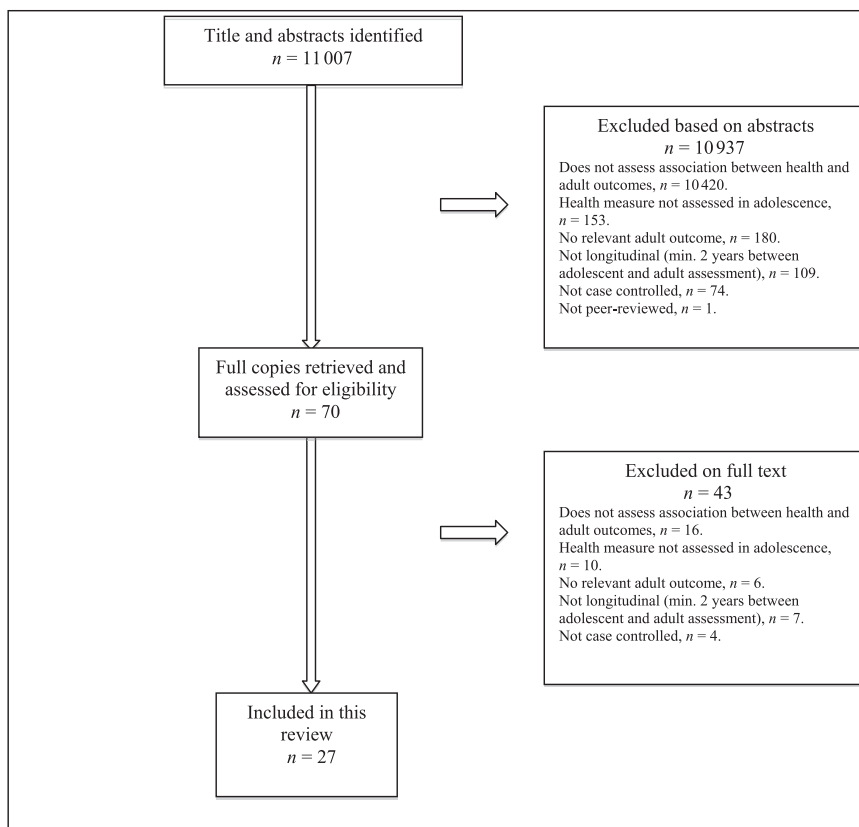
FIGURE 1
Identification of eligible studies.

Quality Assessment

The quality of studies was assessed by using the Newcastle-Ottawa scale (NOS).[12] NOS has been identified by the Cochrane Collaboration as 1 of the 2 most useful quality assessment tools for nonrandomized studies[13] and has been used frequently to assess the quality of nonrandomized studies.[14–16] The NOS uses a star rating system, with stars assigned for adhering to the following criteria.

Selection: (1) The exposed cohort is truly or somewhat representative of the average adolescent with the given chronic condition in the community; (2) the nonexposed cohort is drawn from the same community as the exposed cohort; and (3) health in adolescence is assessed by using a validated diagnostic tool, hospital record, or clinical referral.

Comparability: (1) Cohorts are comparable on the basis of the design

or analysis: the study controls for gender, SES, or ethnicity; (2) the study controls for any other factors.

Outcome: (1) Assessment of outcome is performed by using record linkage or administrative data; (2) attrition rate is adequate (<20%) or lost participants are described.

Though the NOS purports to evaluate study quality, ratings partially reflect the quality of the presentation of the findings rather than the quality of the study per se. Studies that do not adequately describe aspects of the study relating to quality (including assessment of exposures and outcomes, comparability of exposure and control groups, and follow-up rate) will be assigned poor quality ratings regardless of the actual quality of these aspects of the study. Although quality of the study and quality of presentation are closely related, NOS ratings inevitably convey both of these study characteristics.

Quality assessments were used to indicate the likely direction and magnitude of bias arising from the 3 quality domains within included studies; we did not compute total quality scores. Quality ratings played no role in the analyses but are intended to aid the interpretation of the generalizability of the results.

Meta-analysis

Studies were first mapped to adolescent chronic condition (categorized by diagnosis and whether physical or mental health condition) and type of adult outcome studied. Many studies contained >1 analysis, as they assessed multiple adolescent health conditions or adult outcomes. Odds ratios (ORs) for differences in adult outcomes between cases and controls were extracted as the main summary statistic for dichotomous outcomes. For continuous outcomes, Cohen's d was used as the summary statistic.

For dichotomous outcome variables, where ORs were not given in text, they were calculated from (in order of preference where available): (1) risk ratios and outcome prevalence in the control group; or (2) 2 × 2 frequency tables.

For continuous outcome variables, where Cohen's d was not given in text, it was calculated from (in order of preference where available): (1) means, SDs, and sample size; (2) correlation coefficients and sample size; (3) t test t value and sample size; or (4) t test P value and sample size.

We used the Campbell Collaboration effect size calculator for conversions (http://www.campbellcollaboration. org/resources/effect_size_input.php). Where nonsignificant differences were reported but insufficient information was available to calculate ORs, ORs were conservatively set as equal to 1 (assuming total equivalence between cases and controls). If significant differences were reported but ORs were unavailable, ORs were calculated at

the smallest significant value ($P < .05$). In cases where health condition was divided by level of severity, groups were collapsed to form a single group with the condition. In some studies, multiple groups with different conditions were compared with a single control group. In such cases, ORs were calculated based on half of the total control group sample size for each analysis to avoid double-counting of participants. This is a standard method for avoiding double-counting[13] that has been applied in previous meta-analyses.[17–19] Where multiple papers reported the same or similar analyses based on the same sample, the analyses with the largest sample size was reported. Finally, where comparable analyses were conducted at >1 follow-up time, the longest follow-up time was preferred.

Because of heterogeneity of outcomes, it was not possible to conduct a single meta-analysis across all analyses in the included studies. Where ≥ 3 studies were identified with comparable outcome measures, a meta-analysis was conducted.

Analyses were conducted in Stata 12.[20] We used random-effects modeling to compute pooled effect sizes and confidence intervals. Subgroup analyses were conducted to compare pooled effect sizes across physical and mental health conditions. These were omitted in meta-analyses with ≤ 4 analyses across both mental and physical health conditions. We calculated measures of heterogeneity across studies (I^2) for each meta-analysis.

RESULTS

The included studies[21–47] are described in Supplemental Table 2. Mean age during adolescence ranged from 10.5 to 18 years. The unweighted mean age across studies was 14.6 years (SD 2.7). At adult follow-up, mean age within studies ranged from 18.5 to 35, with an unweighted mean of 23.1 (SD 3.4).

More than half of the studies (15/27) were conducted in the United States. New Zealand was the next most represented country, with 4 studies. Two were conducted in France, 2 in Sweden, and 1 each in the UK, Finland, Canada, and China.

Quality assessment suggested that the representativeness of samples was generally adequate and that the nonexposed cohort was drawn from the same community as the exposed cohort. Ascertainment of exposure was performed using validated diagnostic tools or clinical referral in the majority of the studies reported. Nearly all our studies controlled for at least 1 of gender, SES, or ethnicity. Some also controlled for other factors. No studies assessed outcome by using record linkage, instead using self-report measures to assess education and employment outcomes. Quality was mixed regarding attrition rates and appropriate reporting of descriptions of those lost.

The 27 studies incorporated a total of 70 relevant analyses examining the association between adolescent chronic conditions and occupational and educational outcomes (Supplemental Table 4). Sixty-one analyses examined outcomes of mental health problems: 27 analyses examined outcomes of depression (including depressive disorder, major depression, major depressive disorder, or clinical-level depressive symptoms); 13 examined outcomes of conduct disorder (including clinical-level behavioral problems or behavioral disorder); 10 examined attention deficit hyperacticity disorder (ADHD) (including clinical attention problems and hyperactivity-inattention symptoms); 5 examined unspecified psychiatric disorders including psychiatric hospitalization; and 3 analyses each examined outcomes of anorexia nervosa and anxiety disorder. Nine analyses assessed physical health: in 6 the health condition of interest was an unspecified physical chronic

condition, and a further 3 examined outcomes of juvenile idiopathic arthritis.

As shown in Supplemental Table 4, the majority of analyses mapped to 7 adult outcome categories for meta-analysis: secondary school noncompletion, lack of postsecondary education, years of education, unemployment, income, welfare receipt, and unskilled/manual labor. Meta-analyses were conducted in any outcome category for which ≥ 3 analyses were identified. A further 10 analyses assessed a range of other adult outcomes, including age of leaving school, not being currently enrolled in full-time education or training, having ≤ 9 years of education, having no postgraduate degree, highest occupational status (a 4-level continuous variable indicating occupational class ranging from higher-level executive to unskilled employee), and having a family income below the poverty level. These were not included in meta-analyses due to small numbers assessing each outcome.

Across all studies, the great majority of findings (61/70) identified poorer educational and employment outcomes in those with adolescent health problems than in healthy controls; of these, approximately half (28/61) found significant associations between health and subsequent outcomes. Only 6 analyses indicated trends in the opposite direction. Across adolescent mental health conditions, 26 analyses found significant associations between poor health and poorer educational or occupational outcomes, 27 analyses found trends toward poorer outcomes, 5 analyses showed no difference, and 3 analyses found trends toward better outcomes for those with poor adolescent health. For physical health conditions, 2 analyses indicated significantly poorer outcomes associated with poor adolescent health, 4 indicated trends in that direction, and 3 suggested trends in the opposite direction.

Forest plots of meta-analyses undertaken in the 7 adult outcome

categories are shown in Figs 2, 3, 4, 5, and 6. For each meta-analysis, studies are grouped by diagnosis, and pooled summary statistics are shown for mental health conditions, physical health conditions, and all health conditions.

Three meta-analyses concerned completion or participation in education. The largest overall effects of health on educational and employment outcomes were found for secondary school completion (Fig 2), with a significant pooled OR across all studies of 2.1 for risk of not completing secondary school due to poor health in adolescence. However, this association was found only for

mental health conditions (pooled OR 2.4), with no associations found in either of the 2 physical health analyses. Within mental health conditions, there was evidence that depressive disorders, ADHD, and conduct disorders were associated with not completing secondary school.

Meta-analysis of effects on participation in postsecondary education (including any postsecondary education or qualification) (Fig 3A) again identified a significant overall pooled greater risk across all health conditions for not participating in postsecondary education (OR 1.5),

but significant associations were found only within mental health (pooled OR 1.6). This association was seen in studies of depressive disorders, ADHD, anxiety disorders, and conduct disorders. In contrast, the final meta-analysis of educational outcomes (Fig 3B) found no association of either physical or mental health conditions with total number of years of education (Cohen's *d* 0.03), although the number of studies was small (*n* = 4). Heterogeneity was 0% in this analysis, with all included studies consistently showing no association.

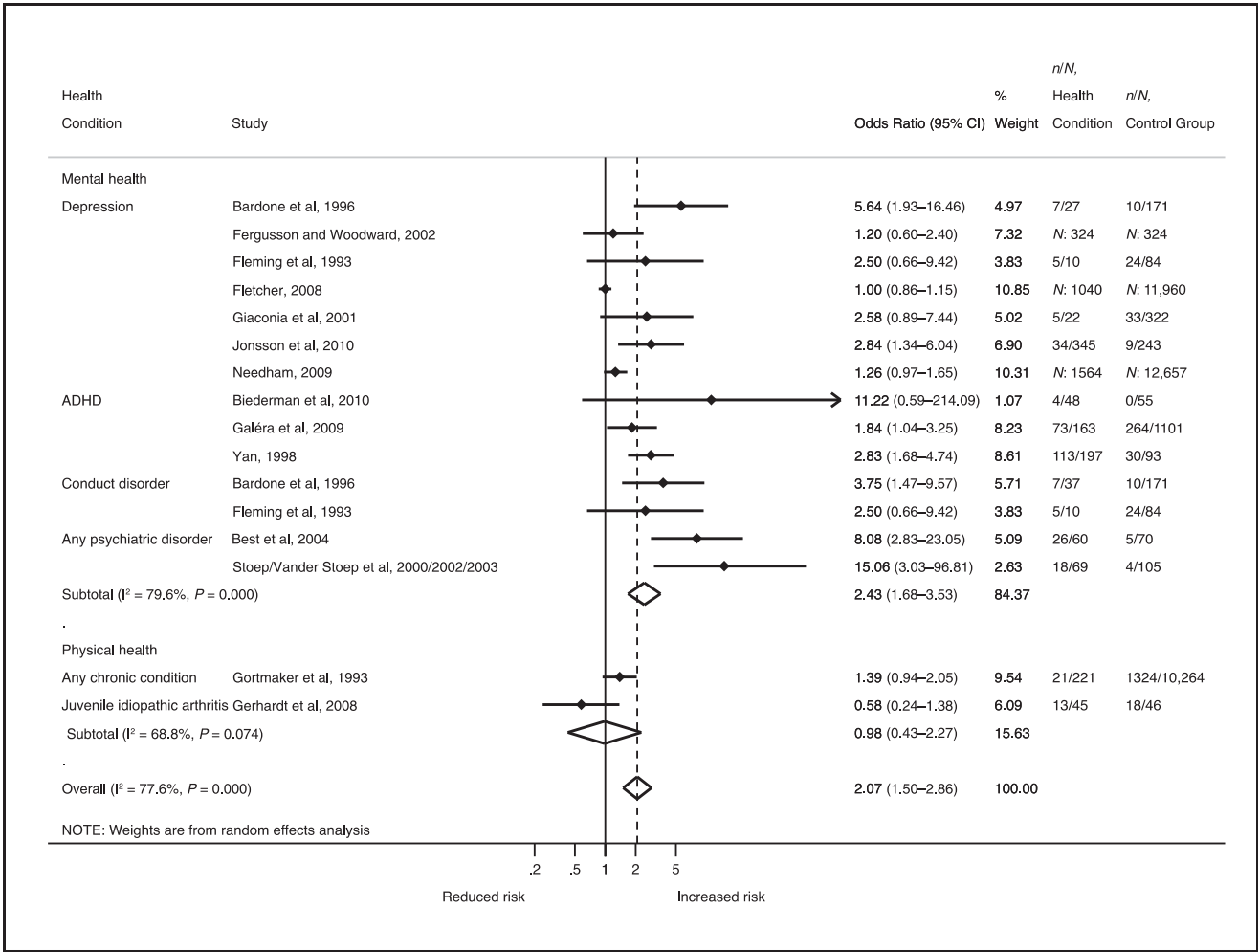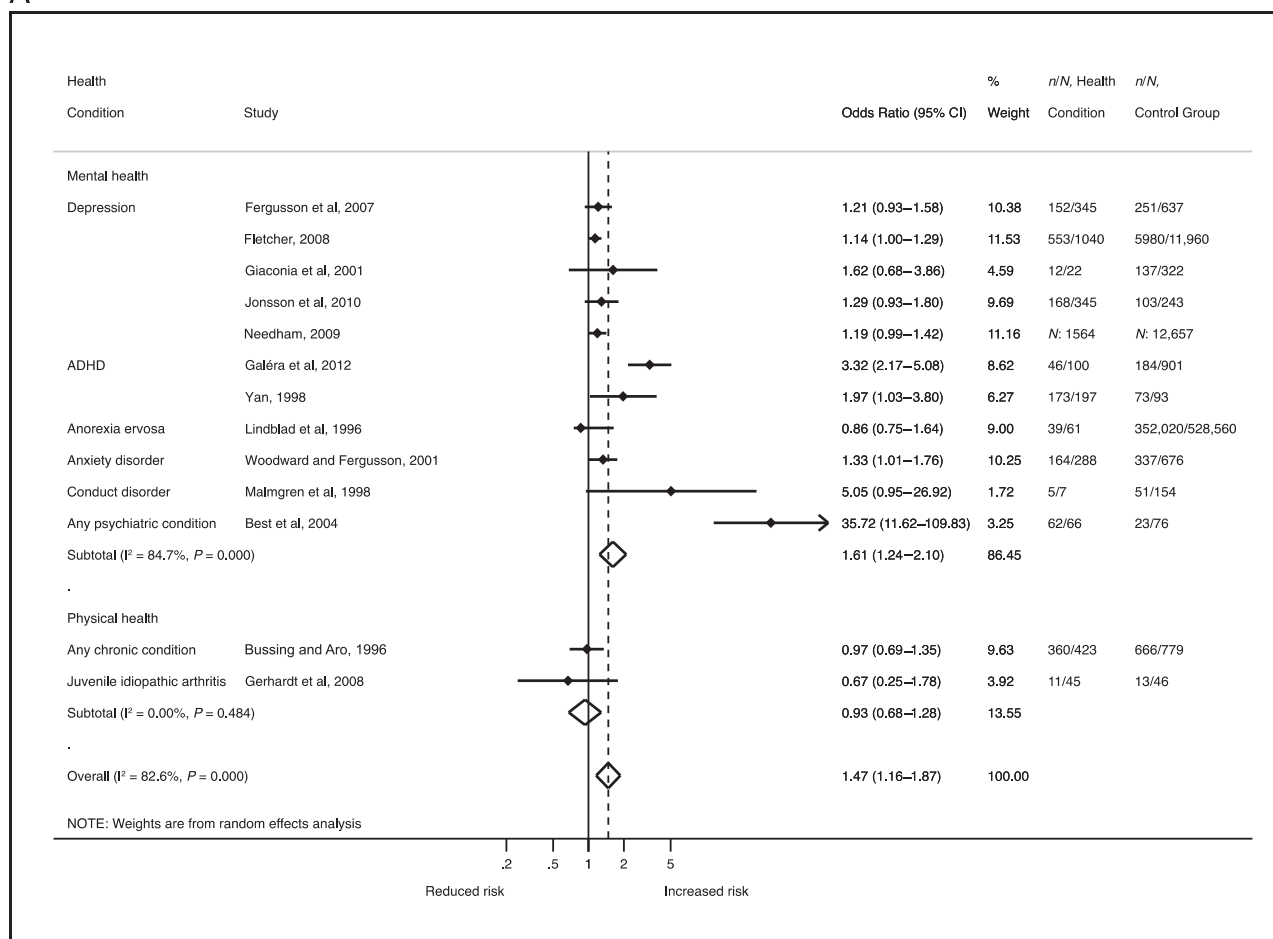Four meta-analyses addressed occupational outcomes. Being

FIGURE 2
Forest plot showing ORs of not completing secondary school for those with a chronic condition in adolescence in individual studies and overall with subtotals for mental and physical health. *n/N*, incidence of outcome and total subpopulation sample size, where available.

HALE et al

Health Condition	Study	Odds Ratio (95% CI)	% Weight	n/N, Health Condition	n/N, Control Group
Mental health					
Depression	Fergusson et al, 2007	1.21 (0.93–1.58)	10.38	152/345	251/637
	Fletcher, 2008	1.14 (1.00–1.29)	11.53	553/1040	5980/11,960
	Giaconia et al, 2001	1.62 (0.68–3.86)	4.59	12/22	137/322
	Jonsson et al, 2010	1.29 (0.93–1.80)	9.69	168/345	103/243
	Needham, 2009	1.19 (0.99–1.42)	11.16	N: 1564	N: 12,657
ADHD	Galéra et al, 2012	3.32 (2.17–5.08)	8.62	46/100	184/901
	Yan, 1998	1.97 (1.03–3.80)	6.27	173/197	73/93
Anorexia ervosa	Lindblad et al, 1996	0.86 (0.75–1.64)	9.00	39/61	352,020/528,560
Anxiety disorder	Woodward and Fergusson, 2001	1.33 (1.01–1.76)	10.25	164/288	337/676
Conduct disorder	Malmgren et al, 1998	5.05 (0.95–26.92)	1.72	5/7	51/154
Any psychiatric condition	Best et al, 2004	35.72 (11.62–109.83)	3.25	62/66	23/76
Subtotal ($I^2 = 84.7\%$, $P = 0.000$)		1.61 (1.24–2.10)	86.45		
.					
Physical health					
Any chronic condition	Bussing and Aro, 1996	0.97 (0.69–1.35)	9.63	360/423	666/779
Juvenile idiopathic arthritis	Gerhardt et al, 2008	0.67 (0.25–1.78)	3.92	11/45	13/46
Subtotal ($I^2 = 0.00\%$, $P = 0.484$)		0.93 (0.68–1.28)	13.55		
.					
Overall ($I^2 = 82.6\%$, $P = 0.000$)		1.47 (1.16–1.87)	100.00		

NOTE: Weights are from random effects analysis

.2   .5   1   2   5
Reduced risk   Increased risk

Health Condition	Study	Cohen's d (95% CI)	% Weight	Health Condition Descriptives	Control Group Descriptives
Mental health					
Depression	Fletcher, 2010	0.00 (−0.08 – 0.08)	59.13	N: 192	N: 2208
	Lewinsohn et al, 2003	0.10 (−0.05 – 0.25)	16.82	N: 319	N: 324
ADHD	Yan, 1998	0.00 (−0.25 – 0.25)	6.05	N: 197	N: 93
.					
Physical health					
Chronic physical condition	Gortmaker et al, 1993	0.06 (−0.28 – 0.21)	18.00	M: 12.6; N: 187	M: 12.7; N: 8688
.					
Overall ($I^2 = 0.0\%$, $P = 0.661$)		0.03 (−0.03 – 0.09)	100.00		

NOTE: Weights are from random effects analysis

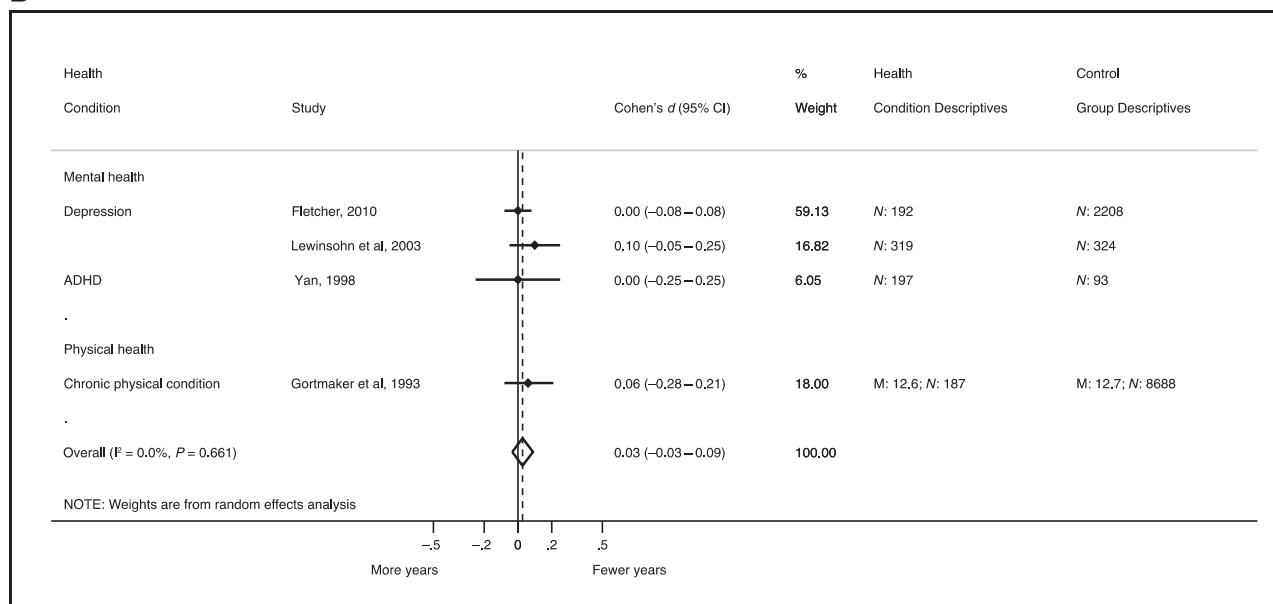−.5   −.2   0   .2   .5
More years   Fewer years

FIGURE 3
Forest plot showing ORs for not undertaking postsecondary education (A) and Cohen's d for total years of education (B) for those with a chronic condition in adolescence in individual studies and overall with subtotals for mental and physical health. n/N, incidence of outcome and total subpopulation sample sizes, where available. N, mean, and SD are presented in B, for both the chronic condition group and control group, where available.
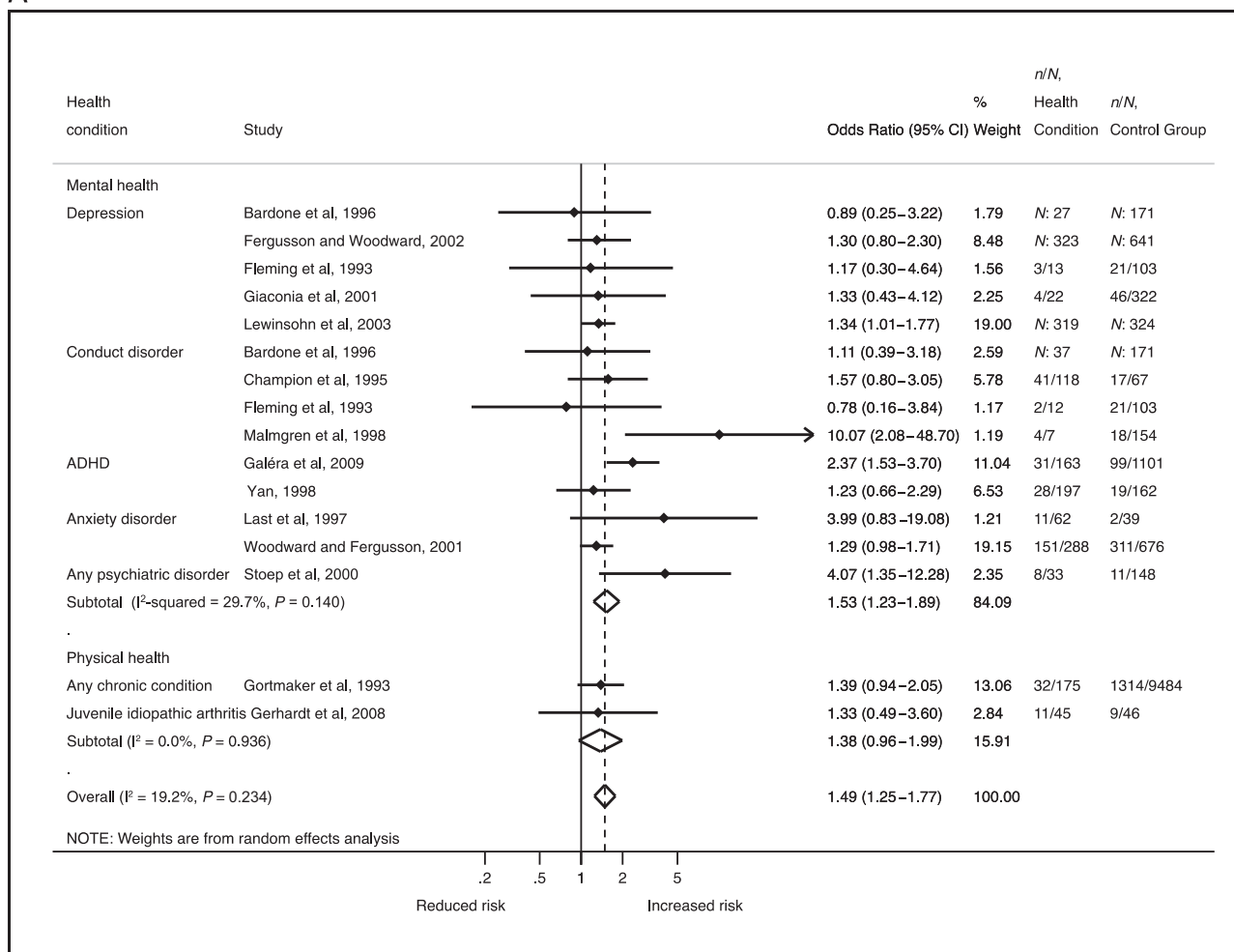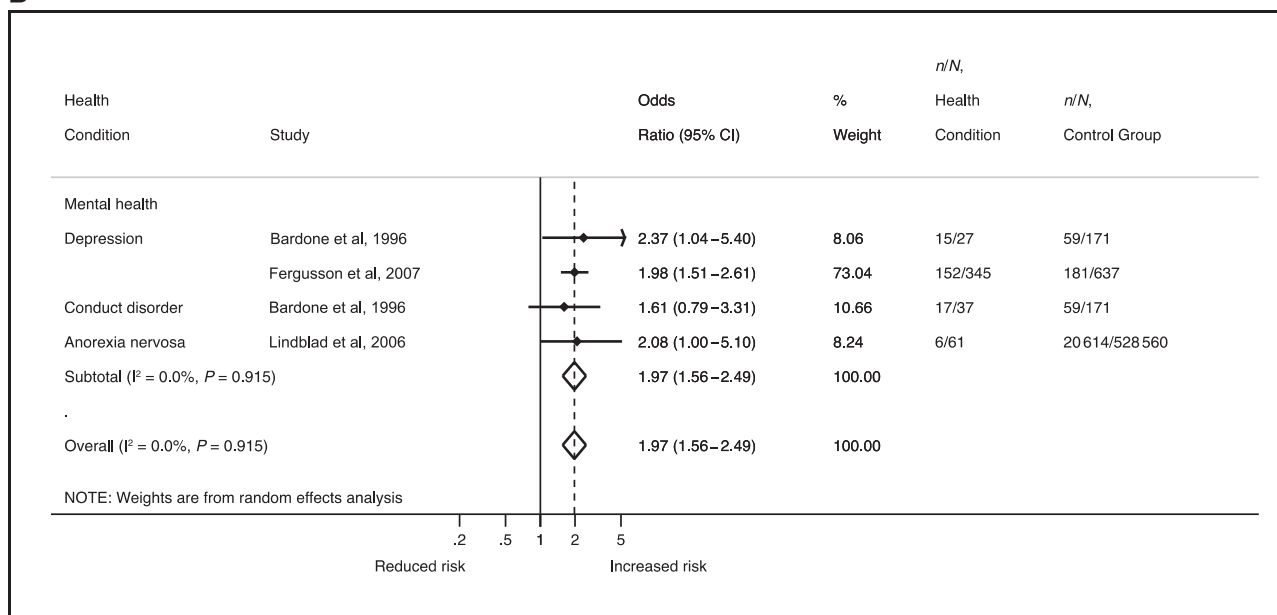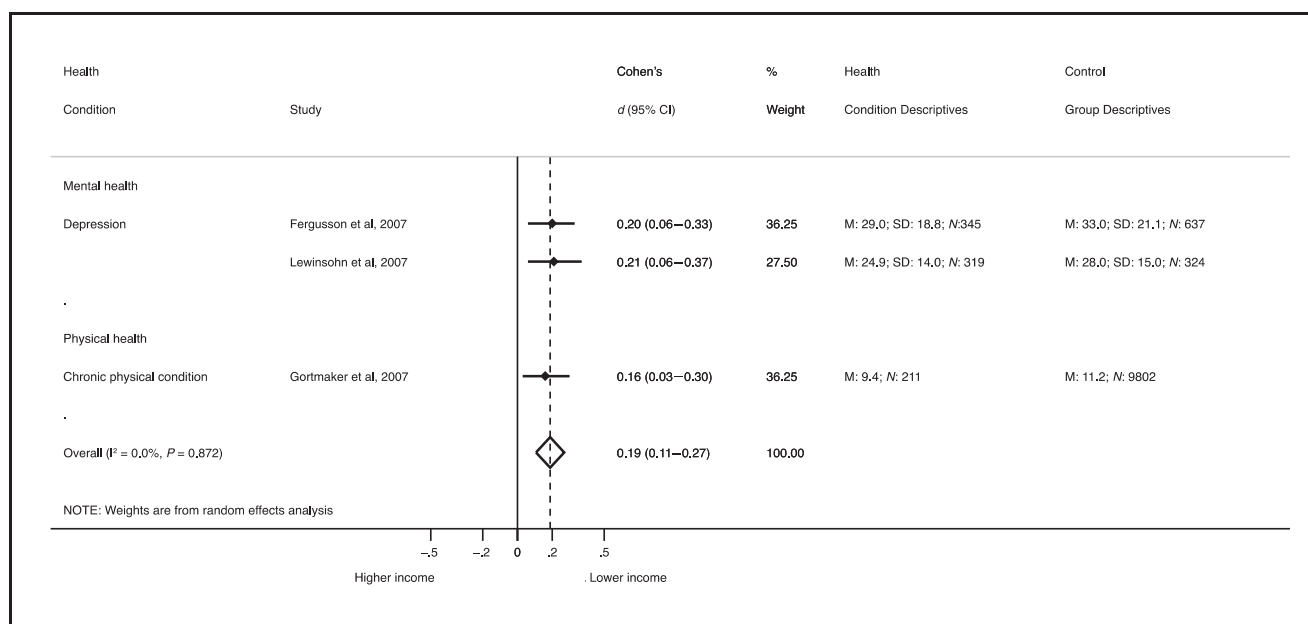
FIGURE 4
Forest plot showing ORs for unemployment (A) and welfare receipt (PB) for those with a chronic condition in adolescence in individual studies and overall, with subtotals for mental and physical health. *n/N*, incidence of outcome and total subpopulation sample sizes, where available.

FIGURE 5
Forest plot showing Cohen's *d* for income for those with a chronic condition in adolescence in individual studies and overall. *N*, mean, and SD (per thousand units of income) are presented for both the chronic condition group and control group, where available.

unemployed (Fig 4A) was significantly associated with all health conditions (pooled OR 1.5) and mental health conditions (OR 1.5), but fell just short of significance for physical health conditions. Analysis of

the association of welfare receipt with adolescent health included only 4 mental health studies but found a significantly increased risk for those with adolescent mental health conditions (OR 2) with zero heterogeneity (Fig 4B).

For adult income (Fig 5), both physical and mental health conditions were significantly associated with lower income (Cohen's *d* 0.2), although this is based on a very small sample of 3 studies.
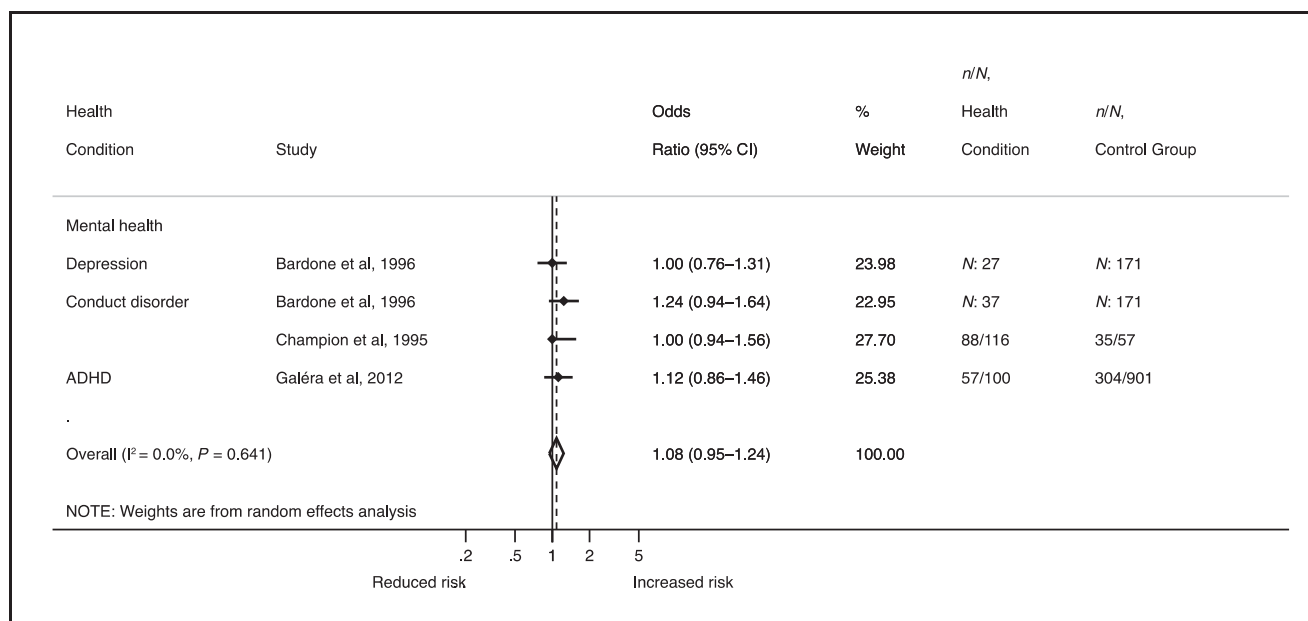

FIGURE 6
Forest plot showing ORs for manual/unskilled occupation in adulthood for those with a mental health condition in adolescence in individual studies and overall. No studies were identified examining physical health conditions. *n/N*, incidence of outcome and total subpopulation sample sizes, where available.

Meta-analysis of risk of being in an unskilled or manual occupation related to adolescent health again contained only 4 mental health studies (Fig 6), which identified no increased risk of low occupational status related to adolescent mental health.

Ten analyses were excluded from meta-analysis because there were <3 analyses for each adult outcome, and are shown graphically in Supplemental Fig 7. Two analyses examined age of leaving secondary school, and both found that young people with mental health problems left school at an earlier age than healthy controls.

Two analyses examined whether young people sat a university bursaries exam, an indicator of academic achievement and planning to continue in further education, formerly an aspect of the New Zealand education system (discontinued in 2004), and found that adolescents with conduct disorder were less likely to sit these exams. Two analyses examined whether young adults were currently enrolled in full-time education or training and found that those with adolescent conduct disorder were less likely to be in education than healthy controls. No differences were found for those with adolescent depression.

One analysis each examined participating in ≤9 years of education, possessing a postgraduate degree, highest occupational status, and whether family income was below the poverty threshold. Young people with mental health disorders were more likely to not have a postgraduate degree than healthy controls, and those with chronic physical health problems were more likely to have adult income below the poverty line. No significant differences were found for highest occupational status and participating in ≤9 years of education.

DISCUSSION

We found strong evidence that poor adolescent health is linked with poorer subsequent academic and vocational outcomes. Across studies, adolescents with chronic conditions were significantly less likely to complete secondary school and undertake or complete postsecondary education. They were more likely to be unemployed and receive welfare, and their adult earnings were significantly less than those of comparable healthy peers. Meta-analyses for both unskilled labor and total years of education showed nonsignificant trends that suggested further disadvantages for adolescents with chronic health conditions. These overall findings mask differences between outcomes for physical health conditions and mental health conditions. The above associations were largely driven by mental health conditions. For physical health conditions, there was substantially less evidence to draw on. Although there were trends toward disadvantages in this group for many outcomes, only 2 analyses showed significant differences from controls, for adult income and for income below the poverty line.

The longitudinal data presented in this work suggest a causal process, with adolescent mental health contributing to increasing risk of poor educational and employment outcomes. However, the causal mechanisms remain unclear. A portion of the association is likely attributable to sociodemographic confounding variables such as parental education, unemployment or poverty, single-parent families, or area-level deprivation, though many included studies that controlled for such variables found significant associations nonetheless. A number of mechanisms may account for the associations. Poor health often results in school absences,[48] which could affect academic attainment and subsequent opportunities for achievement and occupational advancement. Furthermore, poor health may tax limited resources, resulting in insufficient time and energy devoted to school and work, and may cause stress both in adolescents and their families. Physical and mental health may be associated with social isolation and exclusion,[49,50] which themselves are associated with lower attainment and poor employment outcomes.[51,52]

Several potential causal mechanisms are predominantly applicable to the association between mental health and poor outcomes and may account for differences in outcomes when comparing physical conditions to mental health conditions. Several mental health conditions, including conduct disorder and ADHD, may be associated with deficits in academic ability or related skills such as verbal abilities.[53–56] Evidence of similar associations are less robust for physical health.[57] Poor mental health may also result in detriments to other cognitive abilities, which would indirectly contribute to lower academic attainment, poor work performance, and difficulty finding employment such as poor motivation, attention skills, problem-solving, and executive function.[32,58,59]

Mental health may also be associated with poorer outcomes owing to associated behavioral problems. A clear example is conduct disorder, which is defined based on behavioral issues, some of which may negatively affect attainment. Conduct disorder is associated with increased risk for expulsion and suspension.[33] Substance use and abuse may also serve as a key mechanism, with strong associations with depression and anxiety disorders,[60] conduct disorder,[22] and other mental health conditions.[61]

Implications

The results attest to the relevance of health, particularly mental health, in the promotion of academic attainment and employment. Investment in health, beyond the intrinsic benefit of better population-level health, is a way of improving life

chances.[62] The proportion of failure to complete secondary school attributable to mental health conditions is estimated at almost 50%.[44] Considering the costs associated with low educational attainment, secondary school noncompletion, unemployment, and underemployment, the large contribution of child and adolescent chronic conditions to these outcomes is of substantial policy relevance.

Links between adolescent health and subsequent outcomes may also partially account for the intergenerational transfer of health inequalities. Children from lower SES backgrounds are at increased risk for mental and physical health problems[1] which, in turn, are associated with poor education and employment outcomes. Such outcomes themselves contribute to deteriorating health, resulting in a vicious, intergenerational cycle of poor health, low education, and poor employment outcomes.

Our findings support a role for graduated universalism in health-related interventions to improve educational attainments, adult life chances, and productivity. Whereas there is evidence that universal interventions such as health-promoting schools can improve educational outcomes,[63] the data presented here suggest that identification and targeting those with health problems in adolescence may improve life chances in adulthood.

Strengths and Limitations

We included longitudinal studies examining a wide range of chronic conditions and outcomes. The risk of bias within studies was generally low, bolstering the reliability of the findings.

Our data are subject to a number of limitations. We identified relatively few studies examining the long-term outcomes for physical health conditions. The weaker evidence base (compared with mental health

conditions) makes it difficult to draw clear conclusions. Furthermore, across both mental and physical health conditions, it is likely that different diagnoses carry differential risks for poor outcomes. The literature is not sufficiently broad to cover a full range of mental and physical health conditions, making comparisons across conditions difficult. Relatedly, no indication for the severity of health deficiencies was available within the studies. Undoubtedly, increased severity is associated with particularly poor outcomes. This is particularly relevant to included studies focusing on unspecified physical health conditions. Some of these conditions, such as allergies, are unlikely of sufficient severity to substantially disrupt education and employment pathways, especially with appropriate treatment.[25]

Across studies, age and follow-up times varied substantially. This variation likely resulted in some of the heterogeneity in effect sizes seen in meta-analyses. Limiting inclusion to a smaller age range or specific length of follow-up would have resulted in a very small number of eligible studies.

Our analyses were not able to fully account for sociodemographic factors such as social class/position or gender, which are likely to be associated with chronic conditions as well as adult outcomes, and thus may have confounded findings. Metaregression to take account of such factors was not possible due to heterogeneity in measurement. However, we note that the majority of included studies presented findings adjusted for SES.

Although we included only longitudinal studies, defining the exact mechanisms that characterize causal pathways remains difficult. There is undoubtedly a complex and likely bidirectional association between health and education and employment outcomes. For example, poor academic attainment may lead

to stress, anxiety, or low self-esteem[64] which could cause or contribute to health problems, which themselves are detrimental to educational outcomes. The associations we observed here may in part be due to associations established earlier in childhood; for example, health problems in childhood may have already impaired educational attainments. However, it is important to note that the great majority of mental health disorders studied here arise predominantly in adolescence, aside from conduct disorder.[65]

The generalizability of the findings is compromised by the large proportion (more than half) of studies conducted in the United States. Country-level factors such as healthcare quality and access, mental health–related social stigma, disability discrimination policies, and school policies regarding access to education may influence the magnitude of association between health in adolescence and subsequent social outcomes. The fact that American studies are overrepresented may influence the magnitude of associations found in our review; however, there is little cause to question the direction of the findings. No differences in the strength of associations are apparent when comparing American and non-American studies within the review.

We evaluated the risk of bias within studies using a validated quality assessment tool. The quality of the evaluated study components was generally good, although all included studies were penalized for not assessing outcomes through record linkage or administrative data. This limitation, we argue, is largely an artifact of the quality assessment scale; using administrative data is advantageous in assessing health outcomes, but less important for the valid assessment of social outcomes. We are aware of no evidence that self-report is not adequate for these purposes, and it is evidently the norm in the literature.

This raises the limitation that the NOS is a generic measure of study quality and may not, in some cases, be specifically attuned to relevant aspects of quality for the current review. Furthermore, the rating system evaluates the quality of the presentation of the findings rather than the quality of the study per se, though these are related (a limitation that is equally applicable to other quality assessment scales). Poor quality rankings may reflect inadequate reporting rather than poor-quality research, and in some cases, multiple reports of the same study receive different quality rankings. Therefore, indications of bias are likely overstated. The NOS, despite the endorsement of the Cochrane Collaboration, has been subject to other criticism, specifically in terms of its validity.[66]

CONCLUSIONS

Health is a key contributor to educational attainment and later economic productivity, and poor health in adolescence can disrupt educational trajectories and later life chances. This is particularly true for adolescents who suffer from a mental health condition, who are at significant risk of secondary school noncompletion, not entering postsecondary education, unemployment, welfare receipt, and low income in adult life. Health appears to be both contributor to and outcome of low SES. Better recognition is needed that health is part of the core business of schools, ie, to boost attainments and productivity. Universal approaches to improving health and well-being in schools have been shown to boost attainments.[63] Further work is needed to evaluate identification of and targeted early intervention for young people with mental health and other problems in schools.

ACKNOWLEDGMENTS

ABBREVIATIONS

ADHD: attention deficit hyperactivity disorder
NOS: Newcastle-Ottawa scale
OR: odds ratio
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses
SES: socioeconomic status

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