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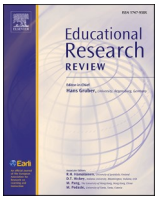

Review

Adolescent psychosocial factors and participation in education and employment in young adulthood: A systematic review and meta-analyses

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ABSTRACT

Adolescence is a critical period for successful transition into adulthood. This systematic review of empirical longitudinal evidence investigated the associations between adolescent psychosocial factors and education and employment status in young adulthood. Five electronic databases (MEDLINE, PsycINFO, CINAHL, ASSIA and ERIC) were searched. Meta-analysis was conducted by using odds ratios (OR) as our common effect size; a narrative synthesis of results was also completed. Of the 8970 references screened, 14 articles were included and mapped into seven domains, namely, behavioral problems, peer problems, substance use, prosocial skills, self-evaluations, aspirations and physical activity. The results showed that behavioral problems (overall OR: 1.48; 95% CI: 1.26–1.74) and peer problems (overall OR_{adj}: 1.27; 95% CI: 1.02–1.57) were significantly associated with being out of education, employment and training (NEET) as young adults. Prosocial skills did not present a significant association (overall OR: 1.03; 95% CI: 0.92–1.15). Other domains were narratively synthesized. The role of substance use was less clear. Only a few studies were available for self-evaluations, aspirations and physical activity domains. Implications for research and practice are discussed.

1. Introduction

Participation in employment and education is highlighted as key to successful transition into adulthood. Emerging adulthood, proposed by Arnett (2000), is a stage of life occurring between the ages of 18 and 25 and this transition stage is marked by exploration of possible life directions and greatly influenced by social factors such as education and employment opportunities (Gutiérrez-García et al., 2018). When looking at the education and employment status of young adults, they are either "in school and/or work" or "not in education, employment or training" (NEET). The acronym NEET was first used in the UK in 1999, and although current policy is to focus on supporting all young people transition to *positive destinations* (Scottish Government, 2016) rather than negatively labelling those who do not, NEET is still used worldwide to describe young people who are struggling to navigate a successful transition (Hutchinson & Kettlewell, 2015; Social Exclusion Unit, 1999). According to International Labor Organization, an estimated 21.8% of

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young people are NEET worldwide (International Labour Organization, 2017). Since the 2008 financial crisis, there has been a steady growth in the NEET rate of 18–25 year olds in the UK as well as an increasing policy attention (Hutchinson et al., 2016; Mendolia & Walker, 2015).

Time spent outside the worlds of work and education as young adults can have negative outcomes including poor mental and physical health, long-term unemployment, low wages and social exclusion (Powell, 2018; Sveinsdottir et al., 2018). Economic inactivity has consequences for individuals throughout their life course as well as for their families and wider society. Economic costs of poor education and unemployment at the end of compulsory schooling is extremely high, estimating the weekly costs of 20–24 year olds who are NEET to be £26-£133 m per week in lost productivity (Allen, 2014). Hence, identification of factors associated with problematic transitions is of crucial importance both from an individual and societal perspective.

Adolescence is a critical period that sets the stage for later life and determine life-course outcomes (Macmillan & Hagan, 2004). Studies have shown that mental disorders and other problems in adolescence are negatively associated with labor market participation later in life (Ose & Jensen, 2017). Factors associated with being out of education and work include poor mental health, low educational attainment, lower socioeconomic status, young parenthood and disadvantaged family background and neighborhoods (Allen, 2014; Dorsett & Lucchino, 2014; Karyda & Jenkins, 2018). Adolescent mental health problems such as depression and anxiety are associated with poorer education and employment outcomes including being NEET (Baggio et al., 2015; Cornaglia et al., 2015; Egan et al., 2015; Hale & Viner, 2018; Rodwell et al., 2018; Veldman et al., 2015; Witt et al., 2019). Two systematic reviews are available: one showing the stronger association of poor mental health compared to poor physical health (Hale et al., 2015); and the other showing the negative association of adolescent depression on education and employment outcomes in adulthood (Clayborne et al., 2019). These demonstrate the increasing attention given in the literature to the crucial importance of mental health in shaping educational and economic trajectories of young people.

Besides mental disorders and background characteristics, there are various psychosocial challenges during adolescence (e.g. substance use, bullying and delinquency) that have strong associations with education and employment outcomes (Karakus et al., 2012; Macmillan & Hagan, 2004; Mcgee et al., 2011; Moore et al., 2015; Patton et al., 2007; Wiesner et al., 2003). It is important to gain insight into such factors associated with education and employment status of young adults which would lead to a better understanding of the etiology of negative pathways and help prevent youth from undesired destinations after compulsory schooling. To date, there has been no systematic examination and synthesis of the evidence to document the impact of psychosocial factors in adolescence on later education and employment status of young adults. Therefore, our objective was to investigate the associations between adolescent psychosocial factors and education and employment status in young adulthood. The following research question was operationalized based on this research objective:

- What and to what extent psychosocial factors in adolescence between the ages 10 and 19 are associated with participation in education and employment in young adulthood between the ages 18 and 25?

2. Method

Methodology and reporting for this systematic review are consistent with the PRISMA statement (Moher et al., 2009). A PRISMA checklist is provided in Appendix A. A protocol has been published in the International Prospective Register of Systematic Reviews (PROSPERO; reference no: CRD42019159918).

2.1. Search strategy and selection criteria

We conducted a comprehensive search of the literature in five electronic databases: MEDLINE, PsycINFO, CINAHL, ASSIA and ERIC. These databases were selected as they are the main databases in the fields of health sciences, psychology, social sciences and education research. Databases were searched using a comparable search strategy, with adapted index terms for each database. The search strategy was reviewed and approved by two senior librarians. A sample search strategy used in MEDLINE is provided in Appendix B. We also scanned reference lists and citing of eligible articles to supplement database searches. Filters were set to only include peer-reviewed articles in English and published from 1999 to 2019. We chose this date range because young people out of education and employment have caught increasing research attention after the aforementioned report published by the Social Exclusion Unit in 1999 which also coined the term NEET, leading to its use in the global literature (Social Exclusion Unit, 1999).

We defined "Psychosocial" as the intersection and interaction of social, cultural and environmental influences on the mind and behavior (American Psychological Association, 2019a,b). We used this definition, rather than an a priori list of variables, in order to avoid excluding relevant research. It is common to see the term *psychosocial* limited to a couple of factors by researchers due to its inclusive nature which makes it difficult to grasp its entire extent. Considering the complexity of the relationship between psychosocial aptitudes and young people's trajectories, we wanted to be as inclusive as possible in our search to cover a wider literature. We aimed to identify associated psychosocial factors from the literature instead of searching the literature with only a few psychosocial factors targeted. In order to achieve this, we created a search string with appropriate MeSH or subject headings and keywords in the title and abstract. A list of 24 psychosocial terms based on the definition were designed to cover a broad spectrum of psychosocial factors. A similar search strategy approach was used in a recent systematic review (Rogers & Rennoldson, 2020).

We included articles that examined participation in education and employment in young adulthood. We expected studies to consider both aspects. This is because education combined with employment status is a better outcome measure to represent this population's productivity status and future trajectory toward economic success (Roldos, 2014). Since the outcome can be expressed in

different ways (e.g. “studying and working”, “in education or work”, “NEET”, “productivity status”), we wanted to review all relevant articles; hence, we did not specify it to a single label such as NEET and preferred to use a comprehensive search strategy. It is also important to emphasize that the included articles reflected the current status of the individuals during the measurement of the outcome.

We included articles that measured psychosocial factors in adolescents aged between 10 and 19 years (inclusive). which is in line with the definition of adolescence put forth by the World Health Organization (World Health Organization, 2017). Young adulthood or *emerging adulthood* is defined as 18–25 years of age (inclusive) which is in line with the definitions of American Psychological Association and Jeffrey Arnett who theorized emerging adulthood as distinct from adulthood (Arnett, 2000; American Psychological Association, 2019a,b). This definition is also consistent with the NEET definition which spans ages 16 to 24 with rates higher for those between 18 and 25 (Arnold & Baker, 2013). We specified a follow-up time of 2 years between adolescent measure and young adult outcome due to the overlap between the defined age ranges. We also considered this as an appropriate interval for any long-term association to be investigated and to allow a clearer determination of developmental patterns allowing young people to make the transition from adolescence into adulthood which is a demanding process with multiple dimensions (Scales et al., 2016).

Furthermore, we only included studies with prospective designs. For an exposure to determine the outcome, it must precede the latter. In prospective studies, the outcome has not occurred when the study starts, and participants are followed up over a period of time to determine the occurrence of outcomes (Ranganathan & Aggarwal, 2018). Similarly, an interventional study is a prospective study since the investigator determines the exposure for each study participant and then follows them to observe outcomes (Ranganathan & Aggarwal, 2018). Therefore, we included both in the protocol stage to cover all relevant literature even though no intervention study met the inclusion criteria. On the contrary, in retrospective studies, the outcome of interest has already occurred, and the data are collected either from records or by asking participants to recall exposures (Ranganathan & Aggarwal, 2018). Therefore, we excluded retrospective studies since there is no control of retrospective bias. The samples of the studies were limited to community, not selected or special populations such as clinic samples so that results could be generalizable to the general young population. Studies with samples restricted to those out of education in the adolescent measurement were also excluded.

Retrieved articles were exported into a reference manager software, namely, RefWorks and duplicates were removed. Then, titles and abstracts of studies were independently screened by two reviewers to ascertain potential eligibility. Any discrepancies were resolved through discussion between the two reviewers. If unresolved, a third researcher was involved, although this was rarely necessary. The remaining articles were full-text reviewed. References of these studies were then scanned for further relevant source papers.

2.2. Quality assessment

The quality of studies was assessed by two independent reviewers using the Newcastle-Ottawa Scale (Wells et al., 2015). It is a quality assessment tool used for cohort studies and has been identified by the Cochrane Collaboration as one of the two most useful quality assessment tools for nonrandomized studies (Higgins & Green, 2008). It has been frequently used in similar systematic reviews within the fields of social and health sciences (Clayborne et al., 2019; Hale et al., 2015). This checklist uses a star rating system to assess an overall quality and has 8 items grouped into 3 categories as selection, comparability and outcome.

2.3. Data extraction and analysis

Data were extracted from each included article independently by two reviewers using a computerized extraction form. We recorded information regarding study year, sample size, country of provenance, age at exposure and outcome, follow-up duration, assessment measurements, outcome measures, covariates and other relevant statistics. We used odds ratios (ORs) as our common effect size across studies to perform meta-analysis. Most articles reported ORs and it was the most comparable measure for meta-analysis among the studies within the same domain. ORs are probably the most widely used statistic employed in risk factor research and is the predominant index of effect size in case-control studies as well as cross-sectional and cohort study designs (Chen et al., 2010; Szumilas, 2010). Hence, we chose this as our common effect size. Where ORs were not available in the paper, they were calculated from available information (i.e. correlation coefficients) using the R software package (R Core Team, 2017). Despite its common and increasing usage, it is important to understand the meaning and interpretation of odds ratio since the difficulty of interpreting the ORs has troubled many clinical researchers and epidemiologists for a long time (Chen et al., 2010). An odds ratio is a measure of association between an exposure and an outcome. The odds ratio represents the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure (Szumilas, 2010). As logistic regression becomes more popular, ORs are increasingly utilized in epidemiological studies (Chen et al., 2010). When a logistic regression is calculated, the exponential function of the regression coefficient is the odds ratio associated with a one-unit increase in the exposure (Szumilas, 2010). Odds ratios are used to compare the relative odds of the occurrence of the outcome of interest, given exposure to the variable of interest (Szumilas, 2010).

$OR = 1$ Exposure does not affect odds of outcome
$OR > 1$ Exposure associated with higher odds of outcome
$OR < 1$ Exposure associated with lower odds of outcome

In order to interpret the size of the odds ratios, Chen et al. (2010) proposed a new method for interpreting the size of the ORs by relating it to differences in a normal standard deviate calculated from the respective probabilities being compared. They showed that

OR = 1.68, 3.47, and 6.71 are equivalent to Cohen's d = 0.2 (small), 0.5 (medium), and 0.8 (large), respectively.

To perform meta-analyses, we mapped studies to type of psychosocial factor studied. Studies mapped into seven domains: behavior problems, peer problems, substance use, prosocial skills, self-evaluations, aspirations, and physical activity. We conducted a meta-analysis where at least three studies reported the same psychosocial factor in relation to the outcome. Using metafor package in R (Viechtbauer, 2010), we performed a random-effects meta-analyses which is preferable over fixed-effects model where there is a significant heterogeneity (Hunter & Schmidt, 2000). As mentioned, interpretation of the magnitude of the odds ratios were as: OR = 1.68, 3.47, and 6.71 are equivalent to Cohen's d = 0.2 (small), 0.5 (medium), and 0.8 (large), respectively (Chen et al., 2010). The *I*-squared (I^2) statistic was used to quantify heterogeneity. Leave-one-out sensitivity analysis was performed to determine the robustness of the meta-analysis. Results that could not be included in a meta-analysis were synthesized narratively.

3. Results

3.1. Search results

A PRISMA flowchart summarizing the article selection process is presented in Fig. 1. The database searches identified 11,153 articles, of which 8970 were title and abstract screened after duplicate removal. Then, 214 were full-text screened. Most common exclusion reasons were either related to outcome or age ranges. The majority of studies focused on educational attainment and did not provide outcomes related to education and employment status. Finally, 14 articles that satisfied the inclusion criteria were retained in the study. The results of 6 studies were included in four meta-analysis and 10 studies were included in narrative synthesis. Some studies investigated more than one psychosocial factor and therefore appear in more than one analysis.

Two articles are included both in qualitative and quantitative synthesis (Meehan et al., 2019; Rodwell et al., 2018).

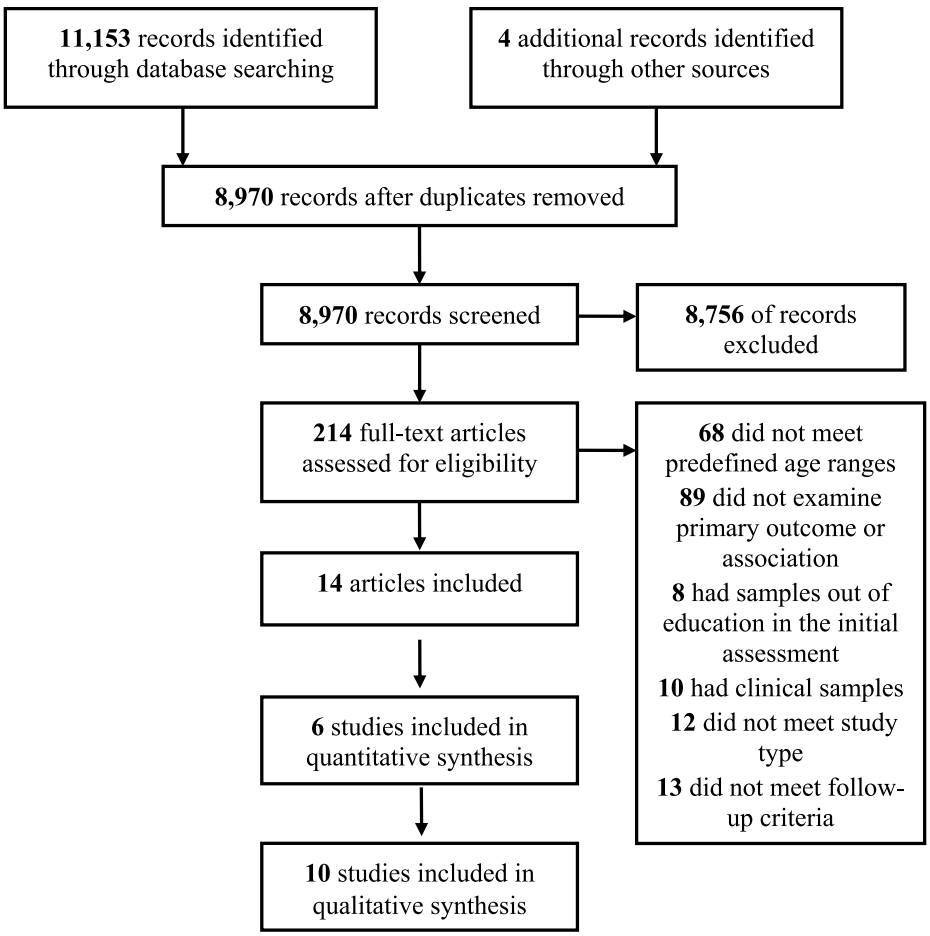

Fig. 1. Prisma diagram of the review process.

Table 1
Results of quality assessment.

Study	Selection	Comparability	Outcome
Meehan et al. (2019)	★★☆☆	★★	☆★★
Bania et al. (2019)	★★★★	★★	★★★
Goldman-Mellor et al. (2016)	★★★☆	★★	☆★★
Moore et al. (2015)	★★☆☆	★★	☆★★
Rodwell et al. (2018)	★★★★	★★	☆★★
Kretschmer et al. (2018)	★★★★	★★	☆★★
Strøm et al. (2013)	★★☆★	★★	★★★
Scholes-Balog et al. (2016)	★★☆★	★★	☆★★
Roldós, 2014	★★☆☆	★★	☆★★
Hakkarainen et al. (2016)	★★☆★	★★	☆★★
Rojewski (1999)	★★☆★	★★	☆★★
Mendolia and Walker (2015)	★★★★	★★	☆★★
Pinquart et al. (2003)	★★☆★	★☆	☆★★
Ryberg (2018)	★★★★	★★	☆★★

Note: Black stars denote meeting relevant quality criterion. Stars awarded for selection if studies met following criteria: 1) representative of average adolescent in community; 2) unexposed adolescents drawn from same community as exposed; 3) exposure ascertainment completed via record linkage or structured interviews; 4) outcomes of interest not present at time of exposure ascertainment (demonstration of samples being drawn from schools). Stars awarded for comparability if studies met following criteria: 1) studies controlled for either sex or baseline socioeconomic status; 2) studies controlled for other factors (e.g. comorbid conditions, ethnicity). Stars awarded for outcome if studies: 1) evaluated outcomes via record linkage or blinded assessment; 2) follow-up time to outcomes adequate (2 years or greater); 3) sufficient number of participants completed follow-up.

3.2. Results of quality assessment

Quality ratings are provided in Table 1. Cumulative star ratings ranged from 6 to 9 out of 9 stars. A higher score reflects greater study quality. Articles were deemed to be of moderate to high quality. Representativeness of samples was generally good and nonexposed cohort was drawn from the same community. Nearly all studies controlled for either sex or socioeconomic status (SES) and almost all of them controlled for other covariates as well. Most studies demonstrated that the outcome of interest was not present at the time of exposure through explicitly stating that the samples were drawn from secondary schools. Even though this was most likely to be the case in other studies since adolescents were in compulsory education due to their age during the study; we did not assign a star for this item if it was not explicit in order to assure robustness. Lastly, follow-up rate and duration were adequate in all included studies.

3.3. Study characteristics

Table 2 gives an overview of the included studies. All included studies were prospective cohort studies. Studies are grouped according to the psychosocial factor measured. Two articles are included both in qualitative and quantitative synthesis (Meehan et al., 2019; Rodwell et al., 2018). Also, one article included two separate studies with independent samples (Kretschmer et al., 2018.

Out of the 14 included articles, five examined the associations of behavior related problems (e.g. delinquent, externalizing or disruptive behavior); five the associations of substance use (five measured cannabis use, three alcohol use and two smoking); four the associations of peer problems; three the associations of prosocial skills; four the associations of self-evaluations (three measured self-esteem; two self-efficacy and two locus of control); two the associations of aspirations and one the associations of physical activity. Sample size in each study ranged from 391 to 11,874. Follow-up duration ranged from 2 years up to 11 years.

3.4. Results of quantitative synthesis

3.4.1. Behavioral problems

Five studies investigated the associations between adolescent behavioral problems and education and employment status in young adulthood (Bania et al., 2019; Hakkarainen et al., 2016; Meehan et al., 2019; Moore et al., 2015; Rodwell et al., 2018). These studies were large cohort studies with nationally representative samples and moderate to high study quality (see Tables 1 and 2). The outcome was specifically NEET status in all of the studies and an overview of the effect sizes is presented in Table 3. Behavior related problems were expressed in various ways such as disruptive, delinquent or externalizing behaviors but measures were similar and related to misbehaving of the adolescent such as lying, different ways of rule-breaking, aggressiveness and interpersonal conflict. In fact, two studies used the same tool, namely, Youth Self Report, to measure behavioral difficulties (Hakkarainen et al., 2016; Moore et al., 2015) (see Table 2 and Table 3).

All studies showed that behavioral problems in adolescence increased the risk of being NEET in young adulthood for both sexes (Bania et al., 2019; Hakkarainen et al., 2016; Meehan et al., 2019; Moore et al., 2015; Rodwell et al., 2018). Potential confounders were considered in the studies with complex models and the association was significant for both sexes in three studies (Hakkarainen et al., 2016; Moore et al., 2015; Rodwell et al., 2018), remained significant only for males in one study (Bania et al., 2019) and disappeared in another study (Meehan et al., 2019). However, in the study conducted by Moore et al. (2015) the association was only true for being

Table 2
Main characteristics of included studies.

Psychosocial factor(s) studied	Main Author	Year	Location	Sample Size	Measure of psychosocial factor	Outcome(s)	Age at adolescent measurement	Age at outcome	Follow-up duration	Covariates[c]
Behavioral problems	Bania	2019	Norway	3987	S[a]rengths and Difficulties Questionnaire-subscale	NEET[a]	15–16	23–25	8–9 years	Ethnicity, residency, parental SES
Behavioral problems	Moore	2015	Australia	1003	Youth Self Report subscale	NEET	14	20	6 years	Noncompletion of secondary school, perceptual reasoning, SES, sex, verbal ability
Behavioral problems	Rodwell	2018	Australia	1938	Nine items adapted from the Moffitt and Silva self-report early delinquency scale	NEET	15–17	20–25	5–8 years	Sex, school location, parental education, parental divorce or separation, sex, wave at which outcome was measured
Behavioral problems	Meehan	2019	UK	3077	Self-report items from the Edinburgh Study of Youth Transitions in Crime	NEE[e]	13–18	20	2–7 years	Childhood adversity and intelligence
Behavioral problems	Hakkarainen	2016	Finland	597[e]	Youth Self Report subscale	NEET	16	21	5 years	SES, sex, educational track
Peer problems	Bania	2019	Norway	3987	Strengths and Difficulties Questionnaire-subscale	NEET	15–16	23–25	8–9 years	Ethnicity, residency, parental SES
Peer problems	Moore	2015	Australia	1003	Questionnaire items	NEET	14	20	6 years	Noncompletion of secondary school, perceptual reasoning, SES, sex, verbal ability
Peer problems	Kretschmer	2017	Netherlands	497 for RADAR study 2230 for TRIALS study	TRIALS: one item from Youth Self Report, one item from Early Adolescent Temperament Questionnaire RADAR: Self-report of Aggression and Social Behaviour Questionnaire	In education or work	13 for RADAR and 11 for TRIALS	19 for RADAR and approx. 22 for TRIALS	7 for RADAR and approx. 11 for TRIALS	Family SES, family instability, child intelligence, depression, anxiety, externalizing problems
Peer problems	Strøm	2013	Norway	11,874	Questionnaire item about bullying	Work participation (i.e. NEET)	15	23	8 years	Sex, age, SES, parent education, parents' birthplace, parents' marital status, parental employment, and living situation, completion of high school
Substance use	Meehan	2019	UK	3077	Self report tobacco and ca[b]nabis frequency of use; AUDIT 10 item screening tool for alcohol use	NEET	13–18	20	2–7 years	Childhood adversity and intelligence
Substance use	Goldman-Mellor[b]	2016	UK	2066	Combined substance use-Questionnaire item	NEET	12	18	6 years	Family SES, neighbourhood level SES
Substance use	Rodwell	2018	Australia	1938	Self report frequency of cannabis use; 7-day diary for alcohol use	NEET	15–17	20–25	5–8 years	Sex, school location, parental education, parental divorce or separation, sex, wave at which outcome was measured
Substance use	Roldos	2014	USA	714	Self report frequency of cannabis use	In education or work, "productive"	14–16	18–21	4–5 years	Sex, SES, academic engagement, employment and academic success, religion importance, religion involvement, parenting, affiliation with deviant peers, community crime, perceived discrimination
Substance use		2016	Australia	852			12–19	21	2–9 years	

(*continued on next page*)

Table 2 (*continued*)

Psychosocial factor(s) studied	Main Author	Year	Location	Sample Size	Measure of psychosocial factor	Outcome(s)	Age at adolescent measurement	Age at outcome	Follow-up duration	Covariates[c]
	Scholes-Balog				Self report frequency of cannabis use	Employed Studying				Sex, parent education, school grades at age 12, antisocial behavior at age 12, alcohol, cigarette and cannabis and drug use between ages 12–19.
Prosocial skills	Bania	2019	Norway	3987	Strengths and Difficulties Questionnaire-subscale	NEET	15–16	23–25	8–9 years	Ethnicity, residency, parental SES
Prosocial skills	Hakkarainen	2016	Finland	597[e]	Multisource Assessment of Children's Social Competence Scale-subdimension	NEET	16	21	5 years	SES, sex, educational track
Prosocial skills	Meehan	2019	UK	3077	Strengths and Difficulties Questionnaire-subscale	NEET	13–18	20	2–7 years	Childhood adversity and intelligence
Self-esteem	Ryberg	2018	India	883	Questionnaire items	NEET	11–12	18–19	7 years	Household size, wealth index, sex, caregiver education, urbanicity (rural)-caste (high caste)
Self-esteem	Rojewski	1999	USA	10,737	Self-esteem scale	Not working or studying	17–19	19–21	2 years	Sex, disability status
Self-esteem	Mendolia	2015	UK	9200	Questionnaire items	NEET for 2+ years[d]	15–16	18–20	3–4 years	Birth characteristics, family characeristics, test scores at age 16
Self-efficacy	Pinquart	2003	Germany	391	A likert scale focusing on academic self-efficacy	Unemployed-noncollege bound	12–15	21	6 years	Job aspirations, career-related motivation, vocational congruence, stress
Self-efficacy	Ryberg	2018	India	883	Questionnaire items for generalized self-efficacy	NEET	11–12	18–19	7 years	Household size, wealth index, sex, caregiver education, urbanicity (rural)-caste (high c[d]ste)
Locus of control	Rojewski	1999	USA	10,737	Questionnaire items	Not working or studying	17–19	19–21	2 years	Sex, disability status
Locus of control	Mendolia	2015	UK	9200	Questionnaire items	NEET for 2+ years[d]	15–16	18–20	3–4 years	Birth characteristics, family characeristics, test scores at age 16
Aspirations (Career)	Pinquart	2003	Germany	391	Likert scale	Unemployed-noncollege bound	12–15	21	6 years	Job aspirations, career-related motivation, vo[c]ational congru[a]nce, s[b]ress
Aspirations (Education)	Rojewski	1999	USA	10,737	Questionnaire item	Not working or studying	17–1[d]	19–21	2 years	Sex, disability status
Physical Activity	Meehan	2019	UK	3077	Questionnaire item	NEET	13–18	[e]0	2 years	Childhood adversity and intelligence

[a] : NEET stands for "not in education, employment or training".
[b] : This study uses a twin cohort.
[c] : All covariates included in each study are listed. It does not necessarily refer to the specific association of the psychosocial factor with the outcome presented in this table.
[d] : This outcome indicates the current status of the individual during the outcome measurement based on the follow up duration and age range, therefore is included.
[e] : This is the total sample size of the study. The general school education sample size is 355 and analysis relating to this sample was pooled for meta-analysis.

Table 3
Specific main study effects.

Psychosocial factor(s)	Main author	Follow-up	Predictor measure(s)	Outcome measure (s)	Main study effects
Behavior problems	Bania	8–9 years	Strengths and Difficulties Questionnaire-subscale	NEET	Female: unadjusted OR = 1.19 (95% CI: 1.10–1.28) adjusted OR = 1.06 (95% CI: 0.96–1.17) Male: unadjusted OR = 1.25 (95% CI: 1.17–1.33) adjusted OR = 1.17 (95% CI: 1.07–1.28)
Behavior problems	Moore	6 years	Youth Self Report subscale	NEET	Adjusted OR = 1.28 (95% CI: 0.46–3.50)
Behavior problems	Rodwell	5–8 years	Nine items adapted from the Moffitt and Silva self-report early delinquency scale	NEET	Unadjusted OR = 2.01 (95% CI: 1.46–2.76) adjusted OR = 1.71 (95% CI: 1.15–2.55)
Behavior problems	Meehan	2–7 years	Self-report items from the Edinburgh Study of Youth Transitions	NEET	Correlation coefficient: 0.148 $p < 0.001$
Behavior problems	Hakkarainen	5 years	Youth Self Report subscale	NEET	Correlation coefficient: 0.16 $p < 0.05$
Peer problems	Bania	8–9 years	Strengths and Difficulties Questionnaire-peer problems subscale	NEET	Female: unadjusted OR = 1.19 (95% CI: 1.11–1.27) adjusted OR = 1.09 (95% CI: 1.01–1.18) Male: unadjusted OR = 1.21 (95% CI: 1.13–1.30) adjusted OR = 1.23 (95% CI: 1.12–1.34)
Peer problems	Moore	6 years	Questionnaire items Victims of peer aggression/ Perpetrators of peer aggression/ Victim-perpetrators of peer aggression	NEET	Victims: unadjusted OR = 2.70 (95% CI: 1.05–6.91) adjusted OR = 0.59 (95% CI: 0.07–4.67) Perpetrators: unadjusted OR = 2.18 (95% CI: 1.10–4.33) adjusted OR = 2.67 (95% CI: 1.12–6.39) Victim-perpetrators: unadjusted OR = 3.40 (1.31–8.84) adjusted OR = 4.36 (1.35–14.11)
Peer problems	Kretschmer	RADAR study: 7 years TRIALS study: approx. 11 years	RADAR: Self-report of Aggression and Social Behaviour Questionnaire Victims/Perpetrators TRIALS: one item from Youth Self Report, one item from Early Adolescent Temperament Questionnaire Victims/Perpetrators	In education or work	RADAR study: Victims: unadjusted OR = 1.15 (95% CI: 0.55–2.40) adjusted OR = 1.28 (95% CI: 0.47–3.49) Perpetrators: unadjusted OR = 2.10 (95% CI: 0.60–7.41) adjusted OR = 3.12 (95% CI: 0.72–13.65) TRIALS study: Victims: unadjusted OR = 0.59 (95% CI: 0.45–0.77) adjusted OR = 0.76 (95% CI: 0.55–1.04) Perpetrators: unadjusted OR = 0.74 (95% CI: 0.62–0.91) adjusted OR = 0.85 (95% CI: 0.69–1.05)
Peer problems	Strøm	8 years	Questionnaire item	Work participation (i.e. NEET)	Being bullied: unadjusted OR = 1.74 (95% CI: 1.48–2.04); adjusted OR = 1.61 (95% CI: 1.36–1.91)
Substance use	Meehan	2–7 years	Self report tobacco and cannabis frequency of use; AUDIT 10 item screening tool for alcohol use	NEET	Tobacco use: correlation coefficient 0.092 $p < 0.05$ Cannabis use: correlation coefficient 0.101, $p < 0.05$ Alcohol use: correlation coefficient 0.071 $p < 0.05$
Substance use	Goldman-Mellor[1]	6 years	Combined substance use-Questionnaire item	NEET	Substance use: OR = 1.89 (95% CI: 1.29–2.77)
Substance use	Rodwell	5–8 years	Self report frequency of cannabis use; 7-day diary for alcohol use	NEET	Cannabis use: unadjusted OR = 2.30 (95% CI: 1.58–3.36) adjusted OR = 1.74 (95% CI: 1.10–2.75) Any drinking below heavy binge levels: unadjusted OR = 1.05 (95% CI: 0.74–1.51) adjusted OR = 0.84 (95% CI: 0.58–1.23) Any heavy binge drinking: unadjusted OR = 1.54 (95% CI: 1.03–2.31) adjusted OR = 0.80 (95% CI: 0.48–1.34)
Substance use	Roldos	4–5 years	Self report frequency of cannabis use		Adjusted OR = 0.65 (95% CI: −0.43 to −0.98)

(*continued on next page*)

Table 3 (*continued*)

Psychosocial factor(s)	Main author	Follow-up	Predictor measure(s)	Outcome measure (s)	Main study effects
				In education or work, "productive"	
Substance use	Scholes-Balog	2–9 years	Self report frequency of cannabis use Early onset, Late onset occasional, Abstinent	Employed, Studying	Late onset occasional vs. abstinent Employed: adjusted $R^2 = 0.05$ (95% CI: −0.51-0.58) p = 0.95, coef: 0.01 Studying: adjusted $R^2 = 0.12$ (95% CI: −0.18- 0.94) p = 0.18, coef:0.36 Early onset vs. abstinent Employed: adjusted $R^2 = 0.05$ (95% CI: -0.28–1.40) p = 0.17, coef:0.57 Studying: adjusted $R^2 = 0.12$ (95% CI: -0.91–0.79) p = 0.90, coef: 0.05
Prosocial skills	Bania	8–9 years	Strengths and Difficulties Questionnaire-subscale	NEET	Female: unadjusted OR = 0.97 (95% CI: 0.90–1.04) adjusted OR = 1.02 (95% CI: 0.94–1.11) Male: unadjusted OR = 0.97 (95% CI: 0.91–1.04) adjusted OR = 1.04 (95% CI: 0.96–1.12)
Prosocial skills	Hakkarainen	5 years	Multisource Assessment of Children's Social Competence Scale-subdimension	NEET	Correlation coefficent: 0.20, $p < 0.01$
Prosocial skills	Meehan	2–7 years	Strengths and Difficulties Questionnaire-subscale	NEET	Correlation coefficient: 0.003 not significant
Self-esteem	Ryberg	7 years	Questionnaire items for self-esteem and self-efficacy	NEET	Self concept: RR = 1.29 $p < 0.05$
Self-esteem	Rojewski	2 years	Self-esteem scale	Not working or studying	Predictive discriminant analyses, M: 0.13 SD: 0.66
Self-esteem	Mendolia	3–4 years	Questionnaire items	NEET 2+ years	Adjusted OLS: 0.018 (0.006) $p < 0.01$
Self-efficacy	Pinquart	6 years	A likert scale focusing on academic self-efficacy	Unemployed-noncollege bound	Correlation coefficient: −0.20, $p < 0.01$ $\beta = -0.13$ (SE: 0.06) $p < 0.05$
Self-efficacy	Ryberg	7 years	Questionnaire items for self-esteem and self-efficacy	NEET	Self concept: RR = 1.29 $p < 0.05$
Locus of control	Rojewski	2 years	Questionnaire items	Not working or studying	Predictive discriminant analyses, M: 0.26 SD: 0.68
Locus of control	Mendolia	3–4 years	Questionnaire items	NEET 2+ years	Adjusted OLS: 0.020 (0.006) $p < 0.01$
Aspirations (Career)	Pinquart	6 years	Likert scale	Unemployed-noncollege bound	Correlation coefficient: −0.11, $p < 0.05$
Aspirations (Education)	Rojewski	2 years	Questionnaire item	Not working or studying	Predictive discriminant analyses, M:5.43 SD: 1.93
Physical Activity	Meehan	2 years	Questionnaire item	NEET	Correlation coefficient: −0.138, $p < 0.01$

Note: OR: odds ratios, RR: risk ratio, OLS: ordinary least squares. Effects are presented with their 95% confidence intervals or with their respective p value. Effects that lack these specifications were presented as such due to lacking information in the original papers.

NEET at age 17 but not at 20 which is the outcome that we were interested in.

As shown in Fig. 2, the meta-analysis of five studies with unadjusted odds ratios as the common effect size revealed an overall odds ratio of 1.48 (95% CI: 1.26–1.74), indicating a small effect size with high heterogeneity ($I^2 = 86.4\%$). Leave-one-out sensitivity analysis was performed but heterogeneity remained significant ($I^2 = 72.9\%$) so no study was excluded. Results from all six meta-analyses using the leave-one-out method are consistent with the overall meta-analysis. To some degree, heterogeneity may be attributed to measurement inconsistency across studies. In general, findings between individual studies were consistent. Overall, the evidence suggests that behavioral problems experienced during adolescence are significantly associated with being NEET in young adulthood.

3.4.2. Peer problems

Four studies examined the associations of peer problems in adolescence with education and employment status in young adulthood (Bania et al., 2019; Kretschmer et al., 2018; Moore et al., 2015; Strøm et al., 2013). These studies had moderate to large sized nationally representative samples. An overview of the effect sizes is presented in Table 3. In one of the studies, peer problems (e.g. *picked on or bullied by other children*) were a significant predictor of NEET status both in the unadjusted and fully adjusted analyses (Bania et al., 2019). In the study by Strøm et al. (2013), exposure to bullying significantly increased the risk of being out of work and education (i.e. NEET) and the association remained significant even after adjusted for potential confounders and the completion of secondary school as a mediator. This study also investigated the associations of violence (physical abuse by youth or adults) and found that exposure to both types of problems further strengthened this association. In the study by Moore et al. (2015), participants were grouped as "victims", "perpetrators" and "victim-perpetrators" and those involved in any form of peer aggression were significantly more likely to be NEET in the unadjusted model. However, after controlling for confounding factors, this remained true for perpetrators and victim-perpetrators, but not for victims. Unlike the study by Strøm et al. (2013), further adjustment for non-completion of secondary

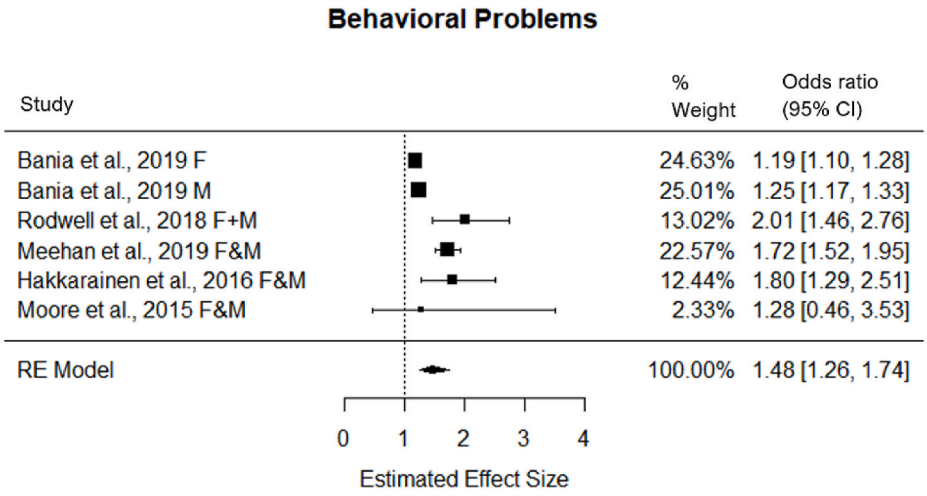

Fig. 2. Forest plot showing individual and overall odds ratios for the association between behavioral problems and NEET status.

school resulted in this association no longer being significant, but participants engaged in any form of peer aggression persisted as being less likely to complete secondary school.

The article by Kretschmer et al. (2018) includes two separate studies called "RADAR-young" and "TRIALS", both looking at the effects of bullying on being in education or work in young adulthood. Similar to the study by Moore et al. (2015), bullying was grouped as "victimization" and "perpetration". For RADAR-young sample, bullying victimization and perpetration showed no significant associations with being in education or work in young adulthood. However, significant associations of victimization and perpetration with education and work status were detected in the TRIALS sample. While perpetration was only significant in the unadjusted model, victimization remained significant in the adjusted model as well. Bullying victims in adolescence showed decreased odds for being in education or work. This link disappeared only with further adjustment to childhood psychopathology. What remained significant though is the link between victimization and welfare dependence which would indicate the financial competence of the individual. It is also important to emphasize that the TRIALS sample in this article comprises of more than four times as many individuals as RADAR-young; thus, more effective to detect small changes.

Being bullied was common among three studies with the outcome NEET status (Bania et al., 2019; Moore et al., 2015; Strøm et al., 2013). All three studies reported both adjusted and unadjusted effect sizes making it possible to conduct a meta-analysis for both measures. As shown in Fig. 3, the meta-analysis of adjusted odds ratios revealed an overall odds ratio of 1.27 (95% CI: 1.02–1.57), indicating a small effect size, and high heterogeneity was detected ($I^2 = 83.3\%$). The meta-analysis of unadjusted odds ratios showed an overall odds ratio of 1.40 (95% CI: 1.10–1.77), also a small effect size, with high heterogeneity ($I^2 = 86.1\%$). The corresponding plot is presented in Fig. 4. The leave-one-out sensitivity analysis was performed for both meta-analyses showing a heterogeneity of $I^2 = 54.1\%$ for adjusted and $I^2 = 32.3\%$ for unadjusted results when the study by Strøm et al. (2013) was excluded. The heterogeneity

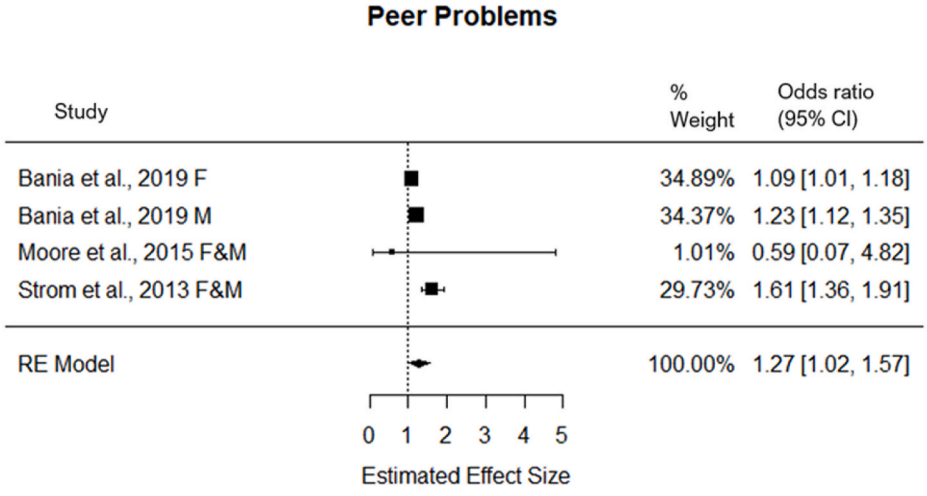

Fig. 3. Forest plot showing individual and overall adjusted odds ratios for the association between experiencing peer problems (i.e. being bullied) and later NEET status.

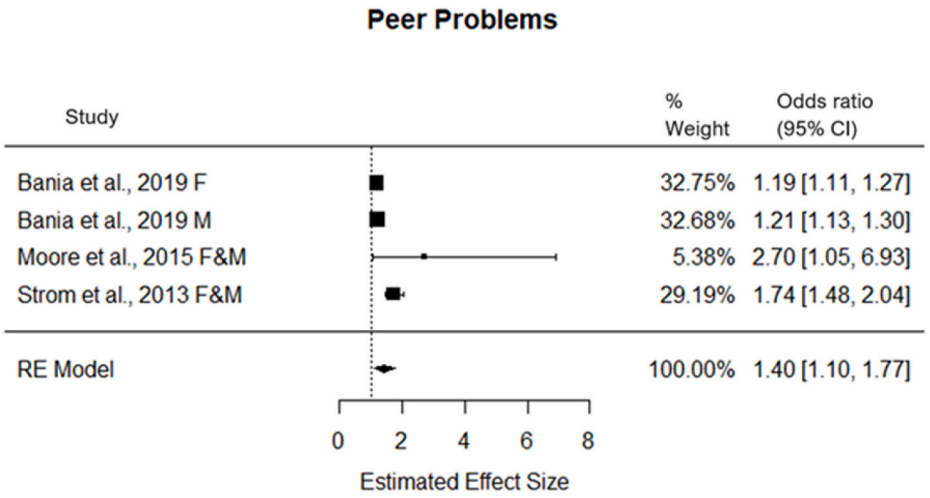

Fig. 4. Forest plot showing individual and overall unadjusted odds ratios for the association between experiencing peer problems (i.e. being bullied) and later NEET status.

introduced by this study may be attributed to methodological differences regarding its outcome and analyses. The outcome measure was defined relatively different raising the question whether it can be classified as NEET which led us to get in touch with the first author of the article and its appropriateness with the NEET framework was confirmed. Due to small number of articles included, we did not run any further sensitivity analysis as suggested by Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Green, 2008).

Overall, all studies concluded that experiencing peer problems (bullying involvement) significantly increase the risk of poor education and employment outcomes in young adulthood (Bania et al., 2019; Kretschmer et al., 2018; Moore et al., 2015; Strøm et al., 2013), even though it may be less implied compared to other risk factors (Kretschmer et al., 2018). Results of meta-analyses show that exposure to bullying in adolescence is significantly associated with being NEET in young adulthood. Explanation regarding the association between peer problems and later education and employment status is not consistent or conclusive among the studies. For instance, completion of secondary school mediates the association in one study (Moore et al., 2015), but not in another (Strøm et al., 2013). Nonetheless, most authors emphasized the need to focus on vulnerable adolescents in schools to avoid marginalization from education and work (Bania et al., 2019; Moore et al., 2015; Strøm et al., 2013).

3.4.3. Prosocial skills

Three studies examined the associations between prosocial skills in adolescence and being NEET in young adulthood (Bania et al., 2019; Hakkarainen et al., 2016; Meehan et al., 2019). All of the studies had nationally representative samples and moderate to high quality ratings (see Tables 1 and 2); however, while two studies had large sample sizes, one study had a relatively smaller sample (Hakkarainen et al., 2016). Bania et al. (2019) found that prosocial skills were not associated with later NEET status for any sex. Similarly, in the study conducted by Meehan et al. (2019), prosocial skills were not significantly associated with later NEET status.

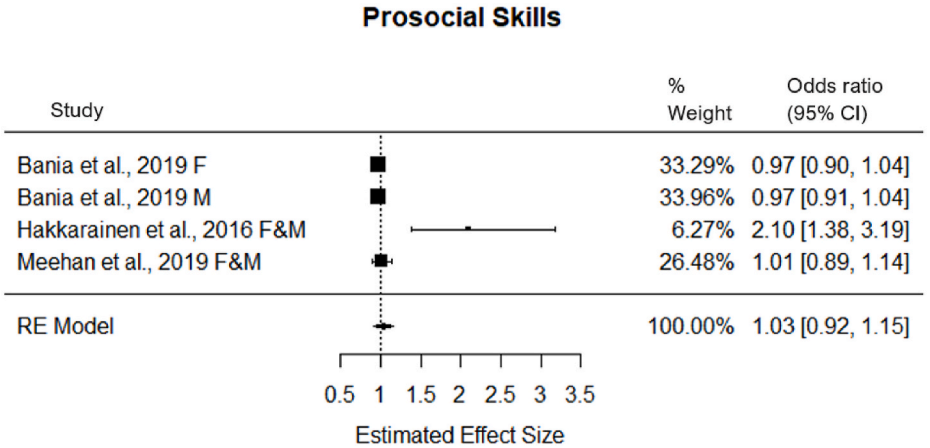

Fig. 5. Forest plot showing individual and overall odds ratios for the association between prosocial skills and NEET status.

However, prosocial skills combined with interpersonal callousness (antisocial traits) which indicates a more severe profile of early risk were directly associated with being NEET at age 20. Hakkarainen et al. (2016) showed that prosocial skills were significantly associated with NEET status and there was also a shared role of prosocial skills with mathematical difficulties resulting in membership in the NEET group. This study also examined the role of antisocial traits and found a significant association with later NEET status.

As shown inFig. 5, the meta-analysis of three studies with unadjusted odds ratios as the common effect size revealed that the association between prosocial skills and later NEET status was not significant (overall OR:1.03, 95% CI: 0.92–1.15). Substantial heterogeneity was detected ($I^2 = 77.2\%$). The leave-one-out sensitivity analysis was performed showing the heterogeneity dropped to 0.0% when the study by Hakkarainen et al. (2016) was excluded. While the other two studies were consistent in terms of most study characteristics including the use of the same measurement tool, the study by Hakkarainen et al. (2016) was different in that it was conducted in Finland where education system is relatively different, and students are placed either in vocational or general education track. For the purpose of meta-analyses, we used the general education sample as this is consistent with the samples of other studies included. This study also uses a different measurement tool for prosocial skills. Therefore, the high heterogeneity may be attributed to these inconsistencies introduced by this study (Hakkarainen et al., 2016). Due to small number of studies included, we did not run any further sensitivity analysis as suggested by Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Green, 2008). Overall, there is no statistically significant evidence to suggest that adolescent low prosocial skills are associated with NEET status in young adulthood.

3.4.4. Summary of meta-analyses

Odds ratios are used to compare the relative odds of the occurrence of the outcome of interest, given exposure to the variable of interest (Szumilas, 2010). Odds ratio of above 1 means exposure is associated with higher odds of outcome. The odds ratios of 1.68, 3.47, and 6.71 are equivalent to Cohen's d = 0.2 (small), 0.5 (medium), and 0.8 (large), respectively. Therefore, it can be said that there is a small but significant increased odds of being NEET for those who reported behavioral problems and peer problems in adolescence compared with those who did not. The meta-analysis results showed that while behavioral problems increased the odds of NEET status by a factor of 1.48 (95% CI: 1.26–1.74), peer problems increased it by 1.27 (95% CI: 1.02–1.57) in adjusted model. A coefficient of 1 leaves the odds unchanged, therefore, prosocial skills did not present a significant association with a factor of 1.03 (95% CI: 0.92–1.15) (see Table 4).

3.5. Results of qualitative synthesis

3.5.1. Substance use (cannabis use, drinking, smoking)

An overview of the effect sizes of cannabis use, alcohol use and smoking on later education and employment status is presented in Table 3. These studies were large cohort studies with moderate to high study quality (see Tables 1 and 2). The sample of one study was not ethnically diverse so it was rated as somewhat representative of the general young population (Roldos, 2014). Four studies specifically investigated the effects of frequency of cannabis use in adolescence on later education and employment status (Scholes-Balog et al., 2016; Meehan et al., 2019; Rodwell et al., 2018; Roldós, 2014). There was another study which examined cannabis experimentation (i.e. "had tried cannabis") as part of combined substance use alongside smoking, drinking, taking pills to get high or sniffing glue/gas (Goldman-Mellor et al., 2016). Two of these studies indicated no statistically significant association of cannabis use on being in education or employment in young adulthood when adjusted for different confounders (Scholes-Balog et al., 2016; Roldós, 2014) even though adolescent cannabis users were 35% less likely to be productive (working or studying) at age 21 in the unadjusted model (Roldos, 2014). Other two studies found that cannabis use was significantly associated with later NEET status (Meehan et al., 2019; Rodwell et al., 2018) and the association remained significant after controlling for a range of confounders (Rodwell et al., 2018). In the study conducted by Goldman-Mellor et al. (2016), combined substance use was found to be a significant predictor of later NEET status even after adjusted for potential confounders.

Overall, current evidence seems to provide mixed results regarding the longitudinal association of cannabis use with later education and employment status. While most studies in this domain suggest that the association is mostly accounted for by the controls included in the studies, the persistent association of cannabis use was shown in one study and authors suggested that frequent cannabis use and disruptive behavior may be an indicator of a personality type or peer group affiliations that reject social norms which lead to declined attributes necessary for engaging in school or work (Rodwell et al., 2018). A further explanation provided by the authors is that increase in the frequency of cannabis use impairs cognitive performance which, in turn, impairs decision-making that relates to education and employment (Rodwell et al., 2018). Similarly, Scholes-Balog et al. (2016) attributed the nonsignificant results found in their study to the low frequency of cannabis use observed in the sample and emphasized that cognitive impairments resulting from heavy cannabis use starting earlier in life may explain the associations found in other studies.

Table 4
Summary of the meta-analyses.

Psychosocial domain	Number of articles included in meta-analysis	Overall odds ratios and 95% confidence intervals
Behavioral problems	5	1.48 [1.26–1.74]
Peer problems	3	1.40 [1.10–1.77] 1.27 [1.02–1.57]
Prosocial skills	3	1.03 [0.92–1.15]

Two studies examined whether drinking alcohol was predictive of later NEET status (Meehan et al., 2019; Rodwell et al., 2018). Both studies showed weak evidence that drinking in adolescence was associated with NEET status in young adulthood, particularly after controlling for other risk factors (Meehan et al., 2019; Rodwell et al., 2018). The association between tobacco use in adolescence and NEET status in young adulthood was investigated only in one study which showed a significant association, but the link disappeared when entered into a model with other confounders (Meehan et al., 2019). As mentioned, one study examined both drinking alcohol and smoking as part of combined substance use and found that it is associated with later NEET status (Goldman-Mellor et al., 2016). It is important to mention that the study conducted by Roldós (2014) also investigated the association of alcohol use trajectory between ages 10 to 21 with education and employment status at age 21 and found no significant association. Overall, it can be said that there is weak evidence suggestive of drinking alcohol or smoking as a significant factor for adverse education and employment status in young adulthood. It may be important to consider the use of different substances together while taking into account the amount and frequency of use as a significant factor for later NEET status (Goldman-Mellor et al., 2016).

3.5.2. *Self-evaluations*

While self-esteem, self-efficacy and locus of control are usually treated as distinct concepts, they are highly related and share the same underlying construct called core self-evaluations which is composed of these three concepts along with emotional stability (Ryberg, 2018). Therefore, we grouped them in this domain. An overview of the effect sizes of self-esteem, self-efficacy and locus of control on later education and employment status is presented in Table 3.

3.5.2.1. Self-esteem. Three studies examined the associations of adolescent self-esteem with education and employment status in young adulthood (Mendolia & Walker, 2015; Rojewski, 1999; Ryberg, 2018). These studies were high-quality studies with nationally representative large samples (see Tables 1 and 2). Mendolia (2015) found that low self-esteem in adolescence is significantly associated with NEET status in young adulthood. Youth with low self-esteem face increased chances of being NEET and remaining in this status for at least two years. Rojewski (1999) found that young adults who were neither in school nor in work were more likely to report low self-esteem as adolescents. Ryberg (2018) examined the associations of both self-esteem and self-efficacy on later education and employment status by combining these factors as a single measure, namely, self-concept and found that high self-concept decreases the chances of youth being NEET. Overall, the studies highlight the association of adolescent self-esteem with adverse education and employment outcomes in young adulthood.

3.5.2.2. Self-efficacy. Two articles studied the associations of adolescent self-efficacy with education and employment status in young adulthood (Pinquart et al., 2003; Ryberg, 2018). Both studies had moderate size nationally representative samples and moderate to high quality ratings (see Tables 1 and 2). As mentioned under self-esteem, Ryberg (2018) included self-efficacy in combination with self-esteem and found that high self-concept in adolescence decreases the chances of youth becoming NEET in young adulthood. Similarly, the other study focusing more on academic and peer related self-efficacy found that higher self-efficacy beliefs were associated with a lower risk of later unemployment (those voluntarily out of the workforce not included) (Pinquart et al., 2003). It was stated that the whole effect of self-efficacy may be underestimated due to the restricted focus on self-efficacy measure (Pinquart et al., 2003). Both studies suggest that adolescent self-efficacy is associated with education and employment outcomes in young adulthood.

3.5.2.3. Locus of control. Two studies investigated the associations of adolescent locus of control with education and employment status in young adulthood (Mendolia & Walker, 2015; Rojewski, 1999). Both studies had large, nationally representative samples and high-quality ratings (see Tables 1 and 2). Rojewski (1999) compared individuals with and without learning disabilities and found that adolescent locus of control was one of the two best predictors of not being in school or work in young adulthood for nondisabled individuals. Individuals who were not studying or working were more likely to report external locus of control whereas individuals enrolled in postsecondary education reported internal locus of control as adolescents regardless of disability status (Rojewski, 1999). The other study showed that individuals with external locus of control face higher odds of becoming NEET and remaining in this condition for at least 2 years (Mendolia & Walker, 2015). In general, both studies suggest that external locus of control is associated with being out of education and employment in young adulthood.

3.5.3. *Aspirations*

Two studies examined the association of aspirations with later education and employment status (Pinquart et al., 2003; Rojewski, 1999). While one has a very large sample size, the other is relatively small and the quality of both studies were moderate to high (see Tables 1 and 2). One of these studies investigated the influence of educational aspirations and found that one of the two best predictors of being out of school and work for nondisabled individuals was educational aspirations (Rojewski, 1999). Having high educational aspirations was one of the important factors in predicting individuals primarily enrolled in postsecondary education, regardless of disability status (Rojewski, 1999). The other study investigated the influence of career aspirations on later unemployment status (those voluntarily out of the workforce not included) (Pinquart et al., 2003). It was found that there was a significant association between career aspirations and future unemployment status. In summary, both studies indicate that aspirations regarding education or career during adolescence are associated with education and employment outcomes in young adulthood.

3.5.4. *Physical activity*

Only one study examined the association of adolescent physical activity with later education and employment status (Meehan et al.,

2019). This study had a large sample size and was high in study quality (see Tables 1 and 2). Lower levels of physical activity in adolescence was found to be significantly associated with being NEET in young adulthood, but the link disappeared when entered into a model with other confounders (Meehan et al., 2019).

4. Discussion

This systematic review synthesized findings from 14 articles and provided an overview of the evidence for the longitudinal association between adolescent psychosocial factors and participation in education and employment in young adulthood. In general, the studies were recent, large and of high quality. The associations of behavioral problems, peer problems and substance use with later education and employment status were predominantly studied. The results of meta-analyses show that behavioral problems and peer problems in adolescence present a significant association with being out of education, employment and training as young adults. The influence of adolescent substance use is not straightforward and present a more complex relationship with later education and employment status. It can be said that combined substance use along with the use of frequency and intensity may be a significant factor rather than individual consumption of alcohol, smoking or cannabis. The results of meta-analysis show that adolescent low prosocial skills are not significantly associated with being NEET in young adulthood, yet its combination with antisocial traits may be a stronger factor and should be considered together in future research. Weaker evidence in other domains make it difficult to draw clear conclusions; however, self-evaluations (i.e. self-esteem, self-efficacy, locus of control), aspirations and physical activity during adolescence indicate significant associations with participation in education and employment as young adults. It is recognized that lower self-evaluation is negatively associated with engagement in positive behaviors across life stages (Whitehall et al., 2020). The small number of studies in the review show the urgent need for more research in this area focusing on psychosocial challenges of adolescents that can disrupt later life chances.

This study identified that psychosocial factors cluster together so studies should include these factors by using comprehensive multilevel and multifactorial approaches to explain causal pathways. This multifactorial perspective is also needed in preventive interventions. An intersectoral approach is required, including health, social care, education (school and post-secondary), drug, alcohol and justice services, and employers. (Irvine Fitzpatrick et al., 2020; Irvine Fitzpatrick, 2019). Various government initiatives have been developed in the UK for this purpose such as the *National Mental Health Strategy* (Scottish Government, 2017) which set out commitments to ensure coordinated engagement with partners and multi-agency pathways to support children and adolescents with mental health problems; *Opportunities for All* (Scottish Government, 2012) or Skills Development Scotland, *(n.d.)* which support all young people to participate in post-16 learning, training or work to ensure that young people reach positive destinations. A recent innovation called *Game-Changer* has been developed in Scotland to increase positive outcomes for vulnerable young people through skills building and experiential learning on different career and educational opportunities in sports demonstrating the potential for similar evidence based, intersectoral and multifaceted intervention approaches (Irvine Fitzpatrick et al., 2020).

The majority of articles included in this study failed to provide a theoretical explanation in their studies. There are limited theoretical principles emerging in the area of positive destinations of young people after compulsory education which suggests that future research should focus on developing or discussing theoretical foundations regarding adolescent transition from compulsory schooling into further education or employment. Any such theory should address the complex interplay of dynamically nature of factors regarding this transition in life roles; one model offering potential is the model of human occupation (MOHO) (Taylor & Kielhofner, 2017). This model has previously been used to understand psychosocial factors related to work-readiness (Prior et al., 2013), mental health assessment (Maciver et al., 2016) and environmental factors (Harrison et al., 2016) and could be adapted to this population. This model also has useful associated standardized measure of psychosocial factors related to work-readiness (Braveman et al., 2005).

It is important to underline that mental health problems greatly affect educational trajectories and later economic productivity (Hale et al., 2015) and poor mental health in adolescence was shown to be specifically associated with later NEET status (Cornaglia et al., 2015; Hale & Viner, 2018). Mental health problems or mental illness may be associated with adverse outcomes owing to associated psychosocial factors discussed in the present study. Behavioral issues, substance use, peer problems and other psychosocial factors have strong associations with common mental disorders such as depression and anxiety. Therefore, it is possible that children or adolescents with mental health problems may be more prone to experiencing psychosocial difficulties in adolescence which can lead to adverse education and employment outcomes.

It is also important to emphasize that there is a sex difference recognized in becoming NEET with young women internationally overrepresented which may be caused by caring responsibilities due to teenage pregnancy and parenthood (Valle et al., 2015). Contrarily, Bania et al. (2019) states that young males, 18–24 years old, make up the majority of the social welfare recipients in Norway which is why they looked at sex differences hypothesizing that male sex would be associated with later NEET status. Even though minor, Bania et al. (2019) found that female NEET status was significantly higher which is in accordance with numbers from Organization for Economic Co-operation and Development countries (Valle et al., 2015). However, they stressed that the explanation is unlikely to be related to teenage pregnancy or young parenthood due to low prevalence in the country and available support by the government. Correspondingly, there is evidence that compared to those who are NEET due to caring responsibilities (i.e. homemakers), non-homemaker NEETs have greater odds of mood, behavioral and substance disorders and require targeted mental health intervention (Gutiérrez-García et al., 2018). They argued that other explanations which are supported by national statistics could be loneliness, inactive lifestyle and mental health problems (Bania et al., 2019). They also found that the impact of mental health problems on later NEET status differed by sex. While hyperactivity-inattention was significant for females, conduct problems and musculoskeletal pain were associated with males in the fully adjusted model. Considering the evidence around the association between

mental health and NEET status, it is plausible to draw attention to sex differences recognized in mental health problems, especially mood and anxiety problems. Prevalence of affective disorders is twice as high in females as males and this difference appears to emerge in early adolescence between the ages of 12 and 14 (Bennett et al., 2005). It is also recognized that depression in males is often visible in aggressive and violent practices because they tend to externalize symptoms compared to females (Branney & White, 2008). Furthermore, prevalence of depression was higher among adolescents with recurrent pain symptoms (Härmä et al., 2002) although females typically experience psychosomatic symptoms more frequently than males (Kinnunen et al., 2010). Majority of NEETs who reported having a health problem (58%) reported both somatic and mental health problems (26%) with various musculoskeletal problems (Ose & Jensen, 2017). These may explain some of the findings by Bania et al. (2019); however, NEETs were more likely to be male in other studies (Stoneman & Thiel, 2008; O'Dea et al., 2014; Henderson et al., 2017). Additionally, there appears to be a difference between depression and anxiety disorders experienced by NEET youth depending on sex (Baggio et al., 2015; Goldman-Mellor et al., 2016). Therefore, there is not a clear explanation to observed sex differences in this complex issue. It is clear that concerns and consequences regarding NEET status are tremendously high and continue to increase regardless of sex (Mawn et al., 2017) and there is need for more studies to understand and identify underlying mechanisms. The results obtained by Bania et al. (2019) show the importance of looking at sex differences in future studies as this was the only study among the included articles to carry out analysis stratified by sex. Future research should examine the sex differences in the relationship between mental health and NEET status in order to provide sex-informed care.

Overall, this systematic review showed the complex and multifactorial nature of the relationship between psychosocial needs and trajectories of young people after compulsory education. The findings confirm that a theoretical structure is needed in this area to gain a better understanding. Considering the relationship between mental health and NEET status, adolescents with mental health problems may be more predisposed to psychosocial challenges and focusing on this subpopulation of young people seems crucial. An emphasis should also be given to sex differences since the relationships observed appear to be sex-specific. By this way, preventive efforts would target the right population, hold a multifactorial perspective with an underlying theoretical framework and provide sex-informed interventions.

4.1. Strengths and limitations

This study has several strengths: (i) it is the first review to synthesize evidence in this topic and all included articles were of moderate to high quality which strengthens the reliability of our findings (ii) a comprehensive approach to psychosocial factors was used rather than an a priori selection of only a few terms (iii) the choice of a wider inclusion of education and employment status enabled a more thorough search of the literature rather than using a single measure of status which is potentially problematic as it narrows the focus of study to one specific type of measure whereas others may also have the same or relevant meaning (iv) only articles with prospective cohort designs were included ensuring that exposure to the factors assessed preceded the outcome (v) a peer review process was used at selection and data extraction stage; efforts were made to minimize bias as much as possible in every stage including a sensitivity analysis.

Some limitations to our study include: (i) language was restricted to English (ii) articles published since 1999 were screened so it is possible that a relevant study published before 1999 may be overlooked even though this is unlikely based on our argument explained in the methods section; 12 out of the 14 included articles were indeed published in the last ten years (iii) high statistical heterogeneity was observed across meta-analyses which remained significant after leave-one-out sensitivity analysis in one of the meta-analyses (iv) most articles in our review used self-report items which may introduce a potential risk of bias compared to diagnostic interviews or administrative data; however, most articles reported strong psychometric properties for the self-report measures used (v) meta analyses included small number of studies which may contribute to biased estimates of overall effect size.

The selection criteria described in the methods section needs particular emphasis as it has its own strengths and limitations. Our search strategy approach was very strong due to its breadth. We covered a wide range of psychosocial variables unlike most previous studies, and we were inclusive in the definition of our outcome by not specifically looking for the label "NEET" which enabled us to find studies that fit the NEET framework that would have been missed otherwise. Since our definition required both education and employment status to be measured in the studies as someone unemployed should not be considered NEET if in education and vice versa, most exclusions occurred due to measurement/associations of the outcome or the age ranges. The age ranges were in line with the literature and exclusions regarding age are not concerning because childhood or late adulthood is not in the scope of our research problem. However, exclusions regarding the outcome need to be emphasized as it was the main reason of exclusions in the full-text stage which led to a small number of studies to be included. If only education or employment related outcome was measured in a study and NEET status was unclear, then the study was excluded. The most evident limitation of a systematic review is the risk to eliminate during the selection of the articles those ones which produced important results. Therefore, it is possible that these excluded studies could potentially offer valuable information relevant to our research problem even though they did not meet the inclusion criteria.

Another limitation to emphasize is regarding the cohorts studied in the included articles because the geographical regions are very diverse among the included articles. For instance, while one is carried out in India (Ryberg, 2018), another is carried out in Finland (Hakkarainen et al., 2016). Educational systems may be different depending on the country and successful transition pathways could be diverse across developed and developing countries. Research regarding psychosocial factors and status attainment has been mostly conducted in developed countries as this review also shows that only 1 out of 14 articles was carried out in a developing country, India (Ryberg, 2018). However, majority of youth worldwide live in developing countries and the influence of psychosocial factors may vary by economic and cultural contexts. Therefore, whether the existing research is applicable to youth that live in a diverse set of

developing countries remains as an important issue that needs to be addressed in future research.

4.2. Implications

Getting disengaged young people to re-engage with education, employment or training is time consuming and expensive. A young person who becomes NEET once is 7.6 times more likely to become NEET again and is at greater risk of poorer life outcomes including social exclusion (Arnold & Baker, 2013). As much as insight into macro-economics of NEET is important, information at the individual and community levels is as valuable. Current government schemes have not been successful in engaging this group of young people which indicates a need for more effective interventions (Hutchinson et al., 2016). Future policy challenges need to tackle these factors which lead to some young people's disaffection with mainstream education system. Therefore, early identification of those who are at higher risk of dropping out of education and work is crucial. Optimistically, Arnold and Baker (2013) suggest that more than half of those at risk can be identified by the age of 14.

Identifying individual barriers to successful transition after compulsory schooling can help improve and implement necessary interventions. It is suggested that preventive efforts should be placed on psychosocial needs of adolescents (Strøm et al., 2013). Preventive approaches to support school participation for adolescents with disabilities and special educational needs recommend intervening at a whole school level, considering the environment and approach of staff together with strengths and needs of learners (Maciver et al., 2018). Such a holistic approach is equally applicable to mental health and psychosocial needs. Determining which psychosocial factors are associated with successful transition from compulsory education is therefore crucial.

This systematic review provides insight into those psychosocial factors that are associated with young individuals in their education and work pathways which should be considered carefully especially in the development or improvement of risk and needs assessments. As mentioned, a multifactorial perspective is needed in these assessments and preventive interventions should be based on the knowledge that multiple adolescent-, family-, school- and social-related factors lead to adverse education and employment outcomes. To our knowledge, there is only one instrument in the literature developed to identify those at risk of dropping out of education and employment which is called "NEET-Hikikomori Risk Factors (NHR) scale" (Uchida & Norasakkunkit, 2015). It proposes a spectrum of NEET to Hikikomori which means socially isolated in Japanese and is composed of psychological risk factors including choosing to not work despite job availabilities, a lack of self-competence, and having unclear ambitions for the future (Uchida & Norasakkunkit, 2015). This scale is specific to Japanese cultural context, but this review may serve as a foundation for forming, adapting or improving new scales while considering cross cultural differences to identify those at risk of later marginalization. In this regard, the model of human occupation (MOHO) offers a strong theoretical foundation to understand the dynamic nature of human life within a "temporal, physical and sociocultural context" (Taylor & Kielhofner, 2017). Considering the lack of theoretical frameworks in this area, MOHO offers a comprehensive framework to understanding complex and multifactorial issues through a suite of standardized assessment tools which can accurately identify the personal strengths and needs of an individual together with physical and social aspects of the environment which facilitate participation (Harrison et al., 2016).

This systematic review identified inconsistent measures of education and employment status across studies such as "work participation", "productivity", "in education or work", "not studying or working" even though they were all indicating the worlds of both education and employment. The classification of young people as "not in education, employment or training (NEET)" was the most common outcome among the included studies. There are a few considerations for future research that need attention. Firstly, this creates a problem for researchers when searching the literature which may lead to bias in the up-to-date understanding of this topic. To overcome this, we reviewed all articles relating to education and employment in general which increases confidence in our findings, but this is not routinely possible by individual researchers. Therefore, NEET is indeed very practical in achieving coherency; however, this is not to say that it does not have its drawbacks. NEET abbreviation is often criticized for pejoratively labelling young people and disregarding their heterogeneity (Hutchinson & Kettlewell, 2015). Therefore, the definition of NEET itself is debatable and future research should focus on how we define and categorize youth who are out of education and employment. An alternative approach is to refer to the resilience of adolescents and how this may facilitate their progression to a positive destination. Resilience is conceptualized as a complex interplay between multiple personal and contextual factors which influence an individual's ability to overcome adverse circumstances (Górska et al., 2019). While there are questions and challenges remaining to the way we define NEET, there is no doubt that if we can avoid a young individual entering this category in the first place, their life chances stand to benefit. Without an anticipatory approach to intervention, we risk adolescents failing to transition successfully into adulthood and without achieving employment and educational goals, enduring needs for welfare, social and mental health support may persist (Prior et al., 2013).

5. Conclusion

Dropout from education and employment is associated with many different life-course problems. To avoid such adverse outcomes, it is important to gain insight into risk factors that lead to negative pathways for adolescents after compulsory schooling. This review is the first to synthesize evidence on the associations between psychosocial factors in adolescence and education and employment status in young adulthood. The results of the meta-analyses showed that behavioral problems and peer problems in adolescence are significantly associated with being out of education, employment and training (i.e. NEET) as young adults while prosocial skills did not present a significant association. The influence of substance use is less clear, and few studies were available for the self-evaluations, aspirations and physical activity domains. The results of this study showed that a multifactorial perspective is needed in interventions to reduce or prevent future dropout from education and employment. It is suggested that current interventions are not very effective or sufficient for NEET population (Mawn et al., 2017). Universal approaches to improving psychosocial needs as well as mental health of

adolescents in schools are necessary to boost their later life chances. Development of intersectoral partnerships (Irvine Fitzpatrick, 2019; Irvine Fitzpatrick et al., 2020) are now required to understand the complexity of psychosocial needs and create innovative solutions, for which current findings of this review may serve as a foundation.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4–5
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix B
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	6
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4–6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	6–7
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	6–7
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	6
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	6–7
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	8
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	8–11
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	12–21

(*continued on next page*)

(*continued*)

Section/topic	#	Checklist item	Reported on page #
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	22–28
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	10
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	22, 24, 27
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	32–35
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	36–37
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	39–40
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Appendix B

Search Strategy (Medline).

List of Mesh Terms	
Psychological Factors	**Social Factors**
Psychosocial factors	Social interaction
Wellbeing	Daily living skills
Stress (Psychological)	Leisure time
Psychological Patterns	Interpersonal relationship
Locus of control	Delinquency
Self efficacy	Student attitudes
Self esteem	Extracurricular activities
Spirituality	Truancy
Religiosity	Bullying
Aspirations	Discrimination
Expectations	Social isolation
Substance use	Social support

AND
teen* OR adolescen* OR youth*).tiab OR adolescent (mesh term)

AND
(long-term OR longitudinal* OR cohort* OR prospective OR follow-up).tiab cohort studies (explode)

AND
occupation* OR employment OR education* OR salary OR income OR "social outcome*" OR "life chances").tiab education (explode) employment (explode) educational status (explode) Schools student dropouts

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