

Supplementary File 1: Search strategy and data extraction

Search strings

A sensitive search strategy using both indexed (where available) and free-text terms was developed and tested by an experienced information scientist. Key search terms were determined by the review question and the inclusion criteria, and were developed and tested against papers already known to the research team in writing the research proposal. The search strategy involved developing strings of terms and synonyms to capture three core concepts in the review:

- **Concept 1: Population** e.g. youth or young people or adolescents.
- **Concept 2: Intervention** e.g. after-school clubs or community based programme or informal education.
- **Concept 3: Population and intervention** e.g. youth work or youth development or youth club.

These concepts were combined in searches as follows: Concept 1 and (Concept 2 or Concept 3). The initial free text search terms generated for concept 1 and 2 were broad and could identify non-relevant literature (e.g. volunteer, development, etc.). Thus, to balance specificity with sensitivity where possible we required that intervention terms were adjacent or near to population terms (e.g. after school" N12 "young people" OR adolescen* OR youth). We present below an example search string from PsycINFO, searched on the EBSCO platform:

#	Query	Results
S1	TI ("Young people#" OR "young person#" OR "young offender#" OR adolescent# OR adolescence OR youth# OR minors OR teen OR teens OR teenage OR teenaged OR teenager# OR juvenile# OR pupil# OR boy# OR girl# OR underage# OR (school AND dropout#) OR (school AND "drop out#") OR "school aged") OR AB ("Young people#" OR "young person#" OR "young offender#" OR adolescent# OR adolescence OR youth# OR minors OR teen OR teens OR teenage OR teenaged OR teenager# OR juvenile# OR pupil# OR boy# OR girl# OR underage# OR (school AND dropout#) OR (school AND "drop out#") OR "school aged")	311,506
S2	TI "youth opportunit*" OR AB "youth opportunit*"	36
S3	TI "youth work*" OR AB "youth work*"	413
S4	TI "youth club#" OR AB "youth club#"	74
S5	TI "youth centre#" OR AB "youth centre#"	38
S6	TI "youth center#" OR AB "youth center#"	145
S7	TI (youth# N2 empower*) OR AB (youth# N2 empower*)	185
S8	TI (adolescent# N2 empower*) OR AB (adolescent# N2 empower*)	112
S9	TI ("young people#" N3 empower*) OR AB ("young people#" N3 empower*)	54
S10	TI ("youth led") OR AB ("youth led")	51
S11	TI youth N1 voice# OR AB youth N1 voice#	85
S12	TI youth N1 advoca* OR AB youth N1 advoca*	78
S13	TI (youth# N1 engagement) OR TI ("engaging youth#") OR AB (youth# N1 engagement) OR AB("engaging youth#")	249
S14	TI (adolescent# N1 engagement) OR TI ("engaging adolescent#") OR AB (adolescent# N1 engagement) OR AB ("engaging adolescent#")	286
S15	TI ("young people#" N1 (engagement OR engaging)) OR AB ("young people#" N1 (engagement OR engaging))	92
S16	TI (youth# N1 involvement) OR TI ("involving youth#") OR AB (youth# N1 involvement) OR AB ("involving youth#")	402
S17	TI ("young people#" N1 (involving OR involvement)) OR AB ("young people#" N1 (involving OR involvement))	111
S18	TI "youth participation" OR AB "youth participation"	191
S19	TI "adolescent participation" OR AB "adolescent participation"	85
S21	TI "youth program*" OR AB "youth program*"	306
S22	TI youth N5 asset# OR AB youth N5 asset#	178
S23	TI youth N12 asset# OR AB youth N12 asset#	245
S24	TI "young people#" N12 asset# OR AB "young people#" N12 asset#	32

S25	TI adolescent# N12 asset# OR AB adolescent# N12 asset#	153
S26	AB (("positive development") N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#))	174
S27	TI "extra curricular" OR AB "extra curricular"	419
S28	TI supplement* N1 education OR AB supplement* N1 education	98
S29	TI (nonformal* N1 education) OR AB (nonformal* N1 education) OR TI ("non formal*" N1 education) OR AB ("non formal*" N1 education)	92
S30	TI informal* N1 education OR AB informal* N1 education	281
S31	TI "additional education" OR AB "additional education"	144
S32	TI (community N1 empower*) OR AB (community N1 empower*)	512
S33	TI "civic engagement" OR AB "civic engagement"	744
S34	TI "Asset# building" OR AB "Asset# building"	87
S35	TI "Developmental asset#" OR AB "Developmental asset#"	172
S36	TI "Psychosocial asset#" OR AB "Psychosocial asset#"	24
S37	TI "peer led" OR AB "peer led"	414
S38	TI "peer engagement" OR AB "peer engagement"	15
S39	TI service N1 learning OR AB service N1 learning	1,601
S40	TI afterschool OR AB afterschool	184
S41	TI ("after school" N5 (program# OR club# OR initiative# OR scheme# OR center# OR centre# OR event# OR intervention# OR service# OR project# OR service# OR session#)) OR AB ("after school" N5 (program# OR club# OR initiative# OR scheme# OR center# OR centre# OR event# OR intervention# OR service# OR project# OR service# OR session#))	957
S42	S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41	5,553
S43	TI (mentor* N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#)) OR AB (mentor* N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#))	826
S44	TI (coach* N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#)) OR AB (coach* N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#))	523
S45	TI ("development program*" N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#)) OR AB ("development	344

	program*" N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#))	
S46	TI ((community N1 service) N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#)) OR AB ((community N1 service) N12 ("young people#" OR adolescen* OR youth# OR minors OR teen* OR juvenile* OR pupil* OR boy# OR girl# OR "school aged" OR "drop out#" OR dropout# OR underage#))	327
S47	DE "Social Programs" OR DE "Mentor" OR DE "Coaching"	6,995
S48	TI "positive youth" OR AB "positive youth"	810
S49	TI "youth development" OR AB "youth development"	1,750
S50	S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S43 OR S44 OR S45 OR S46 OR S48 OR S49	6,245
S51	S42 OR S47	12,467
S52	S51 AND S1	2,564
S53	S50 OR S52 Limiters - Publication Year: 1985-2013 Search modes - Boolean/Phrase	7,286
S54	S51 Limiters - Publication Year: 1985-2013; Age Groups: School Age (6-12 yrs), Adolescence (13-17 yrs)	2,516
S55	S54 OR S53	8,227

Databases

Searches were undertaken on the following 21 electronic bibliographic databases:

- Applied Social Science Abstracts (ASSIA) via ProQuest
- Australian Educational Index (AEI) via ProQuest
- BiblioMap health promotion research via EPPI-Centre
- British Educational Index (BEI) via ProQuest
- Child Data via Ovid

- Cochrane Central Register of Controlled Trials (CCRCT) via Cochrane library
- Cumulative Index to Nursing and Allied Health Literature (CINAHL) via EbscoHost
- DARE (Database of Abstracts of Reviews of Effects)
- Database of Promoting Health Effectiveness Reviews (DoPHER) via EPPI-Centre
- Health Technology Assessment Database
- Econlit via Ovid
- Education Research Index Citations (ERIC) via ProQuest
- International Bibliography Social Sciences (IBSS) via ProQuest
- Medline via Ebscohost
- NHS Economic Evaluation Database
- PsycINFO via Ebscohost
- Sociological Abstracts (SA) via ProQuest
- Social Sciences Citation Index (SSCI) via Web of Knowledge
- Social Policy and Practice via Ovid
- Social care online via Ovid The Health Management Information Consortium (HMIC) via Ovid
- Trials Register of Promoting Health Interventions (TRoPHI – via EPPI-Centre)

Other search sources

The following websites were also searched to identify relevant studies

- The Campbell library
- International Clinical Trials Registry Platform
- OpenGrey
- CISDOC (The Health and Safety Information Centre of the International Labour Office);
- Drug and Alcohol Findings Effectiveness Bank
- Dissertation Abstracts/Index to Theses
- SHEU – schools and students health education unit research archive
- Google Scholar
- Google
- US Center for Substance Abuse Prevention
- Northern Ireland Online Research Base
- FDA – CDC Youth Tobacco Prevention
- Tobacco Use Behaviour Research
- UK Clinical Research Network Study Portfolio
- PSSRU Discussion Papers (not on SCO) <http://www.pssru.ac.uk/>,
- CEA Registry
- National Youth Agency
- Social Policy Digest
- Drug database <http://www.drug.org.au/>
- Smoking and Health Resource Library – CDC
- Child and Adolescent Health Research Unit
- Children in Scotland
- Children in Wales
- Children's Research Centre

- Welsh Government Social Research
- Scottish Government website
- Young Minds
- Social Issues Research Centre
- European Commission - CORDIS library
- Center for Prevention Research and Development
- Joseph Rowntree Foundation
- Childhoods Today
- The Children's Society
- National Youth Agency
- National Criminal Justice Reference Service Abstracts

Dependent on the functionality of each website interface, searches were undertaken using a combination of subject headings (if available) and/or free text search terms to capture the key concepts of the intervention, e.g. "positive youth development"; "youth work"; "youth clubs". Citations were screened online based on their title, title and abstract or full text when available. Potential included studies were cross referenced with the electronic searches imported to EPPI-Reviewer to identify any unique hits. As is customary with hand searching of this type, only include references, not exclude ones were recorded.

We also hand searched those journals which: i) contained studies that we included, ii) which were found only via reference checking and iii) which were not indexed on databases we have searched. We hand searched these

initially for the last 5 years and if these elicited >1 new included study we hand search for a further 5 years. Our original proposal stated that we would hand-search the five journals that yield the highest numbers of studies that met inclusion criteria. However we decided very early in the review that this was not a good use of resources, and therefore amended this aspect of our search, including it in our registered protocol.⁶⁰

We also sought to contact subject experts to identify unpublished or on-going research. We pursued this by contacting authors of all included studies to seek their advice on other studies that we might consider for inclusion. As stated above, the International Clinical Trials Registry Platform was also searched to identify any relevant ongoing and unpublished trials on PYD. Finally, we searched reference lists of all included studies for further relevant studies.

Data extraction

We used the following tool to extract relevant information from outcome evaluations:

1. Study location (country, area of country)
 - Not stated
 - Details
2. The nature of the intervention(s)/components and how it was delivered to intervention group(s)
 - Not stated
 - Details
3. The nature of the intervention(s)/components delivered to control group(s)
 - Waitlist/delayed treatment
 - Attention placebo/alternative intervention (please specify)
Use if the comparison group receives a different intervention to the treatment group that is not the same as usual care and which has different aims to the main intervention
 - Usual treatment/care, with assignment

- Matched group from target population or other inactive, without assignment
- 4. How intervention was developed
 - Not stated
 - Details
- 5. Timing of interventions
 - Not stated
 - Details
- 6. Provider organisation description
 - Not stated
 - Details
- 7. Target population
 - Not stated
 - Details
- 8. Timing of outcome evaluation
 - Not stated
 - Details
- 9. Outcome evaluation study design
 - RCT
 - nRCT
- 10. Unit of allocation
 - Individual
 - Other (please specify)
- 11. Generation of allocation sequence - any stratification, minimisation etc.?
 - Not applicable
 - Not stated
 - No
 - Yes

Guidance: e.g. The investigators describe a random component in the sequence generation process such as: Referring to a random number table; Using a computer random number generator; Coin tossing; Shuffling cards or envelopes; Throwing dice; Drawing of lots; Minimization.NB: Minimization may be implemented without a random element, and this is considered to be equivalent to being random.*
- 12. Concealment of allocation (provide details)
 - Not applicable
 - Not stated
 - No
 - Yes

Guidance: e.g. Participants and investigators enrolling participants could not foresee assignment because one of the following, or an equivalent method, was used to conceal allocation: Central allocation (including telephone, web-based and pharmacy-controlled randomization); Sequentially numbered drug containers of identical appearance; Sequentially numbered, opaque, sealed envelopes.
- 13. Blinding of intervention provider, outcome assessor
 - Not stated
 - No
 - Yes

14. Sample size, overall response rates at baseline
 - Not stated
 - Details
15. Sample size, overall response rates at follow-up
 - Not stated
 - Details
16. Sociodemographic characteristics at baseline/follow-up
 - Not stated
 - Details
17. Were baseline equivalence/differences between arms reported?
 - Yes
 - No
18. How were differences between intervention and comparison groups controlled?
 - Not applicable (e.g. rct)
 - Matching (please specify)
 - Adjustment (please specify)
 - Not controlled
 - Not stated / Not clear (please specify)
19. Outcome measures (1) - for each one answer the following
 - Description
 - Pre-hypothesisation
 - Primary outcome
 - Secondary outcome
 - Other
 - No
 - Evidence of reliability/validity (provide details)
 - Yes
 - No
 - Data collection methods
 - Not stated
 - Details
 - Baseline response rate
 - Not stated
 - Details
 - Follow up response rate
 - Not stated
 - Details
 - Rates of outcome by arm at follow up
This is for each outcome; by IG and CG - differing from overall follow-up rates
 - Not stated
 - Details
 - Effect sizes
 - Overall
Guidance: if multiple choose ITT, adjusted analysis accounting for any clustering

- by gender
Guidance: if multiple choose ITT, adjusted analysis accounting for any clustering
- by age
Guidance: if multiple choose ITT, adjusted analysis accounting for any clustering
- by socio-economic status
Guidance: if multiple choose ITT, adjusted analysis accounting for any clustering
- by ethnic sub-group
Guidance: if multiple choose ITT, adjusted analysis accounting for any clustering
- No effect size?
- Study analysis was intention-to-treat?
 - Not stated
 - No
 - Yes
- Study analysis appropriately accounted for clustering
 - Not stated
 - No
 - Yes
- Study analysis adjusted for confounders
 - Not stated
 - No
 - Yes