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Promoting adolescents' mental health and wellbeing: evidence synthesis.

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Promoting adolescents' mental health and wellbeing: evidence synthesis

Abstract

Purpose: Evidence on implementing effective adolescent mental health promotion and prevention interventions in the European context is underdeveloped. This review aimed to identify evidence-based mental health promotion and prevention interventions for adolescents that have been developed and/or implemented across the school, community and digital settings in Europe. This review also sought to identify the relevant implementation processes in relation to what works, for whom and under what circumstances.

Methodology: A narrative synthesis of the evidence was conducted which included two stages (i) a systematic search of studies assessing adolescent mental health promotion and prevention interventions (ii) a selection of interventions with the most robust evidence base, using predefined criteria, that have been either developed and/or implemented in Europe.

Findings: A total of 16 interventions met the inclusion criteria. The majority of interventions were school-based programmes. The review findings support the delivery of interventions aimed at enhancing young people's social and emotional learning (SEL) and preventing behavioural problems. Results indicate that the effective delivery of SEL interventions on a school-wide basis could provide an important platform on which other universal interventions such as anxiety and bullying prevention, and targeted depression prevention could be developed in a multi-tiered fashion. There were a limited number of studies providing robust evidence on the effectiveness of suicide prevention, digital and community-based interventions.

Originality/value: This review identifies a number of robust evidence-based promotion and prevention interventions for promoting adolescent mental health. While the interventions have been implemented in Europe, the majority has not been evaluated rigorously and few included detailed information on the quality of programme implementation. Evidence of the effective cross-cultural transferability of

these interventions needs to be strengthened, including more systematic research on their implementation across diverse country contexts.

Keywords: mental health promotion, prevention, adolescents, social and emotional learning, interventions, implementation

Introduction

Promoting youth mental health is integral to ensuring positive youth development and improved health and social wellbeing across the lifespan (WHO, 2014). Social and emotional skills development is identified as a key determinant of young people's mental health, wellbeing and social progress and supports them in achieving positive outcomes in school, work, and life (OECD, 2015; Durlak et al., 2011) and reduces health and social inequities (WHO and Calouste Gulbenkian Foundation, 2014).

Young people in Europe face increasingly complex social, cultural and economic environments with growing challenges, including increases in youth unemployment, migration, rising levels of mental health problems and youth suicide (EU, 2015). Disadvantaged, minority and migrant youth are affected disproportionately with poorer mental health outcomes and higher rates of youth unemployment and early school leaving. Together with investing in the early years and childhood, adolescence is identified as a critical transition period due to the pressures young people face in establishing independent identity, making decisions regarding their future education and employment, and preparing for life after school.

Current mental health policy frameworks and initiatives in Europe (WHO, 2015; EU Joint Action on Mental Health and Wellbeing 2016) endorse the central role of intersectoral actions that will promote young people's mental health and wellbeing across the lifespan and reduce their exposure to risk factors, especially for vulnerable groups. There is a robust international evidence base on the effectiveness of universal school-based mental health promotion interventions that incorporate life skills and social and emotional learning (SEL) within a supportive whole-school environment (Durlak et al., 2011; Taylor et al., 2017). Elias et al. (1997) defined SEL as the process of acquiring and effectively applying the knowledge, attitudes and skills necessary to understand and manage emotions, set and achieve positive goals, appreciate the perspective of others, establish and maintain positive relationships, make responsible decisions and handle interpersonal situations constructively. There

is also evidence for selective and indicated interventions targeting mental health problems including anxiety, depression and specific behavioural difficulties (Fazel et al., 2014). Community-based interventions are particularly important for reaching young people who are disadvantaged and socially excluded (Kremer et al., 2015; Clarke et al. 2015; Barry et al., 2018).

Despite the large number of programmes developed and tested in efficacy and effectiveness trials, there is a science-to-practice gap in implementing evidence-based interventions, especially in low-resource settings (Murphy et al., 2017). Furthermore, studies evaluating the implementation and impact of SEL interventions have largely been conducted in the United States, and there has been a relative paucity of intervention development and rigorous evaluation in Europe as evidenced across a number of extant reviews (Durlak et al., 2011; Sklad et al., 2011; Wigelsworth et al., 2016). Challenges related to effective implementation and the transferability and sustainability of evidence-based interventions across diverse cultural contexts can limit their reach and impact (Jones & Bouffard, 2012). Reviews have also highlighted that the positive effects of evidence-based interventions are often reduced when delivered outside of their country of origin (Wigelsworth et al., 2016) and issues of implementation feasibility and the cultural transferability of interventions across countries have been highlighted in the European context (Burkhart, 2013; Barry et al., 2017).

Given the comparative lack of research on implementing school and community-based mental health promotion interventions for adolescents in Europe, this paper reports on an attempt to synthesise the available evidence regarding the most robust and sustainable interventions that have the potential to be implemented across the diverse contexts in the European region. This paper is based on an unpublished review, undertaken for the WHO Regional Office for Europe in 2017, involving a narrative synthesis of the available evidence in order to inform policy and practice developments in the WHO European Region. The review pays particular attention to the implementation requirements of the most effective interventions, and there is also a particular focus on low resource interventions that can be implemented by non-mental health professionals, including interventions delivered online.

The objectives of the review were:

- 1) To identify youth (10-19 years) mental health promotion and prevention interventions with a robust evidence-base of effectiveness, including when implemented in everyday practice in real-world settings.
- 2) To identify the relevant implementation processes in relation to who (target audience and programme implementers), what (programme components), where (setting) and how (implementation) interventions are delivered.

Methodology

In order to identify interventions with the most robust evidence base, a narrative review of the evidence was conducted and included two stages: 1) a systematic search of the literature to identify studies assessing the effectiveness of youth mental health promotion and prevention interventions, and 2) selection of interventions that were either developed and/or implemented in Europe, with the most robust evidence base of effectiveness using a predefined selection criteria. The findings from these interventions were used to identify relevant implementation processes in relation to what works, with whom, and under what circumstances.

Stage 1: Systematic search of literature

An electronic search of relevant databases was undertaken, including a search of six academic databases (EMBASE, Scopus, PubMed, PsycInfo, ERIC, Applied Social Science Index and Abstracts), international databases of youth evidence-based mental health and wellbeing programmes (e.g. Mental Health Compass EU Database for policies and good practice, NREPP, Blueprints for Healthy Youth Development) and international public health databases (e.g. Cochrane Database, NICE, CHAFAEA, DARE). The search strategy included using combinations of terms related to positive or negative mental health, intervention type, population and setting, Internet-based interventions, programmes and the type of study. A list of the search terms and searches conducted can be found in Online Supplement 1. All searches were conducted in September – November 2017.

Inclusion criteria: Studies were included that were published in English after 2005, targeted young people aged 10-19 years, and were evaluated using robust methods, i.e., randomised controlled trials (RCT) and quasi-experimental study (QE) designs. Interventions that were eligible for inclusion included: 1) interventions aiming to

promote positive mental health and wellbeing of young people, and 2) universal, indicated and targeted prevention interventions aiming to prevent common mental health problems (depression and anxiety), behavioural and emotional problems, or suicide and self-harm. For inclusion, studies needed to report on at least one mental health and wellbeing outcome (including general mental wellbeing and life satisfaction, mental health literacy, positive self concepts, and social and emotional competencies) or negative mental health outcome (including depression and anxiety related symptoms, self harm, suicidal ideation or behaviour, and externalising behaviours).

Exclusion criteria: Treatment interventions for young people with a diagnosed disorder, or interventions delivered in clinical settings by mental health professionals were not included.

Stage 2: Selection of interventions with an established evidence-base that have been implemented in Europe

In Stage 2, interventions developed in the European region and/or interventions with a robust evidence base developed in other countries and implemented in Europe, were included in the review. Criteria for the selection of interventions with an established evidence base were adapted from the programme selection criteria used by Blueprints for Healthy Youth Development (2012-2017)

(<http://www.blueprintsprograms.com/programs>). The criteria included:

- clear evidence of effectiveness from high quality studies (RCT or two QE designs)
- consistent evidence of positive intervention impact
- clear description of intervention specificity (content, structure, and delivery process)
- dissemination readiness (implemented in real-world settings with necessary materials, training and support available).

Analysis

As the range of interventions and outcomes in the included studies were too diverse to conduct a quantitative synthesis of the findings, a narrative synthesis was undertaken. Adopting a narrative summary of the findings was deemed appropriate given the focus on implementation processes of effective interventions in this review (Snijlsteit

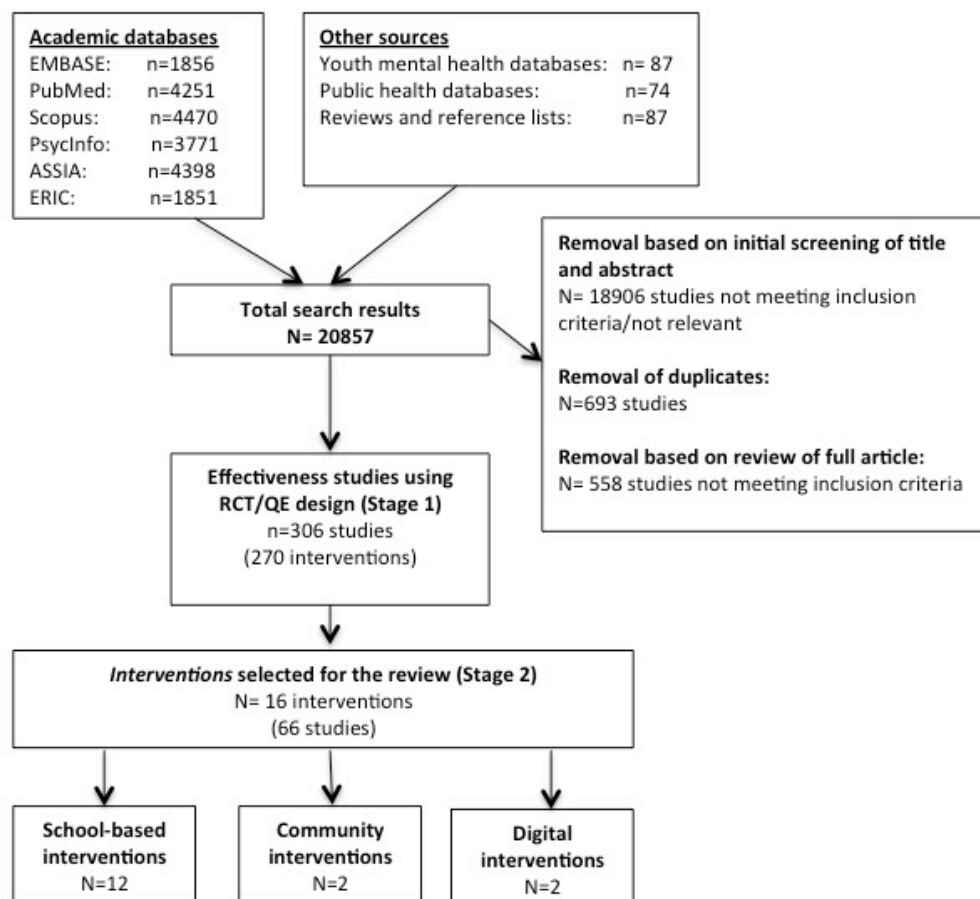
et al., 2012). The selected interventions were categorised by setting (school, community and digital) and type and the key findings in relation to implementation processes (what, who, and how) and programme effectiveness were extracted and entered into a table of intervention characteristics (Online Supplement 2).

Findings

First, an overview of the search results will be provided, followed by a summary of the interventions with the most robust evidence base of effectiveness. Findings are then presented according to the ‘what’ (which interventions work in the school, community and digital settings and on what outcomes?), ‘who’ (who should deliver the interventions and to what target audience?), and ‘how’ (implementation requirements and scaling up) of the most effective approaches.

Overview of Search Results

Figure 1. Flowchart of searches conducted



A flowchart of the search results is presented in Figure 1. The search strategy resulted in 20,857 articles, of which 306 articles, describing the evaluation of 270 interventions using a RCT or QE design, were identified.

Of these, 16 interventions with an established evidence-base, that had been implemented and /or developed in Europe, met the inclusion criteria as determined in Stage 2, and were selected for further review. A summary of the selected interventions can be found in Table 1. Twelve interventions were implemented in the school setting by teachers or other school personnel. School-based interventions included SEL interventions (n=6), depression and anxiety prevention interventions (n=2), suicide prevention (n=1), anti-bullying (n=1) and parent training (n=2). The parent training interventions were also delivered in the school and community settings. Two community-based interventions and two computerised cognitive behavioural therapy (cCBT) interventions were also selected for further review. Half of the interventions (n=8) were developed in the US, with only five interventions developed in European countries. The computerised programmes were developed in Australia and New Zealand.

Table 1. Summary of selected interventions

Intervention	Setting	Type	Primary focus	Country of origin	Implemented within Europe
Positive Action	School	SEL Whole-school	SES	US	UK
RULER	School	SEL Whole-school	SES	US	Spain
Positive Attitude	School	SEL Curriculum	SES	Portugal	Portugal*
Lion's Quest	School	SEL Multicomponent	Substance misuse	US	Sweden, Turkey, Norway
Life Skills Training	School	SEL Curriculum	Substance misuse/Problem behaviours	US	Italy*
Skills for Life	School	SEL Curriculum	Substance misuse/Problem behaviours	Netherlands	Netherlands*
FRIENDS for life	School	CBT for anxiety	Anxiety (Universal/targeted)	Australia	Netherlands*, Ireland*, UK*, Spain*, Germany*
Penn Resiliency	School	Group CBT for depression	Depression (Targeted)	US	Netherlands*, UK*
KiVa	School	Whole-school anti-	Bullying	Finland	Finland*,

		bullying			Netherlands, Estonia, UK, Italy
Youth Aware of Mental Health	School	Awareness training	Suicide	EU	Austria, Estonia, France, Germany, Hungary, Iceland, Italy, Romania, Slovenia, Spain
Strengthening Families 10-14	School/Community	Parenting skills	Substance misuse/problem behaviours	US	Germany*, Sweden*, UK*
Family Check-Up	School/Community	Parenting skills	Problem behaviours	US	Sweden, Spain
Youth United – Youth Social Action Trials	Community	Youth development	SES	UK	UK*
Communities that Care	Community	Violence and substance misuse prevention	Substance misuse/problem behaviours	US	UK, Germany, Croatia, Netherlands
MoodGYM	Digital	cCBT	Anxiety/depression	Australia	Norway*, UK, Ireland, Netherlands, Finland, Germany
SPARX	Digital	cCBT	Depression	New Zealand	Ireland*, Netherlands*

(SEL = social and emotional learning; SES = social and emotional skills; CBT = cognitive behavioural therapy; IPT = interpersonal psychotherapy; cCBT = computerised cognitive behavioural therapy)

*Implemented and evaluated with adolescents using a RCT/quasi-experimental design

What works?

This section provides a brief description of the reviewed interventions in the school, community and digital settings, including their evidence of effectiveness. Further details on the interventions and their evaluation may be found in Online Supplement 2.

School-based Interventions

SEL interventions

Half of the school-based interventions were SEL interventions. SEL interventions aim to improve young people's health, social and educational outcomes by teaching a set of core life skills in the areas of self-management, self-awareness, social-awareness, relationship skills and responsible decision-making, as identified by the Collaborative for Academic, Social and Emotional Learning (CASEL) framework for effective SEL programme development and design (CASEL, 2015). The identified SEL

interventions worked on multiple levels including aspects of professional development for teachers and parental/community involvement.

The SEL interventions consisted of two European (*Positive Attitude* and *Skills for Life*) and four US developed programmes (*Life Skills Training*, *Positive Action*, *Lion's Quest*, *RULER*), one of which was also evaluated in a European country (*Life Skills Training*).

Three of the interventions (*Positive Attitude*, *RULER*, *Lion's Quest*) were based on the CASEL framework (CASEL, 2015) for programme development. Three interventions aimed to promote general social and emotional life skills (*Positive Action*, *Positive Attitude*, *RULER*), with effectiveness studies reporting improvements in social-emotional competence (Brackett et al., 2012; Coelho and Sousa, 2017; Coelho et al., 2015; Rivers et al., 2013), depression and anxiety (Lewis et al., 2013; Lewis et al., 2016; Silverthorn et al., 2017) and academic performance and experience (Brackett et al., 2012; Hagelskamp et al., 2013; Rivers et al., 2013; Snyder et al., 2010; Snyder et al., 2012). Three interventions had a more preventative focus on reducing emotional and behavioural problems, including bullying, suicidal behaviours, substance misuse and violence (*Skills for Life*, *Lion's Quest*, *Life Skills Training*). These interventions primarily reported positive outcomes in terms of substance misuse (Botvin et al., 2015; Eisen et al., 2003; Fekkes et al., 2016; Spoth et al., 2008), with preventative effects lasting to young adulthood (*Life Skills Training*, Spoth et al., 2014).

Depression and anxiety prevention

There was evidence supporting the universal delivery of an anxiety prevention programme, but not the universal delivery of depression prevention programmes in schools. The CBT-based anxiety prevention programme, *FRIENDS*, has been shown to reduce symptoms of anxiety when delivered in several country contexts in both a targeted (Balle & Tortella-Feliu, 2010; Hunt et al., 2009) and universal manner (Essau et al., 2012; Kösters et al., 2015; Mostert and Loxton, 2008; Stopa et al., 2010; Rodgers & Dunsmuir, 2015).

The CBT-based *Penn Resiliency Program* for preventing depression, was shown to reduce symptoms of depression when delivered in a targeted manner in schools (Chaplin et al., 2006; Gilham et al., 2012), but not when adapted as a universal

classroom-based programme in the Netherlands (Kindt et al., 2014) and the UK (Challen et al., 2014).

Suicide prevention

There was limited evidence on the effectiveness of suicide prevention interventions, particularly in terms of reducing actual suicide attempts. One exception is the curriculum-based European *Youth Aware of Mental Health* (YAM) programme for 14-15 year olds, which has resulted in a 50% reduction of suicide attempts and suicidal ideation at 1-year follow-up in a multi-centre European trial (Wasserman et al., 2015). *YAM* is delivered over four weeks, consisting of five hours of interactive workshops and lectures aiming to raise awareness of risk and protective factors for suicide and build coping skills.

Anti-bullying

The impact of anti-bullying interventions on mental health outcomes was rarely evaluated. The *KiVa* antibullying intervention, which adopts a multilevel whole-school approach, was an exception. It has been shown to reduce bullying behaviour, including when delivered on a national level to approximately 150,000 students in Finland (Kärnä et al. 2011b). It has also been shown to lead to improvements in academic, social and emotional outcomes (Salmivalli et al., 2012; Williford et al., 2011). A cluster RCT evaluating the effectiveness of *KiVa* when implemented in schools in Wales is currently underway (Clarkson et al., 2016).

Parenting Skills Training

Two parenting programmes (*Strengthening Families 10-14* and *Family Check-Up*) were selected targeting youth at-risk of substance misuse and problem behaviours. Both of the programmes were developed in the US, with *Strengthening Families* also evaluated in the European context. *Family Check-Up* is tailored to the needs of each individual family using motivational interviewing, whereas *Strengthening Families 10-14* incorporates communication and conflict resolution skills training sessions for parents and adolescents. Both programmes reduced rates of substance misuse (Spoth et al., 2004; Trudeau et al., 2007; Stormshak et al., 2011) and promising findings were also reported on problem behaviours (Stormshak et al., 2010 and 2011; Semeniuk et al., 2010). However, no significant effects on substance misuse for youth or parent behaviours were reported when *Strengthening Families* was adapted in the UK (Coombes et al., 2012) or in Sweden (Skärstrand et al., 2013).

Community-based Interventions

Few community-based programmes with an established evidence-base were identified in the review. The selected programmes included a US developed violence and substance misuse prevention programme (*Communities that Care*) and a youth development intervention from the UK (*Youth United – Youth Social Action Trials*).

Communities that Care provides communities with the skills and resources to identify their needs and select and implement evidence-based programmes to address positive youth development. This intervention showed particular promise in terms of reducing delinquent behaviour and substance misuse (Hawkins et al., 2014) and has been implemented in several countries in Europe (Burkhart, 2013). *Youth United – Youth Social Action Trials* consists of structured community-based activities, including a residential component, delivered by a variety of youth organisations in the UK focusing on youth skills development. Promising findings were reported in terms of improved confidence and team-work (Gorard et al., 2016).

Digital Interventions

Two module-based cCBT interventions for the prevention of anxiety and/or depression were identified (*MoodGYM* and *SPARX*). *MoodGYM* has been shown to reduce symptoms of anxiety in comparison to a no-intervention control group when delivered as a universal intervention in schools (Calear et al., 2009). *SPARX*, which incorporates aspects of gaming, targets depression and has been shown to be non-inferior to treatment as usual (Merry et al., 2012) and feasible when delivered with more disadvantaged young people (Fleming et al., 2012).

Who?

Most of the included interventions had been successfully delivered in the school setting by teachers, including the SEL interventions, the digital interventions, the *KiVa* antibullying intervention and the *FRIENDS* anxiety prevention programme. The *Penn Resiliency Program* is delivered by teams including teachers or other school staff but also involving trained psychologists or graduate students. The parenting programmes were delivered by trained outside personnel such as community/youth workers, social workers, therapists or university employees.

The age of the study participants ranged from 8-19 years, with six interventions including programmes for younger children in primary school and kindergarten.

Several of these programmes reported larger effect sizes for younger children (Essau et al., 2012; Barrett et al., 2005; Kärnä et al. 2013 and 2011a), indicating that interventions should start in primary schools and carry on into secondary schools.

The universal SEL interventions were shown to be effective for youth from a wide range of demographic backgrounds, including those with or without emotional problems. Other programmes, such as depression prevention and parenting skills programmes, are better suited to targeted delivery for at-risk young people and families. In terms of the digital interventions, existing research suggests that the multimedia rich *SPARX* may be more suitable than *MoodGYM* for youth from disadvantaged socio-economic and educational backgrounds (Fleming et al., 2012; Kuosmanen et al., 2017).

How?

The school-based SEL interventions include multiple components, involve a variety of teaching methods and work on multiple levels. Most of the SEL programmes, as well as the *KiVa* antibullying programme, included a curriculum-based programme, system level policies and practices, and a parental component. These interventions were implemented over several years from kindergarten to secondary schools. The anxiety and depression prevention, suicide prevention and parenting skills programmes were shorter in duration, and without the system level component. The *FRIENDS* programme also included booster sessions and a parent component, which were implemented to varying degrees across the studies. The community-based interventions were flexible, adapted to the needs of the local community and used existing services and resources in programme implementation.

All the interventions, apart from the cCBT interventions, provided training for the programme implementers ranging from six hours (*Skills for Life, Positive Action*) to thirty hours (*Penn Resiliency Program*) in duration, and most also provided manuals. Six of the school-based interventions reported incorporating regular monitoring of implementation through weekly or monthly meetings and/or written reports. Low engagement and high-dropout rates were reported from the cCBT interventions, particularly with *MoodGYM* (O’Kearney et al., 2006; O’Kearney et al., 2009). These findings suggest that training and on-going support for programme moderators may

be required to improve cCBT implementation in school and community settings (Kuosmanen et al., 2018).

There was limited evidence concerning the implementation of the selected interventions across different countries. Although all the US developed interventions were implemented in European countries, most were not subject to rigorous evaluation. Furthermore, some interventions showed less consistent results when adapted to other country contexts, such as the *SPARX* computerised CBT programme (Kuosmanen et al., 2017; Poppelaars et al., 2016) and the *Strengthening Families* program (Baldus et al., 2016; Coombes et al., 2012, Skärstrandt et al., 2013). The *FRIENDS* anxiety programme was an exception, showing positive effects when delivered in several different countries (Maggin and Johnson, 2014). Overall, systematic implementation research on the evidence-based programmes when delivered in other country contexts was limited. Evaluation on a national level was only conducted for one of the programmes, the *KiVa* antibullying programme, which is delivered as a national initiative in Finland. *KiVa* has been adapted in several other European countries, with training resources and online support networks available for implementers.

Discussion

This review identifies a number of robust evidence-based promotion and prevention interventions for promoting adolescents' mental health across school, community and digital delivery platforms. The findings support the universal delivery of SEL in schools, based on the CASEL framework of core competencies, and delivered within school-wide supportive practices and policies. The findings show that SEL programmes produced positive outcomes for adolescents in a number of European countries and that the more successful school-based interventions were implemented over several years, endorsing the need to start early in kindergarten and continue through to secondary schools. The findings also suggest that the effective delivery of SEL interventions on a school-wide basis provides an important platform on which other universal interventions such as anxiety prevention, anti-bullying, and targeted depression prevention, could be developed in a multimodal and multi-tiered fashion.

The findings demonstrate that teachers can implement a wide range of programmes addressing social and emotional skills, problem behaviours, anxiety and bullying.

Teacher delivered programmes are more cost-effective and sustainable, and can result in cross-curricular implementation, thus potentially improving the reach and impact of the programme, particularly in terms of positive academic outcomes (Oberle and Schonert-Reichl, 2017; Durlak et al., 2011). However, implementation quality is crucial in achieving desired outcomes, and therefore, adequate training for teachers and other school staff, supportive organisational structures and system-level practices and policies are essential to ensure successful delivery (Domitrovich et al., 2008).

Few of the evaluations in this review provided detailed information on the quality of programme implementation. The lack of systematic implementation research on most of the evidence-based programmes prohibited analysis of possible implementation variables contributing to the differences in programme effectiveness when delivered across countries. Previous reviews highlight the importance of high quality implementation for programme effectiveness, including aspects such as providing thorough training and explicit guidelines for staff, establishing clear goals that are in line with programme components, and complete and accurate implementation (Weare and Nind, 2011). It is therefore, plausible that varying levels of implementation, along with cultural and contextual factors, may explain the differences in programme impact. Understanding the implementation process is critical to strengthening the effective adoption, transferability and system-wide integration of evidence-based interventions in the local context (Durlak and DuPre, 2008; Domitrovich et al., 2008; Lendrum et al., 2013). The existing implementation literature urges a move from discrete packaged interventions to a greater focus on developing sustainable implementation structures (Jones and Bouffard, 2012; Samdal and Rowling, 2013) in order to ensure that interventions can be firmly embedded in educational, youth and health policies and practices.

Limitations

This review included studies published in English only, thus possibly excluding successful interventions delivered in non-English speaking European countries. Although a systematic search was conducted, due to time constraints a detailed quality assessment of the retrieved studies was not conducted. Instead, studies with the most robust evidence-base of effectiveness were selected using pre-defined criteria. This may have led to the exclusion of some promising interventions,

particularly those with less robust evaluation studies. Furthermore, a detailed review of the grey literature was not possible.

Conclusions

This evidence synthesis suggests there is convincing evidence, drawn mainly from outside Europe, of effective adolescent mental health promotion and prevention interventions that have the potential to be implemented in the European region. The findings support the effectiveness of universal school-based interventions that promote the development of social and emotional skills for adolescents, and the delivery of universal prevention programmes for problem behaviours such as bullying and anxiety, and the targeted prevention of depression. There was limited evidence of effective suicide prevention, digital and community-based interventions for adolescents. The majority of the interventions included in this review had limited evidence of their effectiveness when implemented in the European region and few had been scaled up at a country level. In addition, few of the studies included systematic implementation research on the evidence-based interventions when delivered in other country contexts. Therefore, evidence of the effective cross-cultural transferability of these interventions needs to be strengthened. The relative paucity of European developed evidence-based interventions for adolescents, highlights the need to invest in building the policy, practice and research capacity in Europe to support the adoption, implementation and evaluation of the best available evidence-based interventions. To close the science-to-practice gap in promoting youth mental health and wellbeing there is a need to build on best available evidence to support the development of accessible, feasible and low-cost interventions, especially in low resource settings, together with more systematic research on implementation approaches.

References (references for intervention studies included in this review can be found in Online Supplement 3)

Barry, M.M., Clarke, A.M. and Dowling, K. (2017), “Promoting social and emotional well-being in schools”, *Health Education*, Vol. 117 No. 5, pp. 434-451.

Barry, M.M., Clarke, A.M., Morreale, S.E. and Field, C.A. (2018), “A review of the evidence on the effects of community-based programs on young people’s social and emotional skills development”, *Adolescent Research Review*, Vol. 3 No. 1, pp. 13-27.

Burkhart, G. (2013), *North American drug prevention programs: are they feasible in European cultures and contexts?*, European Monitoring Centre for Drugs and Drug Addiction, Publications Office of the European Union, Luxembourg.

CASEL (2015), *CASEL Guide. Effective Social and Emotional Learning Programs. Middle and High School Edition*, Collaborative for Academic, Social and Emotional Learning, Chicago, IL.

Clarke, A.M., Morreale, S., Field, C.A., Hussein, Y. and Barry, M.M. (2015), *What works in enhancing social and emotional skills development during childhood and adolescence? A review of the evidence on the effectiveness of school-based and out-of-school programmes in the UK*, WHO Collaborating Centre for Health Promotion Research, National University of Ireland Galway.

Clarkson, S., Axford, N., Berry, V., Edwards, R.T., Bjornstad, G., Wrigley, Z., Charles, J., Hoare, Z., Ukoumunne, O.C., Matthews, J. and Hutchings, J. (2016), “Effectiveness and micro-costing of the KiVa school-based bullying prevention programme in Wales: study protocol for a pragmatic definitive parallel group cluster randomised controlled trial”, *BMC Public Health*, Vol 16, No. 104.

Domitrovich, C., Bradshaw, C., Poduska, J., Hoagwood, K., Buckley, J., Olin, S., Rokamelli, L.S., Leaf, P.J., Greenberg, M.T. and Ialongo, N. (2008), “Maximizing the implementation quality of evidence based preventive interventions in schools: A conceptual framework”, *Advances in School Mental Health*, Vol 1, pp. 6–28.

Durlak, J.A. and DuPre, E.P. (2008), “Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation”, *American Journal of Community Psychology*, Vol. 41 No. 3–4, pp. 327–350.

Durlak, J.A., Weissberg, R.P., Dymnicki, A.B., Taylor, R.D. and Schellinger, K.B. (2011), “The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions”, *Child Development*, Vol. 82 No. 1, pp. 405-432.

European Union (2015), *EU Youth Report 2015*, Publications Office of the European Union, Luxembourg.

Fazel, M., Hoagwood, K., Stephan, S. and Ford, T. (2014), “Mental health interventions in school 1: mental health interventions in schools in high-income countries”, *Lancet Psychiatry*, Vol. 1 No. 5, pp. 377-387.

Jones, S.M. and Bouffard, S.M. (2012), “Social and Emotional Learning in Schools: From Programs to Strategies. Social Policy Report”, *Society for Research in Child Development*, Vol. 26 No. 4.

Joint Action on Mental Health and Wellbeing (2016), *European Framework for Action on Mental Health and Wellbeing*, European Commission, available at: https://ec.europa.eu/research/participants/data/ref/h2020/other/guides_for_applicants/h2020-SC1-BHC-22-2019-framework-for-action_en.pdf (accessed 1 November 2018).

Kremer, K.P., Maynard, B.R., Polanin, J.R., Vaughn, M.G. and Sarteschi, C.M. (2015), “Effects of after-school programs with at-risk youth on attendance and externalizing behaviours: a systematic review and meta-analysis”, *Journal of Youth and Adolescence*, Vol. 44, pp. 616-636.

Kuosmanen, T., Fleming, T.M. and Barry, M.M. (2018), “The implementation of SPARX-R computerized mental health program in alternative education: exploring the factors contributing to engagement and dropout”, *Children and Youth Services Review*, Vol. 84, pp. 176-184.

Lendrum, A., Humphrey, N. and Wigelsworth, M. (2013), “Social and emotional aspects of learning (SEAL) for secondary schools: implementation difficulties and their implications for school-based mental health promotion”, *Child and Adolescent Mental Health*, Vol. 18, pp. 158–164.

Maggin, D.M. and Johnson, A.H. (2014), “A meta-analytic evaluation of the FRIENDS program for preventing anxiety in student populations”, *Education and Treatment of Children*, Vol. 37 No. 2, pp. 277–306.

Murphy, J.M., Abel, M.R., Hoover, S., Jellinek, M., Fazel, M. (2017), “Scope, scale, and dose of the world’s largest school-based mental health programs”. *Harvard Review of Psychiatry*, Vol. 25 No. 5, pp. 218-228.

Oberle, E. and Schonert-Reichl, K. (2017), “Social and emotional learning: recent research and practical strategies for promoting children’s social and emotional competence in schools”, in Matson, J.L. (Ed.), *Handbook of social behavior and skills in children*, Springer, Cham, pp. 175-197.

OECD (2015), *Skills for social progress: the power of social and emotional skills*, OECD Publishing, Paris.

Samdal, O. and Rowling, L. (2013), *The implementation of health promoting schools: exploring the theories of what, why and how*, Routledge, Oxfordshire.

Sklad, M., Diekstra, R., De Ritter, M., Ben, J. and Gravesteyn, C. (2012), “Effectiveness of school-based universal social, emotional, and behavioural programs: do they enhance students’ development in the area of skill, behaviour, and adjustment?”, *Psychology in the Schools*, Vol. 49 No. 9, pp. 892–909.

Snilstveit, B, Oliver, S. and Vojtkova, M. (2012), “Narrative approaches to systematic review and synthesis of evidence for international development policy and practice”, *Journal of Development Effectiveness*, Vol. 4 No. 3, pp. 409-429.

Taylor, R.D., Oberle, E., Durlak, J.A. and Weissberg, R.P. (2017), “Promoting positive youth development through school-based social and emotional learning interventions: a meta-analysis of follow-up effects”, *Child Development*, Vol. 88 No. 4, pp. 1156–1171.

Weare, K. and Nind, M. (2011), “Mental health promotion and problem prevention in schools: what does the evidence say?”, *Health Promotion International*, Vol. 26 No. S1, pp. 29-69.

WHO and Calouste Gulbenkian Foundation (2014), *Social determinants of mental health*, WHO, Geneva.

WHO (2014), *Investing in children: child and adolescent health strategy for Europe 2015–2020*, WHO Regional Office for Europe, Copenhagen.

WHO (2015), *European Mental Health Action Plan 2013–2020*, WHO, Copenhagen.

Wigelsworth, M., Lendrum, A., Oldfield, J., Scott, A., ten Bokkel, I., Tate, K. and Emery, C. (2016), “The impact of trial stage, developer involvement and international transferability on universal social and emotional learning program outcomes: a meta-analysis”, *Cambridge Journal of Education*, Vol. 46 No. 3, pp. 347-376.

Online Supplement 1. Search terms used for searching electronic databases

A	B	C	D	E	F	G
Positive mental health terms	Negative mental health terms	Type of intervention	Population and setting terms	Web terms	Programme terms	Study terms
"Mental health" OR	Suicide	Promoti* OR	Young people OR	Internet OR	Intervention OR	Implementation OR
Wellbeing	Depression	Prevent*	Youth	Web	Education	Evaluation
Well-being	Anxiety	Universal	Adolescent*	Online	Program*	Study
"Well being"	Bipolar	Indicated	Student*	Computerized	Support	"Random* controlled trial"
Social	Behavioural	Targeted	Child*	Computerised	Training	RCT
Emotional	ADHD	At-risk	Teenager*	Computer-based	Therapy	Quasi-experimental
Coping	Conduct	"at risk"	Juvenile	cCBT		"Scaling up"
Communication	Self Harm	mild	"Alternative education"	"Serious game"		Scaling-up
Resilience	Self-harm	subclinical	School	Game		Delivery
"Problem solving"			Out-of-school	eHealth		Practice
"Emotion regulation"			After-school	mhealth		Efficacy
"Managing feelings"			Classroom	Mobile		Impact
"Self esteem"				eMail		Effectiveness
"Self efficacy"						Feasibility
"Self control"						
Mastery						
"Self regulation"						
"Self awareness"						
Empathy						
"Relationship skills"						
"Positive psychology"						
Psychoeducation						
Mindfulness						
Bullying						
"Conflict resolution"						
Character						
"Youth development"						

* denotes multiple word endings including singular and plural; "" denotes only the full term will be searched for

Searches included:

- Positive mental health terms AND population and setting terms AND intervention terms
- Positive mental health terms AND population and setting terms AND study terms
- Negative mental health terms AND type of intervention AND population terms AND programme terms
- Negative mental health terms AND type of intervention AND population terms AND study terms
- Positive mental health terms AND population terms AND web terms

Negative mental health terms AND type of intervention AND population terms AND web terms

Online Supplement 2. Description of selected interventions

School-based interventions

Social and emotional learning interventions

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target Audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
Positive Attitude Portugal	Social and Emotional Skills (SES)	SEL, CASEL	Children and adolescents 9-14 years	Educational psychologist	3 programs: 4 th grade, middle school, high middle school Pre-packaged format and curriculum format Integrated into Civic Education curriculum	13-15*1h per year	Program manual with detailed lesson plans Monitoring: weekly meetings and monthly and yearly reports	Social awareness, self-control, self-esteem, social isolation and social anxiety (+) (<i>Coelho et al., 2015; Coelho & Sousa, 2017</i>)
Skills for Life Netherlands	Substance misuse/Problem behaviours	Botvin's theory of competence learning Social learning theory, Rational Emotive Behaviour Therapy	Adolescents 13-17 years	Teacher	Skills taught: General SES and specific skills in relation to depression, bullying, drugs and sexual health Variety of teaching methods: active enactment, role play, discussion, video, feedback, commitments to healthy behaviours	14*60min per year OR 25 lessons over 2 years	2 * 3h training + 2 booster sessions	Alcohol use (+), tobacco use (-), cannabis use (0), bullying behaviour (+) Students with lower educational level: suicidal ideation (+) (<i>Fekkes et al., 2016</i>) Suicidality, self-esteem, self-efficacy, emotion regulation (+) (<i>Gravestiejn et al., 2011</i>)
Positive	SES	Theory of self-concept,	Kindergarten	Teacher	Classroom curricula, school-wide development	140* 15-20 min per	Training for teachers and	Academic performance(+); absenteeism &

Action USA		ecological theories of health behaviour	to 19 years		component and family/community component Six major units: self-concepts, physical and intellectual actions, social/emotional actions for self-management, getting along with others, being honest and continuous self-improvement Variety of teaching methods: group work, games, discussion, role play, practice of skills	year (approx. 35h in total)	other staff 3-4h (year 1), 1-2h (subsequent years) + booster sessions once a year (30-50 min). Yearly group meetings with staff from other schools. Teachers' and Principal's manual	suspensions (+), school quality involvement (+), student support (+) (<i>Snyder et al., 2010; Snyder et al., 2012</i>) Positive affect, life-satisfaction, depression and anxiety (+) (<i>Lewis et al., 2013; Lewis et al., 2016; Silverthorn et al., 2017</i>) Substance use and sexual activity (+) (<i>Beets et al., 2009</i>)
RULER US	SES	Ability model of emotional intelligence, CASEL	Kindergarten to 8 th grade (14-15 years)	Teacher	Activities centre on 'feeling words', a new word introduced every few weeks Writing-intensive, including parents Integrated into curriculum (English language, Arts or History)	70*15-20 min	3h overview of emotional literacy + 1.5 days (9h) interactive training + teaching manual 4 yearly meetings with teachers + regular revision by principals	End-of-year grades and teacher rated social-emotional competence (+) (<i>Brackett et al., 2012</i>) Classroom quality (+) (<i>Hagelskamp et al., 2013</i>) Teacher-student relationships and support (+), student autonomy and leadership (+), (<i>Rivers et al., 2013</i>)
Lion's Quest US	Substance misuse	Social influence and social cognitive approach, CASEL	Adolescents 11-18	Teacher	Multicomponent curriculum for developing social and emotional skills, positive character and drug free lifestyle. Includes parent component	40-103*35-45 min 3 years	Teacher manuals and student workbooks Three-day training workshop	Social functioning, academic achievement, misconduct, binge drinking and marijuana use (+) (<i>Eisen et al., 2003</i>)

Life Skills Training	Substance misuse/Problem behaviours	Social learning theory, Problem behaviour theory	Adolescents 10-14 years	Teacher	Three major program components: (1) personal self-management skills, (2) social skills, and (3) information and resistance skills specifically related to drug use. Variety of teaching methods: instruction, demonstration, feedback, reinforcement, and practice	30 core sessions + 7 additional violence prevention sessions 3 years (Year 1: 15 sessions; Year 2: 10 sessions; Year 3: 5 sessions)	1-2 day training (15h) Manualised	Daily substance misuse (+) (<i>Botvin et al., 2015</i>) Violence and delinquency (+) (<i>Botvin et al., 2006</i>) Initiation of substance use (+) (<i>Spoth et al., 2008; Spoth et al., 2014</i>) <i>Italy:</i> Initiation of substance use (+), Life skills (awareness of life-skills, their effects on daily life, techniques to improve life skills, anxiety reduction skills) (+), risk taking and distress (+) (<i>Velasco et al., 2017</i>)
US								

(+) denotes significant positive effect ($p > 0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

Depression and anxiety prevention

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
FRIENDS	Anxiety (Universal/targeted)	CBT	Children and adolescents 8-16 years	Teacher or school counsellor	Main components: Relaxation, cognitive restructuring, attention training, graded-exposure to anxiety-provoking situations and problem-solving 10 weekly group sessions and 1-4 parent	10*60min 2 booster sessions at 1 & 3 months Flexible (10+ weeks)	1-day intensive training for teachers Manualised program with Instructor's Manual and	Anxiety and depression (+) (<i>Barrett et al., 2005; Stopa et al., 2010; Mostert & Loxton, 2008</i>) Peer and conduct problems (+), self-esteem and coping strategies (+) (<i>Stopa et al., 2010</i>)
Australia								

					sessions		Student Workbook	Anxiety (0) (<i>Miller et al., 2011; Cooley-Strickland et al., 2011; Hunt et al., 2009</i>) <u>Ireland</u>: Anxiety, depression, separation anxiety (+) (<i>Rodgers & Dusmuir, 2015</i>) <u>Netherlands</u>: Anxiety and depression (<i>Kösters et al., 2015</i>) <u>Germany</u>: Anxiety, depression, perfectionism (+) (<i>Essau et al., 2012</i>) <u>UK</u>: Anxiety (+) when delivered by health professionals (<i>Skryabina et al., 2016</i>) <u>Spain</u>: Anxiety and depression (+) (<i>Balle & Tortella-Feliu, 2010</i>)
Penn Resiliency Program USA	Depression (Universal/targeted)	CBT	Adolescents 10-15 years (self selected)	Two group leaders including teachers, school counsellors, research staff, graduate students and psychologists	Group CBT (9-14 students) Key components: 1) CBT: Identifying and evaluating pessimistic thoughts, relaxation, emotion regulation; 2) Social problem-solving: assertiveness, decision making, and coping with conflict	12*90min weekly sessions	30h/6 days training + biweekly supervision with program developers Intervention integrity assessed by audio recording and reviewing selected sessions	Depression (+) (<i>Chaplin et al., 2006; Gillham et al., 2012</i>) <u>UK (The UK Resilience Program)</u>: Depression (0) (universal delivery, <i>Challen et al., 2014</i>) <u>Netherlands (Op Volle Kracht)</u>: Depression (0) (universal delivery, <i>Kindt et al., 2014</i>) Depression (+) (targeted delivery, <i>Wijnhoven et al.,</i>

								2014)
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(+) denotes significant positive effect ($p>0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

Suicide prevention

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
Youth Aware of Mental Health EU	Suicide	Psycho-education and coping skills training	Adolescents 14-15 years	Graduate student (can be delivered by school staff)	Intervention consists of: 1) 3h role-play sessions with interactive workshops 2) 32-page student booklet 3) 6 educational posters 4) 2*1-h interactive lectures on mental health	5h over 4 weeks	4.5 day training Instructors trained using an instruction manual	Rate of suicide attempts (+), severe suicidal ideation (+) (Wasserman et al., 2015)

(+) denotes significant positive effect ($p>0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

Bullying prevention

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
Kiva Finland	Bullying	Multifaceted Research on social standing	Adolescent 9-13 years	Teacher (all school personnel involved)	Consists of: 1) 20h universal curricula 2) Indicated intervention for	On-going Curriculum delivered	Training by certified KiVa trainers	Bullying and victimization (+) (Kärnä et al., 2011a, 2011b & 2013) Academic liking, performance and

		of aggressive children and participant roles in bullying Social-cognitive theory			addressing identified cases of bullying 3) Information for parents 4) Program materials Activities include: class discussion, group work, video, role-playing, an interactive computer game.	in three school years	Network meetings and program materials (web resources, lessons, manual) are available	motivation (+) (<i>Salmivalli & Poskiparta, 2012</i>) Internalizing problems (+), negative peer perceptions (+), empathy (+), constructive bystander behaviour (+) (<i>Williford et al., 2011</i>).
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(+) denotes significant positive effect ($p > 0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

Parenting skills interventions

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
Strengthening Families 10-14 US	Substance misuse Behavioural problems	Biopsychosocial model	Children and adolescents 10-14 years	Three to five person teams of trained facilitators (community workers)	Seven weekly sessions: 6*2-hour sessions (one-hour parent and child skills-building followed by a one-hour family session) and 1*1-hour family interaction session. 14-session version available for high risk families Contents: conflict resolution and communication, activities to increase family cohesiveness and positive involvement of the child	Seven weeks	3-day training	Lifetime use of alcohol, cigarettes and marijuana (+) (<i>Spoth et al., 2004</i>). Rate of increase in internalizing symptoms and polysubstance use (+) (<i>Trudeau et al., 2007</i>). Youth hostility (+), parent hostility and parent positive problem solving (-) (<i>Semeniuk et al., 2010</i>). <u>UK:</u> Substance use, aggressive behaviours, school absence, parenting behaviour, measures of

					in the family.			family life (0)(Coombes et al., 2012). <i>Sweden</i> : Substance use (0) (Skärstrandt et al., 2014) <i>Germany</i> : Tobacco use (+), parent reported adolescent behaviour problems (+) (Baldus et al., 2016)
Family Check-Up USA	Behavioural problems	Motivational interviewing	Children 6-12 years Adolescents 13-17 years	Therapist, social worker, University employee	<u>Stage 1</u> : 3*3h sessions: 1) Goals and concerns and motivation for change, 2) Assessment of needs, 3) Feedback session. <u>Stage 2</u> : Tailored, e.g. family-management training, mental health support for parents, support in relation to school success.	Overall duration depends on the needs of the family.	1-week initial training and several follow-up workshops Weekly supervision meetings	Self-regulation skills (+) (Stormshak et al., 2010) Antisocial behaviour (+), substance use (+)(Stormshak et al., 2011) Depressive symptoms (+) in high-risk youth (Connell & Dishion, 2008)

(+) denotes significant positive effect ($p>0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

SFP= Strengthening Families Program; LST= Life Skills Training

Community-based interventions

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
Country of origin								
Communities	Problem	Social Development	Adolescents	Community leaders	A prevention operating system providing a	9-12	Six trainings from	Delinquent behaviour (+)(Hawkins et al., 2008),

that Care US	behaviours Substance misuse	Model	10-14	identify an existing or new community coalition of diverse stakeholders responsible of program implementation	method for helping communities to select and implement evidence-based programs Five stages: 1) Assess community readiness 2) Get organized at community level 3) Profile young people's problem behaviours 4) Develop a plan based on effective strategies 5) Implement and evaluate	months	Communities that Care trainers	initiation of alcohol and tobacco use (+) (<i>Hawkins et al., 2009</i>) 6 years follow-up: Incidence and prevalence of substance misuse, delinquency and violence (+) (<i>Hawkins et al., 2012</i>). 8 years follow-up: Abstinence from use of drugs, alcohol or cigarettes (+) and engaging in delinquency (+) (<i>Hawkins et al., 2014</i>) Protective factors at community, school and peer/individual domains (+), protective factors on family domain (0) (<i>Kim et al., 2015</i>)
Youth United – Youth Social Action Trials UK	SES	Youth development	Adolescents 13-14 years	Youth organization staff	Uniformed youth organizations deliver a regular structured program of activities in schools, working towards a certification. Weekly activities consist of theory and practical learning. Delivered within the curriculum or after school Includes a residential camp	30-38 weeks		Confidence, team-work and willingness to help others (+), Academic attainment (0) (<i>Godard et al., 2016</i>)

(+) denotes significant positive effect ($p > 0.05$) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.

Digital interventions

What?			Who?		How?			Effectiveness
Program	Primary focus	Theoretical background	Target audience	Who delivers	Program components	Duration	Resources and training	
MoodGYM Australia	Depression and anxiety	CBT	Adolescents 12+ years	Teacher	Aims to change dysfunctional thoughts and beliefs, improve self-esteem and interpersonal relationships, teach problem solving skills and relaxation Modules consist of information, animated demonstrations, quizzes and homework exercises	5*20-45min weekly modules	A teacher's manual	Anxiety (+), male depression (+), female depression (0) (<i>Calear et al., 2009</i>) Depression, attributional styles and self-esteem (+) for males completing 3 or more modules (<i>O'Kearney et al. 2006</i>) Depression (+) in females (<i>O'Kearney et al., 2009</i>) <u>Norway:</u> Depression, negative automatic thoughts (+) (college students, <i>Lindvedt et al., 2011</i>) Depression (0) (Lillevoll et al., 2014)
SPARX New Zealand	Depression	CBT	Adolescents 12-19 years seeking help for depression	Psychologist/AE teacher/researcher	Uses first person instruction and a three dimensional interactive game in which the user chooses an avatar and undertakes a series of challenges Content: psychoeducation, relaxation, activity scheduling, behavioural activation, communication	7*25min sequential levels	-	Non inferior to TAU in reducing depression and on all secondary outcome measures (remission, hopelessness, anxiety, quality of life) (<i>Merry et al., 2012</i>) Depression (+) (<i>Fleming et al., 2012</i>) <u>Netherlands:</u> Depression (0) (<i>Poppelaars et al., 2016</i>)

					and interpersonal skills, emotion regulation, problem solving, cognitive restructuring, mindfulness			<u>SPARX-R*</u> : Depression (+) <i>(Perry et al., 2017)</i> <u>SPARX-R, Ireland</u> : Emotion regulation (+), depression, anxiety, coping skills, wellbeing (0) <i>(Kuosmanen et al., 2017)</i> <u>Rainbow SPARX**</u> : Depression (+) <i>(Lucassen et al., 2015)</i>
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*SPARX-R is an adapted version of SPARX targeting low mood, anger and stress

**Rainbow SPARX is adapted for sexual minority youth

Online Supplement 3. References for the reviewed studies

Baldus, C., Thomsen, M., Sack, P., Broning, S., Arnaud, N., Daubmann, A. and Thomasius, R. (2016), "Evaluation of a German version of the Strengthening Families Programme 10-14: A randomised controlled trial", *The European Journal of Public Health*, Vol. 26 No. 6, pp. 953-959.

Balle, M. and Tortella-Feliu, M. (2010), "Efficacy of a brief school-based program for selective prevention of childhood anxiety", *Anxiety, Stress, and Coping*, Vol. 23 No. 1, pp. 71-85.

Barrett, P.M., Lock, S. and Farrell, L.J. (2005), "Developmental differences in universal preventive intervention for child anxiety", *Clinical Child Psychology and Psychiatry*, Vol. 10 No. 4, pp. 539-555.

Beets, M.W., Flay, B.R., Vuchinich, S., Snyder, F.J., Acock, A., Li, K.-K., Burns, K., Washburn, I.J. and Durlak, J. (2009), "Use of a social and character development program to prevent substance use, violent behaviors", *American Journal of Public Health*, Vol. 99 No. 8, pp. 1438-1445.

Botvin, G.J., Griffin, K.W. and Nichols, T.D. (2006), "Preventing youth violence and delinquency through a universal school-based prevention approach", *Prevention Science*, Vol. 7 No. 4, pp. 403-408.

Botvin, G.J., Griffin, K.W. and Williams, C. (2015), "Preventing daily substance use among high school students using a cognitive-behavioral competence enhancement approach", *World Journal of Preventive Medicine*, Vol. 3 No. 3, pp. 48-53.

Brackett, M.A., Rivers, S.E., Reyes, M.R. and Salovey, P. (2012), "Enhancing academic performance and social and emotional competence with the RULER feeling words curriculum", *Learning and Individual Differences*, Vol. 22 No. 2, pp. 218-224.

Calear, A.L., Christensen, H., Mackinnon, A., Griffiths, K.M. and O'Kearney, R. (2009), "The YouthMood Project: A cluster randomized controlled trial of an online cognitive behavioral program with adolescents", *Journal of Consulting and Clinical Psychology*, Vol. 77 No. 6, pp. 1021-1032.

Challen, A.R., Machin, S.J. and Gillham, J.E. (2014), "The UK Resilience Programme: A school-based universal nonrandomized pragmatic controlled trial", *Journal of Consulting and Clinical Psychology*, Vol. 82 No. 1, pp. 75-89.

Kuosmanen, T., Clarke, A. M., & Barry, M. M. (2019). Promoting adolescents' mental health and wellbeing: evidence synthesis. *Journal of Public Mental Health*. <https://doi.org/IPMH-07-2018-0036>

Chaplin, T.M., Gillham, J.E., Reivich, K., Elkon, A.G.L., Samuels, B., Freres, D.R., Winder, B. and Seligman, M.E.P. (2006), "Depression prevention for early adolescent girls: a pilot study of all girls versus co-ed groups", *Journal of Early Adolescence*, Vol. 26 No. 1, pp. 110–126.

Coelho, V.A. and Sousa, V. (2017), "Comparing two low middle school social and emotional learning program formats: a multilevel effectiveness study", *Journal of Youth and Adolescence*, Vol. 46 No. 3, pp. 656–667.

Coelho, V.A., Marchante, M. and Sousa, V. (2015), "'Positive Attitude': a multilevel model analysis of the effectiveness of a social and emotional learning program for Portuguese middle school students", *Journal of Adolescence*, Vol. 43, pp. 29–38.

Connell, A.M. and Dishion, T.J. (2008), "Reducing depression among at-risk early adolescents: three-year effects of a family-centered intervention embedded within schools", *Journal of Family Psychology*, Vol. 22 No. 4, pp. 574–585.

Cooley-Strickland, M.R., Griffin, R.S., Darney, D., Otte, K. and Ko, J. (2011), "Urban African American youth exposed to community violence: a school-based anxiety preventive intervention efficacy study", *Journal of Prevention and Intervention in the Community*, Vol. 39 No. 2, pp. 149–166.

Coombes, L., Allen, D.M. and Foxcroft, D. (2012), "An exploratory pilot study of the Strengthening Families Programme 10–14 (UK)", *Drugs: Education, Prevention and Policy*, Vol. 19 No. 5, pp. 387–396.

Eisen, M., Zellman, G.L. and Murray, D.M. (2003), "Evaluating the Lions-Quest "Skills for Adolescence" drug education program: second-year behavior outcomes", *Addictive Behaviors*, Vol. 28 No. 5, pp. 883–897.

Essau, C.A., Conradt, J., Sasagawa, S. and Ollendick, T.H. (2012), "Prevention of anxiety symptoms in children: results from a universal school-based trial", *Behavior Therapy*, Vol. 43 No. 2, pp. 450–464.

Fekkes, M., van de Sande, M.C.E., Gravesteyn, J.C., Pannebakker, F.D., Buijs, G.J., Diekstra, R.F.W. and Kocken, P.L. (2015), "Effects of the Dutch Skills for Life program on the health behavior, bullying, and suicidal ideation of secondary school students", *Health Education*, Vol. 116 No. 1, pp. 2–15.

- Fleming, T., Dixon, R., Frampton, C. and Merry, S. (2012), "A pragmatic randomized controlled trial of computerized CBT (SPARX) for symptoms of depression among adolescents excluded from mainstream education", *Behavioural and Cognitive Psychotherapy*, Vol. 40 No. 5, pp. 529–541.
- Godard, S., See, B.H., Siddiqui, N., Smith, E. and White, P. (2016), *Youth social action trials: Youth United. Evaluation report and executive summary*, Durham University and the Education Endowment Foundation, U.K. Cabinet Office, the Pears Foundation and the Stone Family Foundation, London.
- Gillham, J.E., Chaplin, T.M., Reivich, K. and Hamilton, J. (2012), "Preventing depression in early adolescent girls: the Penn Resiliency and Girls in transition programs", in LeCroy, C.W. and Mann, J.E. (eds.), *Handbook of Prevention and Intervention Programs for Adolescent Girls*, John Wiley and Sons, Hoboken, NJ.
- Gravesteyn, C., Diekstra, R., Sklad, M., and de Winter, M. (2011), "The effects of a Dutch school-based social and emotional learning programme (SEL) on suicidality in adolescents", *International Journal of Mental Health Promotion*, Vol. 13 No. 4, pp. 4–16.
- Hagelskamp, C., Brackett, M.A., Rivers, S.E. and Salovey, P. (2013), "Improving classroom quality with the RULER approach to social and emotional learning: proximal and distal outcomes", *American Journal of Community Psychology*, Vol. 51 No. 3–4, pp. 530–543.
- Hawkins, J.D., Brown, E.C., Oesterle, S., Arthur, M.W., Abbot, R.D. and Catalano, R.F. (2008), "Early effects of Communities that Care on targeted risks and initiation of delinquent behavior and substance use", *Journal of Adolescent Health*, Vol. 43, pp. 15-22.
- Hawkins, J.D., Oesterle, S., Brown, E.C., Arthur, M.W., Abbot, R.D., Fagan, A.A. and Catalano, R.F. (2009), "Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: a test of Communities that Care", *Archives of Pediatric Adolescent Medicine*, Vol. 163 No. 9, pp. 789-798.
- Hawkins, J.D., Oesterle, S., Brown, E.C., Monahan, K.C., Abbott, R.D. and Arthur, M.W. (2012), "Sustained decreases in risk exposure and youth problem behaviors after installation of the Communities that Care prevention system in a randomized trial", *Archives of Pediatrics and Adolescent Medicine*, Vol. 166 No. 2, pp. 141-148.
- Hawkins, J.D., Oesterle, S., Brown, E.C. and Abbott, R.D. (2014), "Youth problem behaviors 8 years after implementing the Communities that Care prevention system: a community-randomized trial", *JAMA Pediatrics*, Vol. 168 No. 2, pp. 122-129.
- Kuosmanen, T., Clarke, A. M., & Barry, M. M. (2019). Promoting adolescents' mental health and wellbeing: evidence synthesis. *Journal of Public Mental Health*. <https://doi.org/IPMH-07-2018-0036>

- Hunt, C., Andrews, G., Sakashita, C., Crino, R. and Erskine, A. (2009), "Randomized controlled trial of an early intervention programme for adolescent anxiety disorders", *Australian and New Zealand Journal of Psychiatry*, Vol. 43 No. 4, pp. 300–304.
- Kärnä, A., Voeten, M., Little, T.D., Poskiparta, E., Kaljonen, A. and Salmivalli, C. (2011a), "A large-scale evaluation of the KiVa antibullying program: grades 4-6", *Child Development*, Vol. 82 No. 1, pp. 311–330.
- Kärnä, A., Voeten, M., Little, T.D., Poskiparta, E., Alanen, E. and Salmivalli, C. (2011b), "Going to scale: A nonrandomized nationwide trial of the KiVa antibullying program for grades 1–9", *Journal of Consulting and Clinical Psychology*, Vol. 79 No. 6, pp. 796-805.
- Kärnä, A., Voeten, M., Little, T.D., Alanen, E., Poskiparta, E. and Salmivalli, C. (2013), "Effectiveness of the KiVa Antibullying Program: grades 1–3 and 7–9", *Journal of Educational Psychology*, Vol. 105 No. 2, pp. 535–551.
- Kim, B.K.E., Gloppen, K.M., Rhew, I.C., Oesterle, S. and Hawkins, J.D. (2015), "Effects of the Communities that Care prevention system on youth reports of protective factors", *Prevention Science*, Vol. 16 No. 5, pp. 652–662.
- Kindt, K.C.M., Kleinjan, M., Janssens, J.M.A.M. and Scholte, R.H.J. (2014), "Evaluation of a school-based depression prevention program among adolescents from low-income areas: a randomized controlled effectiveness trial", *International Journal of Environmental Research and Public Health*, Vol. 11 No. 5, pp. 5273–5293.
- Kösters, M.P., Chinapaw, M.J.M., Zwaanswijk, M., van der Wal, M.F. and Koot, H.M. (2015), "Indicated prevention of childhood anxiety and depression: results from a practice-based study up to 12 months after intervention", *American Journal of Public Health*, Vol. 105 No. 10, pp. 2005–2013.
- Kuosmanen, T., Fleming, T.M., Newell, J. and Barry, M.M. (2017), "A pilot evaluation of the SPARX-R gaming intervention for preventing depression and improving wellbeing among adolescents in alternative education", *Internet Interventions*, Vol. 8, pp. 40–47.
- Lewis, K.M., DuBois, D.L., Bavarian, N., Acock, A., Silverthorn, N., Day, J., Ji, P., Vuchinich, S. and Flay, B.R. (2013), "Effects of Positive Action on the emotional health of urban youth: a cluster-randomized trial", *Journal of Adolescent Health*, Vol. 53 No. 6, pp. 706–711.

Lewis, K.M., Vuchinich, S., Ji, P., DuBois, D.L., Acock, A., Bavarian, N., Day, J., Silverthorn, N. and Flay, B.R. (2016), "Effects of the Positive Action program on indicators of positive youth development among urban youth", *Applied Developmental Science*, Vol. 20 No. 1, pp. 16–28.

Lillevoll, K.R., Vangberg, H.C.B., Griffiths, K.M., Waterloo, K. and Eisemann, M.R. (2014), "Uptake and adherence of a self-directed internet-based mental health intervention with tailored e-mail reminders in senior high schools in Norway", *BMC Psychiatry*, Vol. 14 No. 1, p. 14.

Lintvedt, O., Griffiths, K., Sørensen, K., Østvik, A., Wang, C., Eisemann, M. and Waterloo, K. (2013), "Evaluating the effectiveness and efficacy of unguided internet-based self-help intervention for the prevention of depression: a randomized controlled trial", *Clinical Psychology & Psychotherapy*, Vol. 20 No. 1, pp. 10-27.

Lucassen, M.F.G., Merry, S.N., Hatcher, S. and Frampton, C.M.A. (2015), "Rainbow SPARX: a novel approach to addressing depression in sexual minority youth", *Cognitive and Behavioral Practice*, Vol. 22 No. 2, pp. 203-216.

Merry, S.N., Stasiak, K., Shepherd, M., Frampton, C., Fleming, T. and Lucassen, M.F.G. (2012), "The effectiveness of SPARX, a computerised self help intervention for adolescents seeking help for depression: randomised controlled non-inferiority trial" *BMJ*, Vol. 344.

Miller, L.D., Laye-Gindhu, A., Bennett, J.L., Liu, Y., Gold, S., March, J.S., Olson, B.F. and Waechter, V.E. (2011), "An effectiveness study of a culturally enriched school-based CBT anxiety prevention program", *Journal of Clinical Child and Adolescent Psychology*, Vol. 40 No. 4, pp. 618–629.

Mostert, J. and Loxton, H. (2008), "Exploring the effectiveness of the FRIENDS Program in reducing anxiety symptoms among South African children", *Behaviour Change*, Vol. 25 No. 2, pp. 85–96.

O’Kearney, R., Gibson, M., Christensen, H. and Griffiths, K.M. (2006), "Effects of a cognitive-behavioural Internet program on depression, vulnerability to depression and stigma in adolescent males: a school-based controlled trial", *Cognitive Behaviour Therapy*, Vol. 35 No. 1, pp. 43–54.

O’Kearney, R., Kang, K., Christensen, H. and Griffiths, K. (2009), “A controlled trial of a school-based internet program for reducing depressive symptoms in adolescent girls”, *Depression and Anxiety*, Vol. 26 No. 1, pp. 65–72.

Perry, Y., Werner-Seidler, A., Calear, A., Mackinnon, A., King, C., Scott, J., Merry, S., Fleming, T., Stasiak, K., Christensen, H. and Batterham, P.J. (2017), “Preventing depression in final year secondary students: school-based randomized controlled trial”, *Journal of Medical Internet Research*, Vol. 19 No. 11, p. e369.

Poppelaars, M., Tak, Y.R., Lichtwarck-Aschoff, A., Engels, R.C.M.E., Lobel, A., Merry, S.N., Lucassen, M.F. and Granic, I. (2016), “A randomized controlled trial comparing two cognitive-behavioral programs for adolescent girls with subclinical depression: a school-based program (Op Volle Kracht) and a computerized program (SPARX)”, *Behaviour Research and Therapy*, Vol. 80, pp. 33–42.

Rivers, S.E., Brackett, M.A., Reyes, M.R., Elbertson, N.R. and Salovey, P. (2013), “Improving the social and emotional climate of classrooms: a clustered randomized controlled trial testing the RULER approach”, *Prevention Science*, Vol. 14 No. 1, pp. 77–87.

Rodgers, A. and Dunsmuir, S. (2015), “A controlled evaluation of the “FRIENDS for life” emotional resiliency programme on overall anxiety levels, anxiety subtype levels and school adjustment”, *Child and Adolescent Mental Health*, Vol. 20 No. 1, pp. 13–19.

Salmivalli, C. and Poskiparta, E. (2012), “Making bullying prevention a priority in Finnish schools: the KiVa antibullying program”, *New Directions for Youth Development*, Vol. 2012 No. 133, pp. 41–53.

Semeniuk, Y., Brown, R.L., Riesch, S.K., Zywicki, M., Hopper, J. and Henriques, J.B. (2010), “The Strengthening Families Program 10-14: influence on parent and youth problem-solving skill”, *Journal of Psychiatric and Mental Health Nursing*, Vol. 17 No. 5, pp. 392–402.

Silverthorn, N., DuBois, D.L., Lewis, K.M., Reed, A., Bavarian, N., Day, J., Ji, P., Acock, A.C., Vuchinich, S. and Flay, B.R. (2017), “Effects of a school-based social-emotional and character development program on self-esteem levels and processes: a cluster-randomized controlled trial”, *SAGE Open*, Vol. 7 No. 3.

Skärstrandt, E., Sundell, K. and Andréasson, S. (2013), “Evaluation of the Swedish version of the Strengthening Families Programme”, *European Journal of Public Health*, Vol. 24 No. 4, pp. 578-584.

Kuosmanen, T., Clarke, A. M., & Barry, M. M. (2019). Promoting adolescents’ mental health and wellbeing: evidence synthesis. *Journal of Public Mental Health*. <https://doi.org/IPMH-07-2018-0036>

Skryabina, E., Taylor, G. and Stallard, P. (2016), "Effect of a universal anxiety prevention programme (FRIENDS) on children's academic performance: results from a randomised controlled trial", *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, Vol. 57 No. 11, pp. 1297–1307.

Snyder, F., Flay, B., Vuchinich, S., Acock, A., Washburn, I., Beets, M. and Li, K.K. (2010), "Impact of a social-emotional and character development program on school-level indicators of academic achievement, absenteeism, and disciplinary outcomes: a matched-pair, cluster-randomized, controlled trial", *Journal of Research on Educational Effectiveness*, Vol. 3 No. 1, pp. 26–55.

Snyder, F.J., Vuchinich, S., Acock, A., Washburn, I.J. and Flay, B.R. (2012), "Improving elementary school quality through the use of a social-emotional and character development program: a matched-pair, cluster-randomized, controlled trial in Hawai'i", *Journal of School Health*, Vol. 82 No. 1, pp. 11–20.

Spoth, R., Redmond, C., Shin, C. and Azevedo, K. (2004), "Brief family intervention effects on adolescent substance initiation: school-level growth curve analyses 6 years following baseline", *Journal of Consulting and Clinical Psychology*, Vol. 72 No. 3, pp. 535–542.

Spoth, R.L., Randall, G.K., Trudeau, L., Shin, C. and Redmond, C. (2008), "Substance use outcomes 5½ years past baseline for partnership-based, family-school preventive interventions", *Drug and Alcohol Dependence*, Vol. 96 No. 1, pp. 57–68.

Spoth, R., Trudeau, L., Redmond, C. and Shin, C. (2014), "Replication RCT of early universal prevention effects on young adult substance misuse", *Journal of Consulting and Clinical Psychology*, Vol. 82 No. 6, pp. 949–963.

Stopa, J.E., Barrett, P.M. and Golingi, F. (2010), "The prevention of childhood anxiety in socioeconomically disadvantaged communities: a universal school-based trial", *Advances in School Mental Health Promotion*, Vol. 3 No. 4, pp. 5–24.

Stormshak, E.A., Connell, A.M., Veronneau, M.-H., Myers, M.W., Dishion, T.J., Kavanagh, K. and Caruthers, A.S. (2011), "An ecological approach to promoting early adolescent mental health and social adaptation: family-centered intervention in public middle schools", *Child Development*, Vol. 82 No. 1, pp. 209–225.

Stormshak, E.A., Fosco, G.M. and Dishion, T.J. (2010), "Implementing interventions with families in schools to increase youth school engagement: The Family Check-Up model", *School Mental Health*, Vol. 2 No. 2, pp. 82–92.

Kuosmanen, T., Clarke, A. M., & Barry, M. M. (2019). Promoting adolescents' mental health and wellbeing: evidence synthesis. *Journal of Public Mental Health*. <https://doi.org/IPMH-07-2018-0036>

Trudeau, L., Spoth, R., Randall, G.K. and Azevedo, K. (2007), “Longitudinal effects of a universal family-focused intervention on growth patterns of adolescent internalizing symptoms and polysubstance use: gender comparisons”, *Journal of Youth and Adolescence*, Vol. 36 No. 6, pp. 725–740.

Velasco, V., Griffin, K.W., Botvin, G.J., Corrado Celata and Gruppo LST Lombardia (2017), “Preventing adolescent substance use through an evidence-based program: effects of the Italian adaptation of Life Skills Training”, *Prevention Science*, Vol. 18, pp. 394-405.

Wasserman, D., Hoven, C.W., Wasserman, C., Wall, M., Eisenberg, R., Hadlaczky, G., et al. (2015), “School-based suicide prevention programmes: the SEYLE cluster-randomised, controlled trial”, *The Lancet*, Vol. 385 No. 9977, pp. 1536–1544.

Wijnhoven, L.A.M.W., Creemers, D.H.M., Vermulst, A.A., Scholte, R.H.J. and Engels, R.C.M.E. (2014), “Randomized controlled trial testing the effectiveness of a depression prevention program (‘Op Volle Kracht’) among adolescent girls with elevated depressive symptoms”, *Journal of Abnormal Child Psychology*, Vol. 42, pp. 217-228.

Williford, A., Boulton, A., Noland, B., Little, T.D., Kärnä, A. and Salmivalli, C. (2012), “Effects of the KiVa anti-bullying program on adolescents’ depression, anxiety, and perception of peers”, *Journal of Abnormal Child Psychology*, Vol. 40 No. 2, pp. 289–300.