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<th><strong>Title</strong></th>
<th>Promoting adolescents’ mental health and wellbeing: evidence synthesis</th>
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<td>Kuosmanen, Tuuli; Clarke, Aleisha M.; Barry, Margaret M.</td>
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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, CHAFEA, 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](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 (Snilstveit
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**

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

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*(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*
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., 2014), 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 (Stormshark 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 (Skärstrandt 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 eCBT 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; Poppelaaars 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)


## Online Supplement 1. Search terms used for searching electronic databases

<table>
<thead>
<tr>
<th>Positive mental health terms</th>
<th>Negative mental health terms</th>
<th>Type of intervention</th>
<th>Population and setting terms</th>
<th>Web terms</th>
<th>Programme terms</th>
<th>Study terms</th>
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<td>Young people OR</td>
<td>Internet OR</td>
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<td>Web</td>
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<td>Online OR</td>
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<td>Computerized OR</td>
<td>Support</td>
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<td>mild OR</td>
<td>“Alternative education” OR</td>
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<td>Self-harm</td>
<td>subclinical OR</td>
<td>School OR</td>
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<td>eHealth</td>
<td>Practice</td>
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<td>After-school OR</td>
<td>mhealth</td>
<td>Efficacy</td>
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<td>“Managing feelings”</td>
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<td>Classroom OR</td>
<td>Mobile</td>
<td>Impact</td>
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<td>“Self esteem”</td>
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<td>eMail</td>
<td>Effectiveness</td>
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<td>“Self efficacy”</td>
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<td>Feasibility</td>
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<td>“Self control”</td>
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<td>Mastery</td>
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<td>“Self awareness”</td>
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<td>Empathy</td>
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<tr>
<td>“Positive psychology”</td>
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<td>Psychoeducation</td>
<td>Mindfulness</td>
<td>Juvenile OR</td>
<td>Computerised OR</td>
<td>Training</td>
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<td>Bullying</td>
<td>Mindfulness</td>
<td>Juvenile OR</td>
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<td>“Conflict resolution”</td>
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<td>Character</td>
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<td>“Youth development”</td>
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* 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

<table>
<thead>
<tr>
<th>Program</th>
<th>Country of origin</th>
<th>Primary focus</th>
<th>Theoretical background</th>
<th>Target Audience</th>
<th>Who delivers</th>
<th>Program components</th>
<th>Duration</th>
<th>Resources and training</th>
<th>Effectiveness</th>
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</thead>
<tbody>
<tr>
<td><strong>Positive Attitude</strong></td>
<td>Portugal</td>
<td>Social and Emotional Skills (SES)</td>
<td>SEL, CASEL</td>
<td>Children and adolescents 9-14 years</td>
<td>Educational psychologist</td>
<td>3 programs: 4th grade, middle school, high middle school</td>
<td>13-15*1h per year</td>
<td>Program manual with detailed lesson plans Monitoring: weekly meetings and monthly and yearly reports</td>
<td>Social awareness, self-control, self-esteem, social isolation and social anxiety (+) (Coelho et al., 2015; Coelho &amp; Sousa, 2017)</td>
</tr>
<tr>
<td><strong>Skills for Life</strong></td>
<td>Netherlands</td>
<td>Substance misuse/Problem behaviours</td>
<td>Botvin's theory of competence learning Social learning theory, Rational Emotive Behaviour Therapy</td>
<td>Adolescents 13-17 years</td>
<td>Teacher</td>
<td>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</td>
<td>14*60min per year OR 25 lessons over 2 years</td>
<td>2 * 3h training + 2 booster sessions</td>
<td>Alcohol use (+), tobacco use (-), cannabis use (0), bullying behaviour (+) Students with lower educational level: suicidal ideation (+) (Fekkes et al., 2016) Suicidality, self-esteem, self-efficacy, emotion regulation (+) (Gravestijn et al., 2011)</td>
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<tr>
<td><strong>Positive</strong></td>
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<td>SES</td>
<td>Theory of self-concept,</td>
<td>Kindergarten</td>
<td>Teacher</td>
<td>Classroom curricula, school-wide development</td>
<td>140* 15-20 min per</td>
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<td>Academic performance(+)</td>
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</tbody>
</table>
| **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 (+) (Snyder et al., 2010; Snyder et al., 2012)**
Positive affect, life-satisfaction, depression and anxiety (+) (Lewis et al., 2013; Lewis et al., 2016; Silverthorn et al., 2017)
Substance use and sexual activity (+) (Beets et al., 2009) |
| **RULER** | **US** | **SES** | **Ability model of emotional intelligence, CASEL** | **Kindergarten to 8th 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 (+) (Brackett et al., 2012)
Classroom quality (+) (Hagelskamp et al., 2013)
Teacher-student relationships and support (+), student autonomy and leadership (+), (Rivers et al., 2013)** |
| **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 (+) (Eisen et al., 2003)** |
### Life Skills Training

**US**

| 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) | Manualed |

**Variety of teaching methods:** instruction, demonstration, feedback, reinforcement, and practice

### Depression and anxiety prevention

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

(*) denotes significant positive effect (p>0.05) on the specified outcome, (0) denotes no significant effect and (-) denotes a significant negative effect.
<table>
<thead>
<tr>
<th>Country</th>
<th>Domain</th>
<th>Program Name</th>
<th>Population/Selection</th>
<th>Format</th>
<th>Coaches/Leaders</th>
<th>Key Components</th>
<th>Duration</th>
<th>Training/Supervision</th>
<th>Intervention Integrity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Depression (Universal/targed)</td>
<td>Penn Resiliency Program</td>
<td>Adolescents 10-15 years (self selected)</td>
<td>CBT</td>
<td>Two group leaders including teachers, school counsellors, research staff, graduate students and psychologists</td>
<td>1) CBT: Identifying and evaluating pessimistic thoughts, relaxation, emotion regulation; 2) Social problem-solving: assertiveness, decision making, and coping with conflict</td>
<td>12*90min weekly sessions</td>
<td>30h/6 days training + biweekly supervision with program developers</td>
<td>Assessed by audio recording and reviewing selected sessions</td>
<td>Depression (+) (Chaplin et al., 2006; Gillham et al., 2012)</td>
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<td>UK (The UK Resilience Program): Depression (0) (universal delivery, Challen et al., 2014)</td>
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<td>Netherlands (Op Volle Kracht): Depression (0) (universal delivery, Kindt et al., 2014)</td>
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<td>Depression (+) (targeted delivery, Wijnhoven et al., 2014)</td>
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<td>Ireland</td>
<td>Anxiety, depression, separation anxiety (+)</td>
<td>(Rodgers &amp; Dusmuir, 2015)</td>
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<tr>
<td>Netherlands</td>
<td>Anxiety and depression (Kösters et al., 2015)</td>
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<tr>
<td>Germany</td>
<td>Anxiety, depression, perfectionism (+) (Essau et al., 2012)</td>
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<td>UK</td>
<td>Anxiety (+) when delivered by health professionals (Skryabina et al., 2016)</td>
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<tr>
<td>Spain</td>
<td>Anxiety and depression (+) (Balle &amp; Tortella-Feliu, 2010)</td>
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</table>
(+), (-) and (0) denote significant positive effect, negative effect and no significant effect respectively on the specified outcome. This is in line with Wasserman et al., (2015). 

### Suicide prevention

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<tbody>
<tr>
<td><strong>Program</strong></td>
<td><strong>Primary focus</strong></td>
<td><strong>Theoretical background</strong></td>
<td><strong>Target audience</strong></td>
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<tr>
<td>Youth Aware</td>
<td>Suicide</td>
<td>Psycho-education and coping</td>
<td>Adolescents 14-15 years</td>
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<tr>
<td>Mental Health</td>
<td>EU</td>
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### Bullying prevention

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<tr>
<td><strong>Program</strong></td>
<td><strong>Primary focus</strong></td>
<td><strong>Theoretical background</strong></td>
<td><strong>Target audience</strong></td>
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<tr>
<td>Kiva</td>
<td>Bullying</td>
<td>Multifaceted Research on</td>
<td>Adolescent 9-13 years</td>
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<td>Finland</td>
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<td>social standing</td>
<td>EU</td>
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</table>
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 (+) (Salmivalli & Poskiparta, 2012)
Internalizing problems (+), negative peer perceptions (+), empathy (+), constructive bystander behaviour (+) (Williford et al., 2011).

(+ ) 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

<table>
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<tr>
<th>Program</th>
<th>Primary focus</th>
<th>Theoretical background</th>
<th>Target audience</th>
<th>Who delivers</th>
<th>Program components</th>
<th>Duration</th>
<th>Resources and training</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengthening Families 10-14</td>
<td>Substance misuse Behavioural problems</td>
<td>Biopsychosocial model</td>
<td>Children and adolescents 10-14 years</td>
<td>Three to five person teams of trained facilitators (community workers)</td>
<td>Seven weekly sessions: 6<em>2-hour sessions (one-hour parent and child skills-building followed by a one-hour family session) and 1</em>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</td>
<td>Seven weeks</td>
<td>3-day training</td>
<td>Lifetime use of alcohol, cigarettes and marijuana (+) (Spoth et al., 2004). Rate of increase in internalizing symptoms and polysubstance use (+) (Trudeau et al., 2007). Youth hostility (+), parent hostility and parent positive problem solving (-) (Semeniuk et al., 2010). <strong>UK</strong>: Substance use, aggressive behaviours, school absence, parenting behaviour, measures of</td>
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Family Check-Up

USA

| Behavioural problems | Motivational interviewing | Children 6-12 years | Therapist, social worker, University employee | Stage 1: 3*3h sessions: 1) Goals and concerns and motivation for change, 2) Assessment of needs, 3) Feedback session. Stage 2: 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

<table>
<thead>
<tr>
<th>Program Country of origin</th>
<th>Primary focus</th>
<th>Theoretical background</th>
<th>Target audience</th>
<th>Who delivers</th>
<th>How?</th>
<th>Duration</th>
<th>Resources and training</th>
<th>Effectiveness</th>
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<tbody>
<tr>
<td>Communities</td>
<td>Problem</td>
<td>Social Development</td>
<td>Adolescents</td>
<td>Community leaders</td>
<td>A prevention operating system providing a</td>
<td>9-12</td>
<td>Six trainings from</td>
<td>Delinquent behaviour (+) (Hawkins et al., 2008),</td>
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<td>that Care</td>
<td>behaviours</td>
<td>Model</td>
<td>10-14</td>
<td>identify an existing or new community coalition of diverse stakeholders responsible of program implementation</td>
<td>method for helping communities to select and implement evidence-based programs</td>
<td>months</td>
<td>Communities that Care trainers</td>
<td>initiation of alcohol and tobacco use (+) (Hawkins et al, 2009)</td>
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<tr>
<td>US</td>
<td>Substance misuse</td>
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<td>Five stages:</td>
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<td>6 years follow-up: Incidence and prevalence of substance misuse, delinquency and violence (+) (Hawkins et al., 2012).</td>
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<td>1) Assess community readiness</td>
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<td>8 years follow-up: Abstinence from use of drugs, alcohol or cigarettes (+) and engaging in delinquency (+) (Hawkins et al., 2014)</td>
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<td>2) Get organized at community level</td>
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<td>Protection factors at community, school and peer/individual domains (+), protective factors on family domain (0) (Kim et al., 2015)</td>
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<td>3) Profile young people’s problem behaviours</td>
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<td>4) Develop a plan based on effective strategies</td>
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<td>5) Implement and evaluate</td>
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| Youth United – Youth Social Action Trials | 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 | Communities that Care trainers | Confidence, team-work and willingness to help others (+), Academic attainment (0) (Godard et al, 2016) |

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

<table>
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<tr>
<th>Program</th>
<th>Primary focus</th>
<th>Theoretical background</th>
<th>Target audience</th>
<th>Who delivers</th>
<th>Program components</th>
<th>Duration</th>
<th>Resources and training</th>
<th>Effectiveness</th>
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<tbody>
<tr>
<td>MoodGYM</td>
<td>Depression and anxiety</td>
<td>CBT</td>
<td>Adolescents 12+ years</td>
<td>Teacher</td>
<td>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</td>
<td>5*20-45min weekly modules</td>
<td>A teacher's manual</td>
<td>Anxiety (+), male depression (+), female depression (0) (Calear et al., 2009) Depression, attributional styles and self-esteem (+) for males completing 3 or more modules (O’Kearney et al. 2006) Depression (+) in females (O’Kearney et al., 2009) Norway: Depression, negative automatic thoughts (+) (college students, Lindvedt et al., 2011) Depression (0) (Lillevoll et al., 2014)</td>
</tr>
<tr>
<td>SPARX</td>
<td>Depression</td>
<td>CBT</td>
<td>Adolescents 12-19 years seeking help for depression</td>
<td>Psychologist/ AE teacher/researcher</td>
<td>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</td>
<td>7*25min sequential levels</td>
<td>-</td>
<td>Non inferior to TAU in reducing depression and on all secondary outcome measures (remission, hopelessness, anxiety, quality of life) (Merry et al., 2012) Depression (+) (Fleming et al., 2012) Netherlands: Depression (0) (Poppelaars et al., 2016)</td>
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<td>and interpersonal skills, emotion regulation, problem solving, cognitive restructuring, mindfulness</td>
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**SPARX-R**: Depression (+) (Perry et al., 2017)

**SPARX-R, Ireland**: Emotion regulation (+), depression, anxiety, coping skills, wellbeing (0) (Kuosmanen et al., 2017)

Rainbow SPARX**: Depression (+) (Lucassen et al., 2015)

*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


