1.0 Project Title

An online parenting intervention to prevent affective disorders in high-risk adolescents: The PIPA trial

2.0 Background

2.1 Existing research

The problem of adolescent depression

Depression in young people is a global public health problem(1). In the UK, it is projected that annual total costs for depression will be over £10 billion by 2019, with costs highest in younger groups(2). Roughly half of all lifetime mental disorders start by mid-teens and three-quarters by mid-20s(3). Early onset depressive disorders, especially if untreated, tend to become chronic or relapsing, increase suicide risk, and lead to a wide range of psychosocial and vocational impairments(4-6). Although intervention efforts for these disorders continue to progress, a large proportion of the burden of disease is still unable to be averted even with optimal treatment(7). Of particular concern, even when depressive symptoms are sub threshold, young people experience greater functional impairment, suicidality(8) and elevated risk of developing an affective disorder(9, 10). Hence, there is an urgent need for an effective, integrated approach to prevent depression, especially for young people. As the incidence of depression rises sharply during adolescence, early adolescence is a particularly opportune time to target preventive efforts(11).

There is, hence, an urgent need for a greater focus on prevention with policy documents such as the Royal College of Psychiatrists "No Health Without Public Mental Health" and the "Five Year Forward View for Mental Health" advocating public mental health approaches(12, 13). A recent UK government green paper has also highlighted the importance of the prevention of mental health problems in Young People(14).

Parents have an important role in prevention

Strategic settings for targeting preventive interventions for youth depression include the family, school, media, and the Internet. We focus here on the family setting, particularly parents, for various reasons. Firstly, young people see their family, especially their parents, as important in their lives, especially when it comes to their own mental health. Various national surveys have found that parents are the most commonly-mentioned source of help for young people when they have mental health difficulties(15, 16) Secondly, parents are intrinsically motivated to take action for their child's well-being, and may possess the wisdom and life experience to help them appreciate the value of prevention(17). Thirdly, most adolescents still live with their parents (or at least one parent) and this proximity affords parents the opportunities to notice significant changes in their child's mental health and behaviour. As argued by proponents of family process(18) and family system(19) models, this proximity underscores the importance of parents in the development and maintenance of youth internalizing problems. Fourthly, international policies and action plans related to mental health have recognized the importance of upskilling parents for the goal of prevention and promotion of child and youth mental and emotional well being(14, 20-23).

Finally, there is now robust evidence delineating risk and protective factors for adolescent depressive disorders(17, 24). Importantly, some of these factors are within parents' control or influence, and are potentially modifiable(25). These include factors that involve the family system (e.g. inter-parental conflict(26)), can be

detected early by parents (e.g. behaviorally inhibited temperament (24)), or are directly socialized or modeled by parents (e.g. parental responses to child emotions(27)). Specifically, our recent meta-analysis identified a sound evidence base for three protective parental factors (warmth, autonomy granting, and monitoring and three risk factors for depression (inter-parental conflict, over-involvement, and aversiveness)(28). Other factors that do not yet have sufficient evidence demonstrating parental influence have also been endorsed by international experts as potentially modifiable by parents (e.g. healthy sleep, diet, and physical activity)(29). Hence, **research on risk and protective factors underscores the important role parents can play in prevention.** However, findings from a national survey of Australian parents revealed that parents' knowledge about what they can do to reduce their adolescent's risk of depression is less than optimal(30), highlighting a need to equip parents through more effective translation of evidence into preventive resources. More locally Birmingham Education Partners NewStart programme also revealed the lack of resource available to engage with parents of adolescents around mental health problems.

Limitations of existing prevention programmes for adolescent depression

There is now a plethora of preventive programs for adolescent depression, especially interventions (largely psychological in nature) that are *targeted towards young people directly*, with evidence of continued efficacy at 12 months post-intervention(31). Some of these programmes include a minimal parent component, but most are limited to teaching parents the skills their adolescents are being taught(32, 33). Notably, **many programmes fail to adequately address modifiable risk and protective parenting factors for adolescent depression**.

In contrast, our Australian collaborator Yap and colleagues demonstrated through a recent meta-analysis that **prevention interventions targeting parents *primarily,* can produce lasting benefits for child internalizing, depression and anxiety outcomes**(34). The meta-analysis included RCTs of preventive parenting programs only if parents received the *majority* of the intervention. Notably, we found remarkably long-term effects on child anxiety (up to 11 years post intervention) and depression (up to 5.5 years) symptoms and diagnoses. Moreover, although very few RCTs assessed long-term diagnostic outcomes, pooled effects for anxiety diagnoses indicated a promising number-needed-to-treat (NNT) of 10, and for depression diagnoses the NNT (albeit marginally significant) was 11; these are similar to the NNT for the prevention of cases of depression using programmes targeting young people directly, at short-term follow-up (NNT=11)(31). Preventive parenting interventions can be *universal* (i.e. delivered to all parents regardless of risk); *selective* (targeting parents whose children have known risk factors); or *indicated* (targeting parents whose children show signs or symptoms of emerging disorders)(35). In Yap and colleagues' review(34), there was no evidence that type of prevention (universal, selective, or indicated) moderated intervention effects. However, most programmes (47 out of 50) were designed for parents of *pre-adolescent children*; only 3 (with mixed evidence) were appropriate for parents of adolescents. Moreover, most existing parenting programs are *limited in their public health benefit* because they involve trained professionals and are expensive to disseminate widely in the community. Finally, many programmes are not well-used even when available due to various barriers, e.g. scheduling difficulties, privacy concerns(36). Hence, **there is a largely untapped potential of preventive programmes for parents of *adolescents***.

Potential of a web-based parenting intervention

With the increasing reach of the internet, the use of web-based media has been recommended as one key way to increase participation rates in preventive

interventions(37). For example, in the UK in 2017, 98% of households with children have internet access(38).The internet has become a popular source of information on parenting and child mental health amongst parents(4, 39), and a recent survey found that the idea of a tailored online parenting program for parents of adolescents was viewed favorably(40) Based on Yap and colleagues' recent systematic review(34) and a search of major clinical trial registries, *there is currently no widely-accessible, tailored web-based parenting intervention to prevent adolescent depression.* Yet, web-based interventions hold great promise because they have the potential to overcome the above-mentioned barriers of existing face-to-face programmes, due to their anonymity, flexibility and accessibility; and implementation fidelity is guaranteed by computerised delivery(41). Online interventions have now demonstrated effectiveness(41) and cost-effectiveness(42) for treating depression. Promising evidence is also emerging for online prevention programmes targeting young people directly(43), as well as parents of younger children(44, 45). The potential efficacy of web-based prevention programs that target parents of adolescents remains largely untapped, but such programs would comprise a promising public health approach to preventing adolescent depression that is potentially lower in cost per individual than existing programs(46).

An important limitation of existing preventive interventions for adolescent internalizing disorders is that they only focus on one or a few parenting risk or protective factors for adolescent depression(19, 47, 48). This narrow-focus approach means that programs may not adequately address the range of modifiable parenting factors for adolescent depression that are relevant for each parent/family. The capacity of digital technology to automatically tailor a web-based intervention to each user offers a potential solution to this limitation. Automated tailoring is beneficial when it involves screening each parent across all evidence-based risk and protective factors to ensure a more thorough coverage of areas that may be important to target in the intervention. In doing so, the program has greater breadth without imposing unnecessary burden on parents (due to the inclusion of less-relevant topics). Importantly, a tailored web-based intervention provides some personalization of the program for the parent without requiring the costly involvement of trained professionals, hence increasing the intervention's perceived relevance(49), effectiveness(50), and potential for scalability and sustainability(49).

To fill this critical gap in adolescent depression prevention, our Australian collaborators developed the web-based PiP intervention. The PiP program assesses each parent in 9 modifiable parental domains that have been endorsed by research evidence(28) and international experts(29) as important risk or protective factors and then delivers a tailored parenting programme. In their RCT of the PiP programme with 359 parent-adolescent dyads, they found greater improvement in parenting in the intervention group (Cohen's d=0.51), compared to an active -control. Among adolescents with elevated depressive symptoms at baseline (n=105), the intervention group showed greater symptom reduction.

2.2 Risks and benefits

The risks of participating in this research are discussed under Ethical arrangements (Section 13) below. Briefly, risks include participant burden and a potential increase in distress and stigma from identifying children as at risk. We outline in Section 13 the measures we will take to mitigate these risks. There is some minor impact on schools and school staff if they are asked to help in screening the pupils and may, potentially, increase burden on local services if there is an increase in referrals to health services precipitated by the RCT. We do not anticipate this will be significant and is likely to involve young people or families who do actually need help; the unmet

need for depression in young people is high(51). We foresee a number of benefits. Clearly if the trial is successful there are anticipated improvements in young people's depressive symptoms and potentially financial savings for society. We hope that the trial will, in addition, raise mental health literacy in participating schools. Even among those who are not eligible for the trial (child is screened as 'close-to-average risk'), parents will be offered the self-guided online intervention if they wish to take this up.

2.3 Rationale for the current study

The study aims to adapt to the UK a tailored online parenting intervention to prevent depression that has been extensively piloted and found to be effective in Australia. There is a clear political imperative to improve youth mental health with an emphasis on prevention, but there are few scalable evidence-based preventive approaches. The recent UK government green paper "Transforming Children and Young People's Mental Health Provision" specifically cites early intervention strategies "This guidance will recommend that local authorities commission parenting programmes for which there is a good evidence base"(14). We feel that it is therefore propitious to thoroughly test in the UK an intervention that has been proven effective in Australia.

3. Research Objectives

The University of Warwick has a strategic alliance with Monash University in Australia and we have developed a specific partnership on youth mental health research supported by collaborative University funding. Here, as part of the Australian leadership in public youth mental health, our collaborators have developed Partners in Parenting (PiP), a novel tailored online intervention targeting parents of adolescents, and shown that it can reduce adolescent depressive symptoms. This proposal aims to investigate whether this online parenting intervention can be adapted to a UK context and can reduce the risk of affective disorders in adolescents at higher risk, using a randomized controlled trial methodology.

Objectives
1) To adapt an online parenting intervention, previously found to be effective in an Australian setting, to a UK context (months 0-6):

D1: An adapted online intervention to be delivered in the trial

2) To perform an internal pilot of a randomised controlled trial of the adapted online parenting intervention with progression criteria concerning recruitment and intervention adherence (months 7-15)

D2: Meeting the pre-set progression criteria (stop-go) to progress to a full trial

3) To complete the definitive RCT of the online parenting intervention, recruiting from schools in Birmingham and Coventry; includes a 12-month follow period (15 months after baseline) to assess if the intervention improves affective outcomes in this high risk group (months 16-45)

D3: Completion of the appropriately powered RCT;

D4 Analysis of the results, completion of a final report and recommendations for further wider uptake and implementation

4.0 Research design:

We propose a project with three linked work packages (WPs):
WP1: Adaptation of an Australian online program for a UK sample and an initial feasibility pilot with focus groups of parents, adolescents and teachers (stakeholders)
WP2: An internal pilot randomised controlled trial (RCT) of the online parenting intervention with *a priori* stop-go progression criteria(52)
WP3: A definitive RCT and economic evaluation of the intervention involving a 15-

month post-randomisation follow-up period, which will continue from the internal pilot, if progression criteria are met.

4.1 WP1 (Months 1-6): Adaptation of PiP to UK context

WP1 will be the adaptation phase of the Partners in Parenting (PiP) intervention, which was co-designed with Australian parents and adolescents and has been the subject of an RCT in Australia(53). We will recruit focus groups of teachers, parents, and young people from diverse ethnic and sociodemographic backgrounds. Teachers and parents will be given access to the original PiP program. After completing the program, they will work with the team to make changes in the language used (e.g. idioms), and any other minor adaptations to improve accessibility and engagement with the intervention, taking into account diversity issues. Parents will also review the factsheets that comprise the control programme, to ensure their relevance in the UK context. Pre and post-intervention assessment measures will be completed by these parents and their adolescents, to establish the feasibility of the outcome measures proposed for the RCT. At the end of WP1, we will have adapted the PiP intervention and piloted the delivery of the outcome measures.

4.2 WP2 (Month 7-15): Internal Pilot

This WP aims to conduct a 9-month internal pilot of the definitive RCT protocols, to establish the feasibility of the full PIPA trial. The trial protocol is detailed in WP3 below.
The progression criteria to the full trial will be set *a priori* and take place 9 months from trial commencement and will be based on recruitment, retention and intervention adherence.
We have provisionally set the stop-go criteria as follows:
1. Recruitment: At least 25 schools in the first 9 months, recruitment of at least 75 parent/child dyads and;
2) Retention: Over 70% of those reaching the 6 month assessment will complete the measures and;
3. Intervention adherence: Beyond 3 months post randomisation parents will have completed 50% of their chosen modules

NB. At the conclusion of the Australian trial, around 70% fully completed the interventions.

Final criteria will be agreed following consultation with the trial steering committee in conjunction with NIHR PHR.

4.3 WP3 (Month 16-45): Definitive RCT

4.3.1 Trial design:
This is a single-blind, prospective, parallel group intention-to-treat RCT with families randomized to the Partners in Parenting intervention or standard educational materials (control) group in a 1:1 ratio.

4.3.2 Study Setting

We will recruit families through both public and independent secondary schools in the large, ethnically diverse geographical regions of Birmingham and Coventry (combined population 1.5 million). We will recruit participating schools through existing contacts who have participated in our previous school studies and trials,

including members of our ‘Schoolspace’ network that recently participated in our school mental health trial(54) and the Birmingham Education Partnership.
We will recruit families through schools within this large, ethnically diverse geographical region of the West Midlands. We aim to oversample schools that have markers of socio-economic disadvantage, e.g. higher percentage of children receiving free school meals. We aim to recruit schools that are representative of the diverse ethnic mix of the region, using information kept by the local education authority on the ethnic mix of each school. During the adaptation of the intervention in WP1, we will selectively engage with parents and families from ethnically and sociodemographically diverse populations to ensure the intervention will meet their specific needs.

4.3.3 Eligibility criteria

i) The target population is parents of young adolescents (aged 11-15) Parents’ include all primary caregivers, including non-biological parents, grandparents, and legal guardians.
ii) Sufficient literacy levels to understand and engage with content delivered aurally or visually in English, and has regular access to the Internet and a personal email account (for email communication) or cell phone number (text messaging communication). Early adolescence represents the highest risk period for developing depression(55).
iii) Adolescents scoring 5 above on the SDQ(56, 57) Emotional Problems subscale, indicating higher-than-average risk for emotional problems.

There are no exclusion criteria.

4.3.4 Sampling

We aim to oversample schools that have markers of socio-economic disadvantage, e.g. higher percentage of children receiving free school meals. We also aim to recruit schools that are representative of the diverse ethnic mix of the region, using information kept by the local education authority on the ethnic mix of schools. Participating schools will be provided with detailed information on the study (including the pre-screening process) and will distribute this information to parents through their standard channels, including fliers in school bags, newsletter advertising, website advertising and parent information sessions.

4.3.5 Interventions

i). The Partners in Parenting (PiP) intervention

The PiP intervention (see video here) aims to increase parental protective factors and decrease parental risk factors associated with adolescent depression. The change in parenting factors (proximal outcome and direct target of the intervention) increases adolescent resilience and in turn reduces adolescent risk for affective disorders in the longer-term(58, 59). Improved parenting skills are expected to increase parents’ sense of efficacy about their parenting, which will in turn maintain their positive parenting skills(60). See **logic model figure** below:

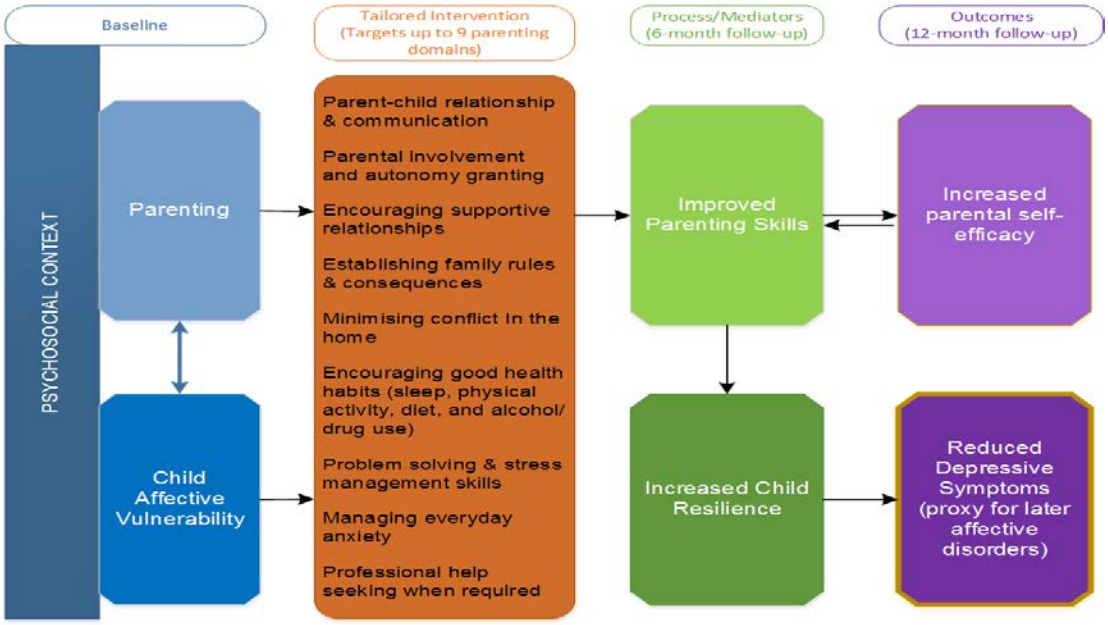

Figure 1: The PiPA trial logic model.

The PiP programme assesses each parent in 9 modifiable parental domains that have been endorsed by research evidence(28) and international experts(29) as important risk or protective factors, in order to identify the areas of parenting requiring improvement. The programme is then automatically tailored to each parent, ensuring that all areas for improvement (i.e. all risk and protective factors relevant to that parent) are targeted. PiP comprises two individually tailored components:

(1) An automated feedback report highlighting areas of strength and how parents can improve, which is provided immediately after parents complete an online measure assessing their current parenting practices(61); and

(2) An interactive program comprising up to 9 modules, with a different combination of modules specifically recommended for each parent based on identified areas for improvement(62).

When parents first see their recommended modules, they can further tailor their program by deselecting recommended modules and/or selecting additional modules. They then confirm their selection and commence their personalized programme.

The 9 modules cover the 9 parenting domains derived from the evidence-based(28) and international expert-endorsed(29) parenting guidelines developed by our Australian collaborators, titled *How to prevent depression and anxiety in your teenager: Strategies for parents* (63). When parents log in to their personalised dashboard on the website, they see their modules and any goals they have set, as well as their progress. Modules include illustrations, audio clips, vignettes, goal-setting exercises, and an end-of-module quiz with immediate feedback to consolidate learning. Module topics are shown in the logic model (Figure 1). Each module takes 15-20 minutes to complete, and one module per week is unlocked for parents, in a set order.

The PiP programme was designed to fulfil the principles of the evidence-based Persuasive Systems Design(64) model (using technology to influence behaviour change), which was found in a recent meta-analysis to be associated with greater program adherence(65). These principles include tailoring (e.g. feedback messages and module recommendations are tailored to each parent's strengths and

weaknesses); personalisation (e.g. all communications are personalised to the parent and adolescent); and self-monitoring (e.g. parents monitor their weekly goals on a personalized dashboard). The intervention is designed to be completed online, wherever it is convenient for the parent.

In the Australian RCT(53), intervention group parents completed a mean of 74% of their personalized PiP programme (comprising a mean of 6.85 modules). By the post-intervention assessment (3 months after baseline), 44% of parents had completed all their selected modules, and 15% of parents also completed a mean of 2 additional modules they had not initially selected. Attrition was relatively low in the intervention group, with 14% at post-intervention and 12% at 12-month follow-up.

ii) Control intervention: education regarding adolescent development.

Parents in the control arm will be provided with an online standardised package of educational materials about adolescent development and wellbeing. Each week for five weeks, parents receive an automated email inviting them to access their factsheet for that week (to match the expected mean number of modules received by the intervention group). To mirror the experience of intervention group parents accessing each module on the trial website, control group parents will access each factsheet by logging in to their dashboard. The factsheets provide general information to parents (without tailored, actionable strategies) and are designed to represent a selection of resources that are available to parents as part of the current UK health promotion approach for adolescent wellbeing. The materials were adapted from highly credible existing resources provided on the Raising Children Network website(66). Minor adaptations will be made to the language (e.g. idioms) following consultations with focus group parents as part of WP1. The topics of the five factsheets are as follows: 1) Teen development: An overview; 2) The teenager's developing brain; 3) The teenager's changing body; 4) Resilience; and 5) Happy teenagers and teenage wellbeing. We have chosen to use an active control in order to engage parents and to aid retention in their allocated group for the duration of the trial. In the Australian trial, attrition rates were low in the control group (9% at post-intervention, 12% at 12-month follow-up), and adherence was high (73% parents completed their program)(53), suggesting that this program was well-tolerated and considered acceptable by parents.

The interventions for both the Intervention and Control groups in the RCT will be delivered automatically by the dedicated trial website. Parents whose adolescent scores in the 'close to average' range and are not eligible for the RCT will also be offered PiP (without regular phone support), automatically delivered by the website.

iii) Adherence: All RCT parent participants will receive fortnightly check-in calls from a research staff member while they are completing their allocated program (intervention or active-control). Research staff will be trained to make these calls following a standard script (i.e. a standard list of questions and prompts), and will not provide individual advice or therapy. In the alternating weeks when parents do not receive a check-in call, they will receive reminder text messages from the same researcher who calls them, to maintain the personal support and accountability. The aims of these contact attempts are to address any study-related questions that arise, encourage parents to progress through their allocated program each week till completion, and enhance program adherence. In the intervention group however, the researcher will tailor additional support provided to the parent according to the needs of parents.
Based on research evidence that participant incentives can increase rate of completion of research assessments(67), we will be reimbursing parents and young

people for completion of the baseline and both follow-up assessments (£10 per assessment). This payment is in acknowledgement of time commitments required to complete research assessments and does not provide an excessive incentive. We will maintain regular contact with parents following completion of the intervention, for example with study update e-newsletters and birthday cards for the child. Using similar methods, the level of attrition at 12-month follow up was low in the Australian trial (less than 15%).

There are no NHS components to the study.

4.3.6 Outcomes

All measures will be taken at baseline, 6 and 15 months post randomisation (approx. 12 months post-intervention), unless otherwise stated.

Primary outcome: total score on the Short Mood and Feelings Questionnaire (SMFQ) (68) used in the Australian trial), at 15 months post-randomisation

Secondary outcomes:
1) Number of cases of adolescent depression or anxiety disorders up to 15 months post randomisation: Development and Well-Being Assessment (69) (computer-administered parent and child interviews at 15-months post-randomisation).
2) Adolescent anxiety symptoms (parent- and self-report): Spence Children's Anxiety Scale(70).
3) Adolescent wellbeing/resilience: SDQ(57, 71) and Warwick Edinburgh Mental Wellbeing Scale (parent- and child-report)(72, 73); Resilience Scale for Adolescents(74)(child-report).
4) Parenting (parent- and child-report): Parenting to Reduce Adolescent Depression and Anxiety Scale (PRADAS) developed and validated by the intervention developers in Australia(75); Children's Report of Parenting Behavior Inventory (CRPBI)(76); Parenting Self-Efficacy Scale (PSES)(77).
5) Cost-utility (health economic evaluation): Health-related quality of life measures in the child (Child Health Utility-9D; CHU-9D(78, 79), EQ-5D-5L-Y(80) and parent (EQ-5D-5L)(81) to calculate Quality Adjusted Life Years (QALYS).

All assessments will be completed online. As in the Australian trial, we will telephone parents in the intervention and control arms during the intervention period to encourage continued engagement and trouble-shoot; and in the intervention arm to discuss issues arising from the intervention.

4.3.7 Participant timeline
The participant flow is described in the uploaded file in the main application.

4.3.8 Sample Size

Based on the results from the large pilot RCT in Australia, for a subgroup of adolescents (n=105; 29% of pilot sample) with elevated scores on the SMFQ at baseline, the effect size of the intervention on depressive symptoms was 0.35 (Cohen's d). In our largely urban UK sample that will be pre –screened for emotional difficulties, we would anticipate similar or higher rates of elevated scores. As noted above, students at higher-than-average risk for emotional problems on the SDQ Emotional Problems subscale (about 20% of the screening sample) will be invited to participate in a randomised controlled trial with their parents. We anticipate a sample size of 433 families in the RCT will give sufficient power to investigate both the main effects of the intervention on the primary outcome but also enable an analysis of

high-risk groups such as children from low socioeconomic and BME backgrounds. This is based on an effect size of 0.35 for 90% power at the 5% level (n=346), assuming a correlation of .5 between pre- and post- intervention scores, and adding 20% loss to follow up. Assuming that this subgroup is 20% of the screened sample, and allowing up to 20% drop-off between in-school screening and completion of baseline assessments (and randomisation into the RCT), we will need to screen 2706 students. Based on our experience recruiting for similar trials through schools, we anticipate a 10% parental consent rate. With an average of 500 Years 7-10 students per school, we will need to engage with 55 schools to successfully recruit our screening sample.

4.3.9 Recruitment

Schools
We will initially include all state-funded secondary schools in Coventry and Birmingham in our sampling frame (approximately 101 schools). Each school will be categorised as either inner-city or not, to allow over-sampling of inner city schools. Within each category, schools will be approached/invited to participate in a pre-determined random order, with the ratio of inner city to non-inner city schools being 60:40 to ensure rapid recruitment (owing to greater number of eligible YP at inner-city schools) and greater chance of recruiting low SES/BME participants. In order to get 55 schools to participate, assuming 70% take-up, we would need to approach 80 schools. Should take up be less than 55%, or the number of each type of school (inner city vs not inner city) insufficient, then we will broaden the net to include secondary schools in the surrounding areas (Solihull, Warwickshire, Worcestershire, Staffordshire, etc) and recruit appropriate schools in random order.

Adolescents and their Parents/carers
Recruitment will be done through schools in our Birmingham and Coventry networks who will distribute letters to parents of young people in Years 7-10 (aged 11-15 years) explaining the study and inviting participation. Eligible parents are invited to register for the study and provide consent for their own and their adolescent's participation on the dedicated trial website. Consenting parents will complete the parent-report SDQ at registration.

All students in Years 7-10 with parental consent will subsequently complete an initial screen using the SDQ(57, 71). Screening will be done during the school day and at a time deemed suitable by individual schools. A flexible approach with regard to screening is necessary due to existing timetable commitments, which may vary in each setting. Screening will be done online via the trial website. Screening data will only be accessible by the research team using assigned logins and passwords. This will allow the research team to view the status of screening sessions. Data will be saved in a comma-separated values (csv) file and, following closure of screening, will be held securely by the research team. All data will be treated in confidence and will not be disclosed or used for any unrelated purposes (except by prior agreement with the participant or to address specified risks to the participant, researcher or others). If the research team identifies a young person deemed at risk or become concerned about their safety, the team will have a duty to inform a relevant member of staff.

Students who score 5 or above on the Emotional Problems subscale (indicating higher-than-average risk for emotional problems), will then be invited to participate in the RCT with their parents/caregivers (both parents if possible, but at least one). Based on SDQ data collected from a large UK population sample(82), we expect about 20% of students to score in this range. Parents of adolescents who score within the 'close to average' range (0-4) will be offered the Partners in

Parenting online programme to complete on their own (see Planned Interventions section below). These families, expected to represent about 80% of the pre-screened sample(82), will not be part of the RCT component of the project.

4.4 Allocation

The random sequence generation will be automated within the dedicated trial website, with participant assignment revealed to parents only after all consenting family members have completed their baseline assessments, hence ensuring allocation concealment. Each family will be assigned to the intervention or active-control condition in a 1:1 ratio using minimisation with a random element, stratified by age group, school and number of parents participating.

4.4.1 Masking and contamination

This trial is entirely delivered online and no intervention is delivered by the researchers. The participants are of course aware of their allocation. We will request that parents in the trial do not discuss the content with other parents. We will test for contamination this by asking the control group at the post-intervention time point whether there was any contact with others in the school participating in the trial.

4.4.2 Data collection and management

The PiP website incorporates all data collection and secure and anonymised data storage. Anonymised data can be generated from the website and exported in excel format for analysis, subject to University of Warwick policy.
All data will be stored immediately after generation in the University of Warwick Departmental Filestore, hosted by IT Services. The Filestore is hosted by IT services and this storage provides reliable and secure, medium-term storage for research data. IT Services provide an automated disk-to-disk backup, with full backups also being made to tape and backups being held in physically separate locations from the original data. Access to the data will be restricted to those with a valid right to access the information by applying relevant permissions to the folder in which it is stored. Data will be stored in in a suitable University of Warwick repository for at least 10 years after its last access, in accordance with University of Warwick Research Data Management Policy.

4.4.3 Statistical methods

All analyses will be performed on an intention-to-treat basis. The baseline characteristics of the study group will be presented using descriptive statistical methods. Continuous variables that follow an approximately normal (or symmetric) distribution will be summarized using means and standard deviations. Continuous variables that are skewed will be summarized using the median and inter-quartile range. Categorical data will be summarized using frequencies and percentages. Mental health and wellbeing, as assessed by the relevant primary and secondary outcomes, will be summarised at baseline, 6 and 15 months post randomization and the mean and 95% confidence intervals presented graphically, overall and by treatment group, over time.

The primary endpoint will be change in SMFQ score between entry to the study and 15 months post-randomisation and we will test the hypothesis that there is no difference in this between the control and intervention groups using a linear mixed model with school as a random effect and age group and number of participating parents/carers (1 or 2) as a fixed effect. The estimate of treatment effect from the

model will be presented with corresponding 95% confidence intervals. The number of cases of adolescent depression or anxiety disorders up to 15 months will be reported (overall and by treatment group) and multilevel Poisson models (adjusted, as above) used to assess any difference between the treatment arms. Similarly, appropriate linear mixed models, adjusted as above, will be developed to assess the impact of the intervention on each of the secondary outcome scales (SCAS, SDQ, WEMWB, PRADAS, CRPB) (depending on the distribution of scores). All scales will be scored according to the appropriate manual. Imputation of missing elements of individual scales will be considered if appropriate (>10% of overall scores are missing, ≤ 80% of individual elements are not missing, missing at random assumption holds). Distributional assumptions will be checked and outliers identified using graphical methods (such as histograms and box-plots). Pre-planned subgroup analyses, by school location (inner city vs not inner city), SES (low, vs rest) and ethnicity will also be undertaken and the estimated treatment effect for each presented in a Forest plot.

A detailed statistical analysis plan will be developed by the trial statisticians early in the trial and reviewed by the Chief Investigator, Steering Committee (SC), Project Management team (PMT) and, if appropriate, the Data Monitoring Committee.

4.4.4 Economic evaluation

A prospective economic evaluation, conducted from the recommended NHS and personal social services perspective, will be integrated into the trial(83). Primary research methods will be followed to estimate the costs of delivering the PiP programme, including programme development, web maintenance, participant monitoring activities, and any follow-up/management. Broader resource utilisation will be captured through two principal sources: (i) routine health and social service data collection systems; and (ii) bespoke participant online questionnaires administered at baseline, and at 6 and 15 months post-randomisation. Unit costs for health and social care resources will largely be derived from local and national sources and estimated in line with best practice. Primary research using established accounting methods might also be required to estimate unit costs. Child health-related quality of life will be measured at baseline and at each follow-up point using the Child Health Utility-9D; CHU-9D(78, 79) and the EQ-5D-5L-Y(80), whilst parental health-related quality of life will be measured at baseline and at each follow-up point using the EuroQol EQ-5D-5L (81). Responses to the multi-attribute utility measures will be converted into health utilities using established utility algorithms for the purposes of parent-child dyad quality-adjusted life year (QALY) estimation. The results of the economic evaluation will primarily be expressed in terms of incremental cost per QALY gained. We shall use non-parametric bootstrap estimation to derive 95% confidence intervals for mean cost differences between the trial groups and to calculate 95% confidence intervals for incremental cost effectiveness ratios(84). A series of sensitivity analyses will be undertaken to explore the implications of uncertainty surrounding the incremental cost-effectiveness ratios and to consider the broader issue of the generalisability of the study results. One such sensitivity analysis will involve adopting a societal perspective for the economic evaluation, which will incorporate productivity losses and economic values placed on school absences. In the baseline analysis, and for each sensitivity analysis, cost-effectiveness acceptability curves will be constructed using the net benefits approach(85). More extensive economic modeling using decision-analytic methods will extend the time horizon of the economic evaluation, drawing on best available information from the literature together with stakeholder consultations to supplement the trial data. Parameter uncertainty in the decision-analytic model will be explored using probabilistic sensitivity analysis. Longer term costs and consequences will be

discounted to present values using discount rates recommended for technology appraisal in the United Kingdom(83).

4.4.5 Process evaluation

We will employ process evaluation at different stages throughout the study to ensure we have a clear understanding of how the study is functioning at each stage. Recruitment of sufficient eligible participants and engagement with the study are clearly priorities for success of any intervention trial and we will monitor recruitment iteratively at every stage of the trial.

Additionally at adaptation stage (WP1) we will examine:

- Recording of any adaptations necessary to language and idiom within the online educational materials to ensure they are appropriate to the local population and ensure our recruitment materials and promotional information materials reflect these adaptations

At pilot stage (WP2) we will consider:

- Recruitment patterns especially reasons for non-participation in the intervention by those eligible to participate. This will take the form of a small number of multiple-choice questions regarding reasons for non-participation or participation included as part of the study information sheet (with paid for return envelope) sent out by schools to parents including an open text field to capture any additional reasons not recorded. Potential participant parent/carers will be asked to return the both the signed consent form and the completed questionnaire in the envelope that was provided, but also to send the questionnaire sheet back even if they had decided *not* to participate, and to assess their reasons for non-participation. We anticipate that we will also be able to use the schools online communication system with parents to send an online request for participation alongside the letter and include these questions on participation in that email communication. This in turn would inform the recruitment strategy for the main intervention phases and allow us to address modifiable barriers to engagement. We will consider a short telephone survey of a random sample of those deemed eligible to participate with advice from the University Ethics Committee. We will use this data alongside previous work we have completed on factors influencing parenting engagement in preventive parenting interventions (86).

Examination of feasibility of delivering the intervention within the pilot (WP2) & if progression agreed- full intervention protocol (WP3) by:

- Examination of adherence / completion rates of course materials by those recruited to the study to understand reasons for early drop-out or non-completion of course. This will be completed within the planned telephone contacts of participants within the study and any emerging patterns of non-completion (compared with school and regional demographics) used to address ongoing support and facilitation of engagement with the study.
- Examination of reach of the study and engagement with the programme across the geographic region and demographic profile of the local population. This will be enabled through comparison of recruitment numbers with regional postcodes and population demographics as part of regular study intervention /operational meetings and will be used to inform the ongoing recruitment and engagement strategy throughout the study.

At full study stage (WP3):

- All parents will complete a predesigned satisfaction and acceptability question at the completion of the intervention. We also plan to recruit 20 parents/child dyads to

complete a 30-minute interview to determine the effectiveness of the parenting intervention and its effects in specific populations, including ethnic heritage and socio-demographic profile at 6 months post-assessment. We will use a topic guide to reflect suitability and acceptability of the intervention, its effectiveness and perceived changes in behaviours based on the intervention content. We will purposively sample from parents who both fully engaged with the program and also those who were less engaged (based on the number of recommended modules completed). The interviews will be recorded and transcribed by researchers experienced in qualitative interviewing and analysis. Interviews will be conducted by trained research staff and will be guided by a standard Customer Satisfaction Survey utilising a Likert type scale (Excellent, Very Good, Good, Fair, Poor), with clearly worded questions (e.g. How did you rate the support you received before, during and after the Intervention? How confident are you that the Intervention will help reduce risk of depression in your son/daughter?"; "How confident would you be in recommending the Intervention to others who are dealing with the same things as you and your family?") focusing directly on suitability, acceptability and effectiveness of the intervention as well as factors important in achieving change such as child resilience. Although guided by specific questions each interview will also provide options for interviewees to comment further. This open-ended interview structure will provide a rich source of qualitative data to inform process evaluation.

Qualitative analysis of transcripts will be conducted using Framework analysis methodology, a well-used deductive qualitative method designed for large data sets and research that is applied or policy driven. This methodology is ideally suited to studies such as ours, which has preset aims and objectives (acceptability, suitability and effectiveness) and is recommended for studies in which qualitative interviews are conducted by a team of several researchers. Analysis will identify key ideas and emergent themes, develop a thematic framework and index significant themes, including disconfirming evidence, with regard to the acceptability, suitability and effectiveness of the intervention. We will additionally enable a series of small focus groups with parent/carers and school staff to capture process evaluation information on contextual issues, implementation processes and mechanisms of change that will be analysed employing Interpretive Phenomenological Analysis (IPA) and used to amplify our understanding of the wider utility and impact of the Trial in an iterative fashion.

4.4.6 Harms

Predesigned questions on distress and stigma of being selected for a trial for individuals at risk will be completed as part of the baseline assessment. Parents and adolescents will be consulted specifically about this risk in WP1 and will assist in designing these questions. These questions will assess whether the screening process and allocation to a high-risk group has any unintended consequences for the parent or the child. We will offer a debriefing and support session to individuals who score highly on the stigma feedback measure that is performed 1 week following consent. The pooled results of these questions will be scrutinized at every steering group meeting throughout the trial and will be presented at each investigator meeting. The qualitative interviews in WP3 will also investigate any other unintended harms. We will also develop a liaison protocol with School wellbeing leads.

5.0 Monitoring and governance

AT will lead this project. He will be supported by the expertise of the finance/research

management teams at the University of Warwick and the Warwick Clinical Trials Unit. He will also receive mentorship in this role from MB. The University of Warwick is the nominated research sponsor. There will be a project coordinator post. The project coordinator will be responsible for the day to day running of the project and supervision of the research assistants.

We will establish a Steering Committee and Project Management Team: Steering Committee: We will convene an independently chaired committee to provide independent oversight of the programme throughout the duration of the project. The aim will be to ensure the safety and quality of the project. Someone with experience of running evaluation projects will fill the chair of this group and health services research but independent to the study. We have provisionally identified someone for this role. The committee will include investigators AT and MB, a schools representative and an independent adolescent mental health researcher. The steering committee will meet every 6 months in the first year, at the 9-month stop-go point to consider trial progression and then at the end of year 2, with advice from the chair as needed between meetings. They will review data concerning adverse consequences for adolescents or parents participating in the trial.

Project Management Team: This will be weekly and chaired by AT, the trial research coordinator, applicants with responsibility of schools liaison research assistants and the PPI lead. This team will have responsibility for programme delivery and will meet weekly in the first year and every month thereafter. Investigator meetings: will be convened bimonthly and include the CTU, statistician, health-economist, PPI lead, other applicants, and Monash collaborators. This will provide overview of the project.

Financial management will be administered through close liaison with the University of Warwick finance department who will hold the budget and keep it under review. AT will also be responsible for reports to funders and the study budget.

6.0 Ethics and dissemination

6.1 Ethical issues

There are potential ethical issues regarding any unintended consequences. There is a potential risk that identifying a child at risk due to scoring high on the screening tool may cause child or parental distress. There is previous literature to suggest this is unlikely in this population (87, 88). Nonetheless, we will monitor for any distress and internalized stigma in the child/parents that is associated with the identification of the child being at risk. In the baseline assessment, we will ask the parents and child to complete specific questions on distress and stigma in relation to taking part in the trial. We will offer a debriefing and support session to individuals who score highly on the stigma feedback measure that is performed 1 week following consent. In the pilot study, we will also attempt to contact those who do not wish to be randomised to see if this is a barrier to participation. Monitoring of this data will be done formally monthly through the management group and 6-monthly through the steering committee.

Other ethical issues are those of consent and data protection. Written informed consent from the parents will be obtained as the children will all be under 16. Verbal assent will be obtained from the young person himself or herself at each assessment. Parents/children will be informed that they, even once consented, they will be able to withdraw from the study at any point. Full ethical approval will be applied for through the University of Warwick Medical School ethics committee. The trial will adhere to the Declaration of Helsinki.

We will approach children for consent for the trial in a sensitive manner; for example that they have indicated that they are feeling below par and that working with their parents could help to alleviate these issues and prevent them from escalating. This will be developed alongside our PPI groups. We will use language that will normalise the outcome of the screening and provide them with opportunity to discuss any concerns.

6.2 Dissemination

This is detailed in the main application document

7.0 Project timetable and milestones

The project timetable is summarised in the attached uploaded GANNT chart and in the main application. There will be a number of tasks planned pre-commencement of the project including staff recruitment and application for ethical approvals. The project will take 45 months including three work packages (WPs) with the following milestones and deliverables:

Milestone 1 (WP1): Completion of focus groups and piloting of pre and post intervention assessments (month 6)

D1: Adapted the PiP intervention and piloted the delivery of the outcome measures.

Milestone 2 (WP2): completion of internal pilot (month 15)
D2: Meeting the pre-set progression criteria (stop-go) to progress to a full trial
Milestone 3 (WP3): Recruitment and follow up of internal pilot sample (month 15)
D3: Completion of the appropriately powered RCT (month 42)
D4 Analysis of the results, completion of a final report and recommendations for further wider uptake and implementation

8.0 Expertise

Lead app AT has over 10 years of experience in youth mental health research in Australia (Orygen, Melbourne) and the UK, including RCTs of interventions to attempt to prevent development of mental disorders. He will oversee the trial including supervising the project manager and RA's and chair the project management meetings. Co-app MB is an international pioneer in early intervention and youth mental health. He has conducted numerous large-scale trials, including a recent schools trial on stigma and resilience in Birmingham. MB will provide senior overview of the project and provide mentorship to the lead app. He will assist in intervention development. Co-app PP is Digital Engagement & Public Health Lead for Forward Thinking Birmingham and has strong PPI links with young people/carers. He has implemented several public health initiatives including the Birmingham Headstart resilience programme. He will provide input into study design/implementation. Co-app CC has expertise in school mental health research and adolescent emotional resilience. She will provide links to regional schools through previous work and input into study design and implementation. She has qualitative expertise and will lead the analysis/interpretation of WP1 focus groups and WP3 qualitative interviews. Co-app JW is a senior statistician and co-app SP is a senior health economist, both at Warwick CTU. They will provide input into study design/data analysis/interpretation. Co-app SSB is an expert in public mental health and wellbeing in adults and adolescents. She will provide considerable expertise in public health trials. All co-apps will be part of the project management group.

Collaborator Dr Sue Frossell is a senior local public health consultant who will provide oversight of the local/national public health landscape. Associate Professor Marie Yap is the co-author of the PiP intervention at Monash University and has worked closely with Associate Professor Glenn Melvin on developing this. Thompson, Birchwood, Yap and Melvin have received specific Warwick University Alliance funding to build a strong partnership between these research groups. A/Profs Yap and Melvin are project collaborators and members of the project management group.

We have previously recruited from schools in Birmingham and Coventry for two large trials led by MB, CC and PP. We have therefore established strong links with schools and the education authorities through partnerships with BEP and Coventry City Council and our local public health collaborator Sue Frossell.

In summary, the study team has an outstanding track record of innovation in youth mental health care and working with schools and has worked as a stable team in the local health economy over a number of years. We also have the expertise of the Warwick CTU and a well-established collaborative link with authors of the Australian intervention.

9.0 Partner Collaboration

There are a number of key partners in this research project
1) Monash University and authors of the PiP intervention: We have an established partnership with A/Profs Yap and Melvin, which has been strengthened by a recent Warwick Monash Alliance partnership research grant (£20,664; see support letter). The two universities have a clear and established alliance on which this partnership will be further fostered. We will work closely with our partners at Monash to develop the intervention for a UK setting and draw on the expertise of their RCT, which has established the evidence base for the intervention approach. Monash University will be providing the funding to adapt the online intervention for the UK population.
2) Birmingham Education Partnership (BEP): BEP is both a charity and a company (not for profit) that is focussed on school improvement. Their key activities include knowing the needs and strengths of all Birmingham schools, supporting those that are at risk, or those already judged to be less than good. They work through training, brokering and signposting, especially with Birmingham's teaching schools in systematic school improvement. BEP also champions peer review and the sharing of good practice. We have worked closely with BEP previously and they have been instrumental in helping us to recruit schools to participate in our research.
3) West Midlands Collaboration for Leadership in Applied Health Research (CLAHRC): The CLAHRC initiative, funded by the NIHR, aims to create lasting and effective partnerships across health and social care organisations and universities (Birmingham, Keele and Warwick) to improve the services we can deliver for patient benefit. One of the themes of the West Midland CLAHRC is youth mental health. Professor Birchwood leads this theme. Our links with the CLAHRC provides us with access to PPI training and a vehicle for accessing networks and dissemination.
4) Children Services Directorate at Coventry City Council: Coventry City Council run public health services for young people in the Coventry area including schools, and we have developed links with a number of key professionals including Dr Sue Frossell, Public Health consultant with an interest in children and adolescents.

References

1. Whiteford HA, Ferrari AJ, Degenhardt L, Feigin V, Vos T. The global burden of mental, neurological and substance use disorders: An analysis from the global burden of disease study 2010. PLoS ONE. 2015;10(2):e0116820.
2. McCrone P, Dhanasiri S, Patel Aea. Paying the price: the cost of mental health care in England to 2026. London: King's Fund; 2008.
3. Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S, Ustun TB. Age of onset of mental disorders: a review of recent literature. Current Opinion in Psychiatry. 2007;20(4):359-64.
4. Lawrence D, Johnson S, Hafekost J, Boterhoven De Haan K, Sawyer M, Ainley J, et al. The Mental Health of Children and Adolescents. Report on the second Australian Child and Adolescent Survey of Mental Health and Wellbeing. Canberra: Department of Health; 2015.
5. Rao U, Ryan N, Birmaher B, Dahl R, Williamson D, Kaufman J, et al. Unipolar depression in adolescents: Clinical outcome in adulthood. Journal of the American Academy of Child and Adolescent Psychiatry 1995;34(5):566-78.
6. Last CG, Hansen C, Franco N. Anxious children in adulthood: A prospective study of adjustment. Journal of the American Academy of Child and Adolescent Psychiatry. 1997;36:645-52.
7. Andrews G, Issakidis C, Sanderson K, Corry J, Lapsley H. Utilising survey data to inform public policy: comparison of the cost-effectiveness of treatment of ten mental disorders. The British Journal of Psychiatry. 2004;184(6):526-33.
8. Balázs J, Miklósi M, Keresztény Á, Hoven CW, Carli V, Wasserman C, et al. Adolescent subthreshold-depression and anxiety: psychopathology, functional impairment and increased suicide risk. Journal of Child Psychology and Psychiatry. 2013;54(6):670-7.
9. Klein DN, Shankman SA, Lewinsohn PM, Seeley JR. Subthreshold depressive disorder in adolescents: Predictors of escalation to full-syndrome depressive disorders. Journal of the American Academy of Child and Adolescent Psychiatry. 2009;48(7):703-10.
10. Shankman SA, Lewinsohn PM, Klein DN, Small JW, Seeley JR, Altman SE. Subthreshold conditions as precursors for full syndrome disorders: A 15-year longitudinal study of multiple diagnostic classes. Journal of Child Psychology and Psychiatry, and Allied Disciplines. 2009;50(12):1485-94.
11. Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. The Lancet. 2007;369(9569):1302-13.
12. Royal College of Psychiatrists. No Health without Public Mental Health: The Case for Action (Position Statement PS4). London: Royal College of Psychiatrists; 2010.
13. The Mental Health Taskforce. The Five Year Forward View for Mental Health. London: NHS England; 2016.
14. Department of Education and Department of Health. Transforming Children and Young People's Mental Health Provision: a Green Paper. London: Her Majesty's Government; 2017.
15. Yap MB, Reavley N, Jorm AF. Where would young people seek help for mental disorders and what stops them? Findings from an Australian national survey. Journal of Affective Disorders. 2013;147(1-3):255-61.
16. Jorm AF, Wright A, Morgan AJ. Where to seek help for a mental disorder? National survey of the beliefs of Australian youth and their parents. The Medical Journal of Australia. 2007;187(10):556-60.
17. Cairns KE, Yap MB, Pilkington PD, Jorm AF. Risk and protective factors for depression that adolescents can modify: a systematic review and meta-analysis of longitudinal studies. Journal of Affective Disorders. 2014;169:61-75.
18. Schleider JL, Weisz JR. Family process and youth internalizing problems: A triadic model of etiology and intervention. Development and Psychopathology. 2017;29(1):273-301.
19. Restifo K, Bogels S. Family processes in the development of youth depression: translating the evidence to treatment. Clinical Psychology Review. 2009;29(4):294-316.

20. The Commonweatlth of Australia. Fourth National Mental Health Plan-An agenda for collaborative government action in mental health 2009-2014. Canberra: Commonwealth of Australia., 2009.
21. National Prevention Council. National Prevention Strategy. Washington, DC: U.S. Department of Health and Human Services; 2011.
22. World Health Organisation. Mental health action plan 2013-2020. Geneva, Switzerland: WHO Document Production Services; 2013.
23. European Commission. Mental Health in All Policies: Situation analysis and recommendations for action. Joint Action on Mental Health and Well-being [Internet]. 2014 12 September 2016. Available from: http://www.mentalhealthandwellbeing.eu/assets/docs/publications/MHiAP Final.pdf.
24. Beesdo K, Knappe S, Pine DS. Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. Psychiatric Clinics of North America. 2009;32(3):483-524
25. Sandler IN, Schoenfelder EN, Wolchik SA, MacKinnon DP. Long-term impact of prevention programs to promote effective parenting: lasting effects but uncertain processes. Annual Review of Psychology. 2011;62:299-329.
26. Yap MB, Pilkington PD, Ryan SM, Jorm AF. Parental factors associated with depression and anxiety in young people: a systematic review and meta-analysis. Journal of Affective Disorders. 2014;156:8-23.
27. Schwartz O, Dudgeon P, Sheeber L, Yap M, Simmons J, Allen N. Parental behaviors during family interactions predict changes in depression and anxiety symptoms during adolescence. Journal of Abnormal Child Psychology. 2012;40(1):59-71.
28. Yap MBH, Pilkington PD, Ryan SM, Jorm AF. Parental factors associated with depression and anxiety in young people: A systematic review and meta-analysis. Journal of Affective Disorders. 2014;156:8-23.
29. Yap MBH, Pilkington PD, Ryan SM, Kelly C, Jorm AF. Parenting strategies for reducing the risk of adolescent depression and anxiety disorders: a Delphi consensus study. Journal of Affective Disorders. 2014;156:67-75.
30. Yap MBH, Jorm AF. Parents' beliefs about actions they can take to prevent depressive disorders in young people: results from an Australian national survey. Epidemiology and Psychiatric sciences. 2011;21(1):117-23.
31. Merry SN, Hetrick SE, Cox GR, Brudevold-Iversen T, Bir JJ, McDowel HH. Prevention of depression in children and adolescents. Cochrane Database of Systematic Reviews. 2011;12.
32. Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. Lancet. 2007;369(9569):1302-13.
33. Stockings EA, Degenhardt L, Dobbins T, Lee YY, Erskine HE, Whiteford HA, et al. Preventing depression and anxiety in young people: a review of the joint efficacy of universal, selective and indicated prevention. Psychological Medicine. 2016;46(1):11-26.
34. Yap MBH., Morgan A, Cairns K, Jorm AF, Hetrick Sarah E, Merry SN. Parents in prevention: A meta-analysis of randomized controlled trials of parenting interventions to prevent internalising, depression and anxiety problems in children from birth to age 18 Clinical Psychology Review. Under review.
35. Mrazek PJ, Haggerty RJ. Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research. Washington DC: National Academy Press; 1994.
36. Heinrichs N, Bertram H, Kuschel A, Hahlweg K. Parent recruitment and retention in a universal prevention program for child behavior and emotional problems: barriers to research and program participation. Prevention Science. 2005;6(4):275-86.
37. Cuijpers P, van Straten A, Warmerdam L, van Rooy MJ. Recruiting participants for interventions to prevent the onset of depressive disorders: Possibile ways to increase participation rates. BMC Health Services Research. 2010;10:181.
38. Statistical Bulletin: Internet access – households and individuals. London: ONS; 2017.
39. Metzler CW, Sanders MR, Rusby JC, Crowley RN. Using consumer preference information to increase the reach and impact of media-based parenting interventions in a public health approach to parenting support. Behavior Therapy. 2012;43(2):257-70.

40. Yap MBH, Martin PD, Jorm AF. Online parenting guidelines to prevent adolescent depression and anxiety: Evaluating user characteristics and usefulness. Early Intervention in Psychiatry. 2017:1–8.
41. Andrews G, Cuijpers P, Craske MG, McEvoy P, Titov N. Computer therapy for the anxiety and depressive disorders is effective, acceptable and practical health care: a meta-analysis. PLoS One. 2010;5(10):e13196.
42. Donker T, Blankers M, Hedman E, Ljótsson B, Petrie K, Christensen H. Economic evaluations of Internet interventions for mental health: a systematic review. Psychological Medicine. 2015;45(16):3357-76.
43. Calear AL, Christensen H. Review of internet-based prevention and treatment programs for anxiety and depression in children and adolescents. The Medical Journal of Australia. 2010;192 (11):12.
44. Love SM, Sanders MR, Turner KM, Maurange M, Knott T, Prinz R, et al. Social media and gamification: Engaging vulnerable parents in an online evidence-based parenting program. Child Abuse and Neglect. 2016;53:95-107.
45. Morgan AJ, Rapee RM, Salim A, Goharpey N, Tamir E, McLellan LF, et al. Internet-delivered parenting program for prevention and early intervention of anxiety problems in young children: Randomized Controlled Trial. Journal of the American Academy of Child & Adolescent Psychiatry. 2017;56(5):417-25.e1.
46. Lee YY, Barendregt JJ, Stockings EA, Ferrari AJ, Whiteford HA, Patton GA, et al. The population cost-effectiveness of delivering universal and indicated school-based interventions to prevent the onset of major depression among youth in Australia. Epidemiology and Psychiatric Sciences. 2016:1-20.
47. Yap MB, Morgan AJ, Cairns K, Jorm AF, Hetrick SE, Merry S. Parents in prevention: a meta-analysis of randomized controlled trials of parenting interventions to prevent internalizing problems in children from birth to age 18. Clinical Psychology Review. 2016;50.
48. Schleider JL, Weisz JR. Family process and youth internalizing problems: A triadic model of etiology and intervention. Development and Psychopathology. 2016:1-29.
49. Kreuter MW, Farrell DW, Olevitch LR, Brennan LK. Tailoring Health Messages: Customizing Communication With Computer Technology. Mahwah, N.J: Mahwah, N.J: Lawrence Erlbaum Associates; 2000.
50. Wildeboer G, Kelders SM, van Gemert-Pijnen JEWC. The relationship between persuasive technology principles, adherence and effect of web-Based interventions for mental health: A meta-analysis. International Journal of Medical Informatics. 2016;96(Supplement C):71-85.
51. Davies SC. Annual report of the Chief Medical Officer 2012, Our children deserve better: Prevention pays. London: Department of Health; 2013.
52. Avery KNL, Williamson PR, Gamble C, O'Connell Francischetto E, Metcalfe C, Davidson P, et al. Informing efficient randomised controlled trials: exploration of challenges in developing progression criteria for internal pilot studies. BMJ Open. 2017;7(2).
53. Yap MBH, Mahtani S, Nicolas C, Rapee R, Lawrence K, Mackinnon A, et al. A tailored web-based intervention to improve parenting risk and protective factors for adolescent depression and anxiety problems: Post-intervention findings from a randomized controlled trial Journal of Medical Internet Research. 2017(Accepted 5 December 2017).
54. Chisholm K, Patterson P, Torgerson C, Turner E, Jenkinson D, Birchwood M. Impact of contact on adolescents' mental health literacy and stigma: the SchoolSpace cluster randomised controlled trial. BMJ Open. 2016;6(2):e009435-e.
55. Kessler RC, Petukhova M, Sampson NA, Zaslavsky AM, Wittchen H-U. Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. International Journal of Methods in Psychiatric Research. 2012;21(3):169-84.
56. Goodman R. The Strengths and Difficulties Questionnaire: A research note. Journal of Child Psychology and Psychiatry. 1997;38:581-6.

57. Goodman R, Meltzer H, Bailey V. The Strengths and Difficulties Questionnaire: A pilot study on the validity of the self-report version. European Child and Adolescent Psychiatry. 1998;7:125-30.
58. Sandler I, Ingram A, Wolchik S, Tein J-Y, Winslow E. Long-Term Effects of Parenting-focused preventive interventions to promote resilience of children and adolescents. Child Development Perspectives. 2015;9(3):164-71.
59. Sandler IN, Schoenfelder EN, Wolchik SA, MacKinnon DP. Long-term impact of prevention programs to promote effective parenting: Lasting effects but uncertain processes. Annual Review of Psychology. 2011;62(1):299-329.
60. Glatz T, Buchanan C. Over-time associations among parental self-efficacy, promotive parenting practices, and adolescents' externalizing behaviors. Journal of Family Psychology. 2015;29(3):427-37.
61. Cardamone-Breen MC, Jorm AF, Lawrence KA, Mackinnon AJ, Yap MBH. The Parenting to Reduce Adolescent Depression and Anxiety Scale: Assessing parental concordance with parenting guidelines for the prevention of adolescent depression and anxiety disorders. In submission.
62. Yap MBH, Lawrence KA, Rapee RM, Cardamone-Breen MC, Green JM, Jorm AF. Partners in Parenting: A multi-level web-based approach to support parents in prevention and early intervention for adolescent depression and anxiety. Journal of Medical Internet Research. 2017(Accepted on 20th November 2017).
63. Parenting Strategies Program. How to prevent depression and clinical anxiety in your teenager: Strategies for parents. Melbourne: *beyondblue*; 2013.
64. Oinas-Kukkonen H, Harjumaa M. Persuasive Systems Design: Key issues, process model, and system features. Communications of the Association for Information Systems. 2009;24:485-500.
65. Kelders SM, Kok RN, Ossebaard HC, Van Gemert-Pijnen JE. Persuasive system design does matter: a systematic review of adherence to web-based interventions. Journal of Medical Internet Research. 2012;14.
66. Raising Children Network. Raising Children Network website - Teens [Available from: http://raisingchildren.net.au/teens/teens.html (Archived by WebCite® at http://www.webcitation.org/6qz1JBTsj).
67. Morgan AJ, Rapee RM, Bayer JK. Increasing response rates to follow-up questionnaires in health intervention research: Randomized controlled trial of a gift card prize incentive. Clinical Trials. 2017;14(4):381-6.
68. Angold A, Costello E, Messer S. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. International Journal of Methods in Psychiatric Research. 1995;5:237-49.
69. Last A, Henley W, Norman S, Goodman R, Ford T. Innovations in Practice: Feasibility of the development and well-being assessment as an adjunct to clinical assessment in child and adolescent mental health services. Child and Adolescent Mental Health. 2014;19(2):142-6.
70. Spence SH. Structure of anxiety symptoms among children: a confirmatory factor-analytic study. Journal of Abnormal Psychology. 1997;106(2):280.
71. Goodman R. The Strengths and Difficulties Questionnaire: a research note. Journal of Child Psychology and Psychiatry and Allied Disciplines.1997;38(5):581-6.
72. Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, et al. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. Health and Quality of Life Outcomes. 2007;5:63.
73. Clarke A, Friede T, Putz R, Ashdown J, Martin S, Blake A, et al. Warwick-Edinburgh Mental Well-being Scale (WEMWBS): validated for teenage school students in England and Scotland. A mixed methods assessment. BMC Public Health. 2011;11:487.
74. Kelly Y, Fitzgerald A, Dooley B. Validation of the Resilience Scale for Adolescents (READ) in Ireland: a multi-group analysis. International Journal of Methods in Psychiatric Research. 2017;26(2):e1506-n/a.
75. Cardamone-Breen MC, Jorm AF, Lawrence KA, Mackinnon AJ, Yap MBH. The Parenting to Reduce Adolescent Depression and Anxiety Scale: Assessing parental

concordance with parenting guidelines for the prevention of adolescent depression and anxiety disorders. PeerJ. 2017;5:e3825.
76. Schwarz JC, Barton-Henry ML, Pruzinsky T. Assessing child-rearing behaviors: a comparison of ratings made by mother, father, child, and sibling on the CRPBI. Child Development. 1985;56(2):462-79.
77. Nicolas C, Cardamone-Breen M, Jorm AF, MBH. Y. Parental confidence about parenting to reduce their adolescent's risk of depression and anxiety: Validating the Parental Self-Efficacy Scale. Under review. 2017.
78. Stevens KJ. Developing a descriptive system for a new preference-based measure of health-related quality of life for children. Quality of Life Research. 2009;18 (8):1105-13.
79. Stevens KJ. Working With Children to Develop Dimensions for a Preference-Based, Generic, Pediatric Health-Related Quality-of-Life Measure. Qualitative Health Research. 2010;20:340 - 51.
80. Ravens-Sieberer U, Wille N, Badia X, Bonsel G, Burstrom K, Cavrini G, et al. Feasibility, reliability, and validity of the EQ-5D-Y: results from a multinational study. Quality of Life Research. 2010;19(6):887-97.
81. Herdman M, Gudex C, Lloyd A, Janssen MF, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of Life Research. 2011;20(10):1727-36.
82. Goodman A, Goodman R. Strengths and difficulties questionnaire as a dimensional measure of child mental health. Journal of the American Academy of Child and Adolescent Psychiatry. 2009;48(4):400-3.
83. National Institute for Health and Clinical Excellence. Guide to the Methods of Technology Appraisal. London: NICE; 2013.
84. Barber JA, Thompson SG. Analysis of cost data in randomized trials: an application of the non-parametric bootstrap. Statistics in medicine. 2000;19(23):3219-36.
85. Stinnett AA, Mullahy J. Net health benefits: a new framework for the analysis of uncertainty in cost-effectiveness analysis. Medical Decision Making. 1998;18(2 Suppl):S68-80.
86. Finan, S, Swierzbiolek, B, Priest, N, Warren, N, & Yap, MBH. (in press). Parental engagement in preventive parenting programs for child mental health: A systematic review of predictors and strategies to increase engagement. PeerJ.
87. Jorm AF, Kelly CM, Morgan AJ. Participant distress in psychiatric research: a systematic review. Psychological Medicine. 2007;37(7):917-26.
88. Gould MS, Marrocco FA, Kleinman M, et al. Evaluating iatrogenic risk of youth suicide screening programs: A randomized controlled trial. JAMA. 2005;293(13):1635-43.