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A Randomized Controlled Trial of the Impact of a Family-Based Adolescent Depression Intervention on both Youth and Parent Mental Health Outcomes

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Abstract This paper presents findings from a multi-centre, double-blind, randomized controlled trial that tested the hypothesis that parent and youth mental health improvements would be superior in a family-based intervention for adolescent depression (BEST MOOD) compared to a treatment-as-usual supportive parenting program (PAST). Eligible participants were families with a young person aged between 12 and 18 years who met diagnostic criteria for a depressive disorder (major, minor or dysthymic). Participating families (N = 64; 73.4% of youth were female) were recruited in Victoria, Australia and allocated to treatment condition using a block randomization procedure (parallel design) with two levels of blinding. This paper reports on the trial's secondary outcomes on youth and parent mental health. General linear mixed models were used to examine the longitudinal effect of treatment group on outcome. Data were analyzed according to intention-to-treat; 31 families were analyzed in BEST MOOD, and 33 families in PAST. Parents in the BEST MOOD group experienced significantly greater reductions in stress and depressive symptoms than parents in the PAST group at 3-month follow-up. A greater reduction in parental anxiety was observed in the BEST MOOD group (d = 0.35) compared with PAST (d = 0.02), although the between-group difference was not significant. Both groups of youth showed similar levels of improvement in depressive symptoms at post-treatment (d = 0.83 and 0.80 respectively), which were largely sustained at a 3-month follow-up. The family-based BEST MOOD intervention appeared superior to treatment-as-usual (PAST) in demonstrating greater reductions in parental stress and depression. Both interventions produced large reductions in youth depressive symptoms.

Keywords Adolescent · Depression · Parental mental health · Family-based intervention · Randomized controlled trial

Clinical trial registration information—Engaging youth with high prevalence mental health problems using family based interventions; http://www.anzctr.org.au; ACTRN12612000398808.

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Depressive disorders are highly prevalent among adolescents, with approximately 5% of young Australians aged 12 to 17 affected (Australian Bureau of Statistics 2008). Depression has been identified as a leading cause of morbidity in adolescents, and a major risk factor for suicide, which is the second most common cause of death in this age group (World Health Organisation 2014). It is often the case that the parents of depressed adolescents also suffer from psychological distress and often psychological disorder (Mordoch and Hall 2002; Vostanis et al. 2006).

Practice guidelines around the world are increasingly recommending family involvement in the treatment of youth depression (Birmaher et al. 2007; Hollon et al. 2002; Malhi et al. 2015; McDermott et al. 2010; National Institute for Health and Care Excellence [NICE] 2005), with families also playing a key part in the prevention of depressive disorders

(Jacka et al. 2013; Lewis et al. 2014). The importance of familial involvement in the treatment of adolescent depression is highlighted by the substantial evidence of the role of family-related factors in the onset and maintenance of youth depression (Garber 2006; Goodman and Gotlib 1999; Sander and McCarty 2005; Sheeber et al. 1997), and findings that family environment influences treatment attendance and adherence, and early termination in depressed youth (Parra et al. 2011).

Current interventions for youth depression incorporate familial participation in a variety of ways including: parent training programs; concurrent group therapy, where parents and youth attend separate parallel groups; additional family sessions combined with individual cognitive-behavioural therapy (CBT) or interpersonal therapy (IPT); multi-family group therapy, and family therapy (Carr 2014; Jacobson and Mufson 2010; Kaslow et al. 2012; Stark et al. 2012). Family-based interventions differ in the degree to which the family is a focus of the theoretic interventions. At one end of this spectrum some intervention models simply aim to engage family members in order to enhance the effects of their therapeutic approach (Carr 2014). For example, this may include using parents as agents of change, educating parents to better support their young person, gaining input on the history of the problem, and reviewing treatment parameters (Sander and McCarty 2005). At the other end of this continuum, family therapy addresses its interventions to the family system as a whole assuming that systemic interactions are causal or maintaining factors in the presenting issue (Carr 2014). Here patterns of communication and behaviour are targeted to assist all family members in achieving the ultimate goal of alleviating psychological symptoms (Sander and McCarty 2005). All family-based interventions differ from individual approaches (i.e., exclusive adolescent treatment) in that, at least to some degree, psychological problems are addressed within the context of the wider family system as opposed to an identified focus only on the adolescent (Lerner 2007; Sexton and Datchi 2014).

The effectiveness of family-based interventions for adolescent depression is well established (Carr 2014; Diamond and Josephson 2005; Kaslow et al. 2012; Stark et al. 2012). For example, attachment-based family therapy (ABFT) is a family-based intervention for adolescent depression that uses a family systems approach and also draws on attachment theories (Diamond et al. 2003; Diamond et al. 2010). ABFT involves 12 weekly family therapy sessions (where the whole family attends) and focuses on repairing poor parent-child relationships and promoting adolescent autonomy (Diamond et al. 2002). Among 66 depressed adolescents with suicidal ideation, an RCT of ABFT was found to be more efficacious than enhanced usual care in reducing depressive symptoms (d = 0.22) and had a large impact on suicidal ideation (d = 0.97; Diamond et al. 2010), while another RCT found that compared with a waitlist control condition, ABFT was significantly more effective in reducing adolescent depression (d = 0.72) in 32 depressed adolescents (Diamond et al. 2002). Similarly, in an RCT of 93 depressed adolescents with comorbid conduct disorder, where a parent therapy group was added to a cognitive behavioural group intervention for depressed adolescents called the Adolescent Coping with Depression program (CWD-A; Lewinsohn et al. 1990), major depressive disorder recovery rates were greater in the CWD-A condition post-treatment compared with a life skills/tutoring control condition (Rohde et al. 2004).

Notably, family-based interventions focused on youth have also been shown to be effective in treating parent mental health (Forsberg et al. 2015; Toumbourou and Bamberg 2008; Toumbourou et al. 2001). In Australia, the Behaviour Exchange Systems Therapy (BEST) program was evaluated to determine whether family-based intervention for youth substance use disorders impacted parent mental health outcomes. In a quasi-experimental waitlist control trial of a parent-group format, improvements in parent mental health symptoms and emotional wellbeing were observed together with reductions in parent emotional dependence on their child's behaviour (Toumbourou et al. 2001). In a trial of a format extended to target adolescent externalizing behaviour and to include siblings (BEST Plus), reductions in parent stress symptoms and emotional dependence on their child's behaviour were observed in a pre-post evaluation involving 34 parents (Bamberg et al. 2008; Toumbourou and Bamberg 2008). However, within the literature on family based interventions for adolescent depression to date, there have been no studies examining improvements in parental mental health in the context of interventions for adolescent depression.

The relationship between parent and adolescent mental health is complex. Parental psychological distress may precede the onset of the child's depression, or develop as a result of the child developing depressive symptoms (Pardini 2008). The association between parental mental health issues and the development of depression in children is well established in longitudinal research (Mattejat and Remschmidt 2008; Weissman et al. 1997; Weissman et al. 2006). A consistent explanation for this link is that mental health problems impact on parenting, with parents more likely to engage in negative parenting practices (e.g., hostile, disengaged, and/or permissive; Sim and England 2009), spend less time with their children (Bronte-Tinkew et al. 2007), display lower levels of sensitivity towards their children (Pape and Collins 2011), and are less likely to access services (Mowbray et al. 2004). Research on parental substance use indicates that offspring of parents with substance use problems are at an increased risk of somatic and psychological problems (Lewis et al. 2015b). There is also some evidence for a genetic contribution in the relationship between parent and adolescent mental health, with large-scale twin studies (N = 42,161 twins) suggesting that genetics

account for 30–40% of the variance in depression heritability (Kendler et al. 2006).

Conversely, research focusing on the impact of youth mental health on parental mental health has shown evidence of an association between parent psychological distress and rearing a depressed child (Costa et al. 2006; Tan and Rey 2005). In a study that examined the association between depression in children and adolescents, parental depression and parenting stress in 53 depressed youths (9–16 years) and 53 non-depressed controls, depressed adolescents were more likely to be perceived by mothers as 'difficult' and to have caused significant parenting stress (Costa et al. 2006; Tan and Rey 2005).

The BEST MOOD program was developed as an extension of the original BEST program in order to specifically target depression in adolescents (aged 12–18 years). BEST MOOD is a manualized (Lewis et al. 2012) multi-family group intervention that encourages parent self-care, stress management strategies, promoting parental confidence, family connectedness and enhancing family communication, but is distinctive in directly involving adolescents and thereby deliberately targeting adolescent depressive symptoms by focusing on behavioural activation, family cohesion and healthy attachments (Poole et al. 2016). BEST MOOD is more akin to a family therapy approach in that it targets the family as a whole, starting with the parent subsystem (Poole et al. 2016). Adopting a family systems approach that also incorporates elements of attachment theories, BEST MOOD was designed to optimize youth and family mental health outcomes and to engage youth who may be resistant to treatment (Poole et al. 2016).

The present study reports on secondary outcomes of the Family Options study, a multi-centre, double-blinded, randomized controlled trial (RCT) comparing the BEST MOOD program with a treatment-as-usual supportive parenting program known as Parenting Adolescents Support Training (PAST). PAST was manualized for the purpose of the Family Options study, its content designed to reflect standard practice in currently available child and family services in Australia (Bertino et al. 2012). PAST is a non-directive approach that uses supportive counselling techniques to facilitate therapeutic discussion between parents. The Family Options study was registered on the Australia and New Zealand Clinical Trials Registry (12612000398808) with the primary outcome rates of remission of adolescent depressive disorders (Lewis et al. in prep), and one of the secondary outcomes, parent and youth mental health symptoms. The primary outcome was based on diagnostic measures of depressive disorder and will be published in a separate paper in due course. To date, previous publications from the Family Options study include the trial protocol paper (Lewis et al. 2013), a paper describing the therapeutic model used in BEST MOOD (Poole et al. 2016), an analysis of psychometric features of suicide and depression in the clinical sample (Lewis et al. 2014), and a qualitative analysis of adolescent social media use within the trial and its impact on family functioning (Lewis et al. 2015a).

The aim of the present study was to report rates of parental mental health symptoms at baseline, and the trial's secondary outcomes on the impact of BEST MOOD on parent and adolescent mental health symptoms. In parents, depression, anxiety and stress symptoms were investigated. In young people, depression, hyperactivity/inattention, peer relationship problems, emotionality, conduct behaviour, prosocial behaviour, dependency, efficacy, self-criticism, and alcohol consumption were investigated. The present study is the first outcomes analysis from the Family Options study.

It was hypothesized that parent and adolescent mental health symptoms would improve in response to both treatment groups (H1); with greater improvements identified in parents and adolescents in response to BEST MOOD compared with PAST (H2).

Method

Design

The trial was designed as a randomized, double-blinded multicentre comparison trial with two parallel treatment arms. Families were randomly allocated to either BEST MOOD (treatment group) or PAST (treatment-as-usual control group) using Altman and Bland's (1999) block randomization procedure. Full details of the randomization procedures and methods are available in the published study protocol (Lewis et al. 2013). Participants were assessed at enrolment in the trial (T1), completion of treatment (T2), and three months post-treatment completion (T3). There were no methodological alterations in the conduct of the study as compared to the published study protocol, other than a lower than planned participant recruitment.

Study Setting

Families were primarily recruited through the intake service of a large public mental health service in the eastern region of Melbourne (Eastern Health's Child and Youth Mental Health Service; CYMHS). Community referrals from schools and other community based mental health services were also accepted. Recruitment ran over two years from July 2012 and June 2014, and a total of 247 families were referred for participation. The study was approved by the Eastern Health and Deakin University Human Research Ethics Committees. The trial was conducted by staff from a university-based research team at Deakin University, Melbourne. Clinical interventions were conducted in several community settings both in

metropolitan Melbourne and Geelong, Victoria. Written informed consent was obtained from all participants after a thorough description of the study, including details of potential risks, benefits and reporting of harms, had been provided.

Once referral to the trial was received, an intake worker conducted an initial telephone assessment with a parent or primary caregiver of the young person. This assessment included the gathering of family socioeconomic and demographic information (i.e., age, gender, education, income and marital status in the parents, and age, gender, employment and studying status in the adolescents), a genogram, a screen for inclusion and exclusion criteria, and the KID-SCID Mood Episodes Module B (Hien et al. 1994). Those administering the KID-SCID were registered and trainee psychologists who had all completed the standard SCID training and were supervised by a senior clinical psychologist. Families where the young person met a depressive disorder diagnosis (Major Depressive Disorder, Minor Depressive Disorder, and Dysthymic Disorder) were then randomly allocated to treatment condition. Therapists were clinical psychologists, registered psychologists or postgraduate clinical psychology trainees, all of whom were provided with a training workshop of equivalent length, and were provided supervision in equal amounts by one of the creators of the intervention, who monitored fidelity to the intervention manual. In addition, all treatment sessions were audio-recorded and a live observer was present at the sessions. A supervisor randomly reviewed sections of the recordings to ensure fidelity to the manual, and to provided supervision regarding therapists' delivery of the material. Therapists and supervisors were similar across interventions with regards to experience and training (Lewis et al. 2013). Therapists were blinded to the content of the alternate interventions, in that they were not informed as to whether they were delivering the experimental or control condition in the study (Lewis et al. 2013) and had no knowledge of the content of the alternate intervention. Those assessing clients and collecting and entering data were also blind to the participant intervention status.

Inclusion and Exclusion Criteria

To be included in the trial, families were required to have an adolescent aged 12 to 18 years who currently met DSM-IV criteria for a depressive disorder (Major Depressive Disorder, Minor Depressive Disorder, or Dysthymic Disorder) as assessed on the KID-SCID. Families were excluded from the trial if the identified adolescent reported mania, hypomania, a bipolar disorder, psychotic disorders on the KID-SCID or reported drug dependence other than alcohol nicotine or cannabis use, had an intellectual disability or a severe mental illness requiring inpatient treatment or otherwise impairing their ability to participate in a group program, had a pervasive developmental disorder including Autism, was unable to understand spoken English, was pregnant, was involved in a current child protection investigation, was unwilling to undertake the minimum requirements for entry to the study including completion of the consent form, telephone KID-SCID interview, and the baseline questionnaire, where there was an insufficient address for follow-up or an unwillingness to be followed-up, or when severity of psychiatric presentation required an acute inpatient admission (Lewis et al. 2013). Families were also excluded if the parent(s) or caregiver(s) were unwilling or unable to participate in the program (Lewis et al. 2013), but no exclusion was applied if the young person initially refused to participate in the intervention. If the above criteria were met, the adolescent only needed to provide consent for the study; a commitment to attend the intervention was not an inclusion criteria.

Interventions

The two interventions were the BEST MOOD program and PAST program, each comprised of eight two-hour family group therapy sessions (Lewis et al. 2013). Youth attendance varied between the intervention protocols. BEST MOOD was structured so that the first four sessions were exclusively for parents, with young people and their siblings invited to attend from week five through to eight. In PAST, parents attended all eight sessions with young people and siblings invited to attend the fifth session only.

As a control condition, the PAST program was a fully manualized treatment that sought to approximate a treatment-as-usual condition, akin to parenting groups sometimes used in child and family services in Victoria, Australia. PAST contained supportive counselling to assist parents to acknowledge and express concerns about their young person, general psychoeducation to enhance parents' knowledge and understanding about adolescent depression, and support group options. The BEST MOOD program was also fully manualized (Lewis et al. 2012), and its content and program logic is described in detail elsewhere (Poole et al. 2016). BEST MOOD is a family systems therapy focused on parent-child communication, stress reduction, psychoeducation and elements of attachment theory such as parental sensitivity, responses to grief and loss, and the understanding of stressful or frightening family environments. It was designed to address both individual and family-related factors in the treatment of adolescent depression. Compared with PAST, BEST MOOD contained a targeted therapeutic model with a focus on family dynamics, developmental processes such as individuation, the quality of parent-child interactions and family communication patterns and interactions, The first four parent-only sessions included strategies for parents to engage their adolescent in the program, stress reduction techniques, material on child and family development and family unity, parent-child communication and parental self-

care. The final four sessions, which include children and siblings, focus on clarifying family roles, addressing major losses and trauma, enhancing patterns of communication, behavioural activation techniques for youth, and promoting positive family rituals. Sessions including both parents and young people are structured so that some activities are completed all together whereas others are completed in separate parent and youth groups. Each session has a set topic, and most sessions include a 'guiding metaphor' to assist families in understanding and remembering content covered. Further details of BEST MOOD session content and program logic are published in Poole et al. (2016).

Measures

Parent Mental Health

Parental mental health symptomology was assessed using the Depression Anxiety Stress Scales-21 (DASS-21; Lovibond and Lovibond 1995). The DASS-21 is a 21-item self-report measure of negative emotional symptoms comprised of three subscales: depression (7 items), anxiety (7 items), and stress (7 items). Responses ranged from 0 *(Did not apply to me at all)* to 3 *(Applied to me very much, or most of the time)*. Cut-off scores for severity labels were as follows: for depression, 0–9 (Normal), 10–13 (Mild), 14–20 (Moderate), 21–27 (Severe), and 28+ (Extremely severe); for anxiety, 0–7 (Normal), 8–9 (Mild), 10–14 (Moderate), 15–19 (Severe), and 20+ (Extremely severe); for stress, 0–14 (Normal), 15–18 (Mild), 19–25 (Moderate), 26–33 (Severe), and 34+ (Extremely severe). The DASS-21 has sound psychometric properties, with a Cronbach's alpha of .82 to .90 for each subscale (Henry and Crawford 2005), and good internal reliability (Antony et al. 1998).

Adolescent Mental Health

The Strengths and Difficulties Questionnaire (SDQ; Goodman 1997) is a 25-item self-report measure comprised of the following five subscales: hyperactivity/inattention, emotional problems, conduct problems, peer problems, and prosocial behaviour. Participants responded *Not True*, *Somewhat True* or *Certainly True* to questions such as "I am often unhappy, depressed or tearful." In addition to individual subscale scores, a 'total difficulties' score was calculated by summing all subscale scores except prosocial behaviour. For total difficulties, cut-off scores for severity labels were as follows: 0–14 (Normal); 15–17 (Borderline); 18–40 (Abnormal). The SDQ has demonstrated good validity and reliability (Cronbach $\alpha = .73$) in adolescents (Goodman 2001).

The Short Moods and Feelings Questionnaire (SMFQ; Angold et al. 1995) is a 13-item self-report measure of youth depression, based on the original 34-item version (Angold and Costello 1987). Participants responded *True, Sometimes* or *Not True* to questions such as "I cried a lot [in the past two weeks]". Higher scores reflect increasing severity, with scores of 11 and above indicating clinically meaningful depression. Research indicates the SMFQ has sound psychometric properties (Angold et al. 1995).

Adolescent Depressive Style

The Depressive Experiences Questionnaire for Adolescents—shortened (DEQ-A; Blatt et al. 1992) measures three depressive styles that are suggested to predispose a person to depression. It is a 20-item self-report measure comprised of three subscales: efficacy, dependency and self-criticism. The DEQ-A was developed from the original 66-item DEQ for adults (Blatt et al. 1982). The DEQ-A included items such as "I often find that I fall short of what I expect of myself" and "often, I feel I have disappointed others," and responses ranged from 1 *(Not at all true of me)* to 4 *(Really true of me)*. Research indicates adequate reliability and validity for the DEQ-A subscales (Fichman et al. 1994).

Adolescent Substance use

The consumption subscale of the Alcohol Use Disorders Identification Test (AUDIT; Babor et al. 2001) was administered to assess recent problematic alcohol drinking behaviour. The consumption subscale consists of 3 items, for example "How often do you have a drink containing alcohol?" and responses range from 0 *(Never)* to 4 *(Four or more times a week)*. A cut-off score of 6 indicated a risk of alcohol-related harm; scores below 6 were considered low-risk. Prior research indicates the AUDIT has sound psychometric properties (Allen et al. 1997; Saunders et al. 1993).

Statistical Methods

Using SPSS Version 22.0 (IBM Corp 2013), descriptive statistics and frequencies for parents' and adolescents' demographic characteristics were calculated. General linear mixed models (SPSS Mixed) were used to examine the longitudinal effect of treatment group on outcome. The approach was suitable given it accounts for the correlated nature of repeated measures data, and effectively handles missing data using maximum likelihood estimation, and is appropriate when there are unequal sample sizes across groups (Gibbons et al. 2010). The data were analysed according to intention-to-treat (ITT). Missing data were handled using restricted maximum likelihood estimation of model parameters. The model assumed fixed effects and random intercepts, while controlling for therapy group to account for a therapist or therapy group effect. An autoregressive (order 1) covariance matrix was used to account for repeated observations nested within

participants. The 2-way interaction between treatment group and time represents overall treatment outcome, as it assesses whether there were any significant differences in treatment outcome at 3-month follow-up. Effect sizes (Cohen's *d*) were calculated for repeated measures, within-group changes using Morris and Deshon's (2002) eq. 8 calculator. Cohen's (1992) definitions of effect sizes as small ($d = 0.20$), moderate ($d = 0.50$), and large ($d = 0.80$) were adopted.

Results

Participant Flow

Figure 1 shows the participant flow throughout the trial. At the completion of the trial 106 families had been assessed for eligibility. Sixty-four families were found eligible after 13 did not meet inclusion criteria, 25 met exclusion criteria, and 4 declined to participate due to logistical or personal reasons. Following randomization, 31 families were allocated to PAST and 33 families to BEST MOOD. Of the families allocated to PAST, 26 received the intervention and seven withdrew before groups commenced. Of the families allocated to BEST MOOD, 27 received the intervention, and four withdrew before groups commenced.

Demographic Characteristics

Chi square and independent samples t-tests were run to compare demographics across treatment group, and Table 1 demonstrates that families randomized to BEST MOOD and PAST did not differ across a range of baseline socio-demographic characteristics. The sample characteristics suggested that, in an Australian context, these families were very slightly below average socio-economic status, but demographically similar to outer suburban metropolitan Australian families (Australian Bureau of Statistics 2011).

Parents: Baseline Characteristics

Rates of parent mental health symptoms at baseline (T1) amongst both BEST MOOD and PAST intervention participants are summarized in Table 2. There were no significant differences in mental health indicators between the PAST and BEST MOOD participants at T1. Rates of parental depression as measured by the DASS-21 were in the moderate range for both BEST MOOD and PAST; rates of parental stress were in the mild range for both BEST MOOD and PAST; and rates of parental anxiety were in the normal range for BEST MOOD and in the mild range for PAST.

Parents: Improvement in Mental Health Symptoms over Time

Type III fixed effects of time and group on each parent outcome variable at post-treatment (T2) and three months follow-up (T3) are presented in Table 2. At T2, there were main effects for time for DASS-21 depression, indicating depression improved significantly over time. The interaction between time and group was not significant for depression, indicating there was no difference between BEST MOOD and PAST. Main effects for time and interaction effects between time and group were not significant for DASS-21 stress and DASS-21 anxiety, indicating improvements over time were not significant and did not differ between BEST MOOD and PAST.

At T3, there were main effects for time and an interaction between time and group for both DASS-21 depression and DASS-21 stress, indicating that improvements were significant over time and superior in BEST MOOD. For DASS-21 anxiety, there was no main effect for time or interaction between time and group, suggesting improvements over time were not significant and did not differ between BEST MOOD and PAST.

Adolescents: Baseline Characteristics

Rates of youth mental health symptoms at baseline amongst both BEST MOOD and PAST interventions are summarized in Table 3. There were no significant differences in mental health indicators between the PAST and BEST MOOD participants at T1. At T1, rates of adolescent depression as measured by the SMFQ were high in both BEST MOOD and PAST; rates of SDQ total difficulties were in the abnormal range for both BEST MOOD and PAST; and rates of AUDIT alcohol consumption were in the low-risk range for both BEST MOOD and PAST.

Adolescents: Improvement in Mental Health Symptoms over Time

Table 3 presents the Type III fixed effects of time and group on each adolescent outcome variable at post-treatment (T2) and three months follow-up (T3). In general, improvement in adolescent mental health symptoms did not differ between BEST MOOD and PAST over time. At T2, there were main effects for time for depression, though the interaction between time and group was not significant. This indicates that while adolescent depression improved significant over time, there was no difference between BEST MOOD and PAST. There were main effects for time for SDQ emotional symptoms and SDQ total difficulties, though interactions between time and group were not significant, suggesting that improvements did not differ between groups. For AUDIT alcohol consumption, there were no main effects for time or interaction between time and group, suggesting improvements over time were not significant and did not differ between groups. For DEQ-A

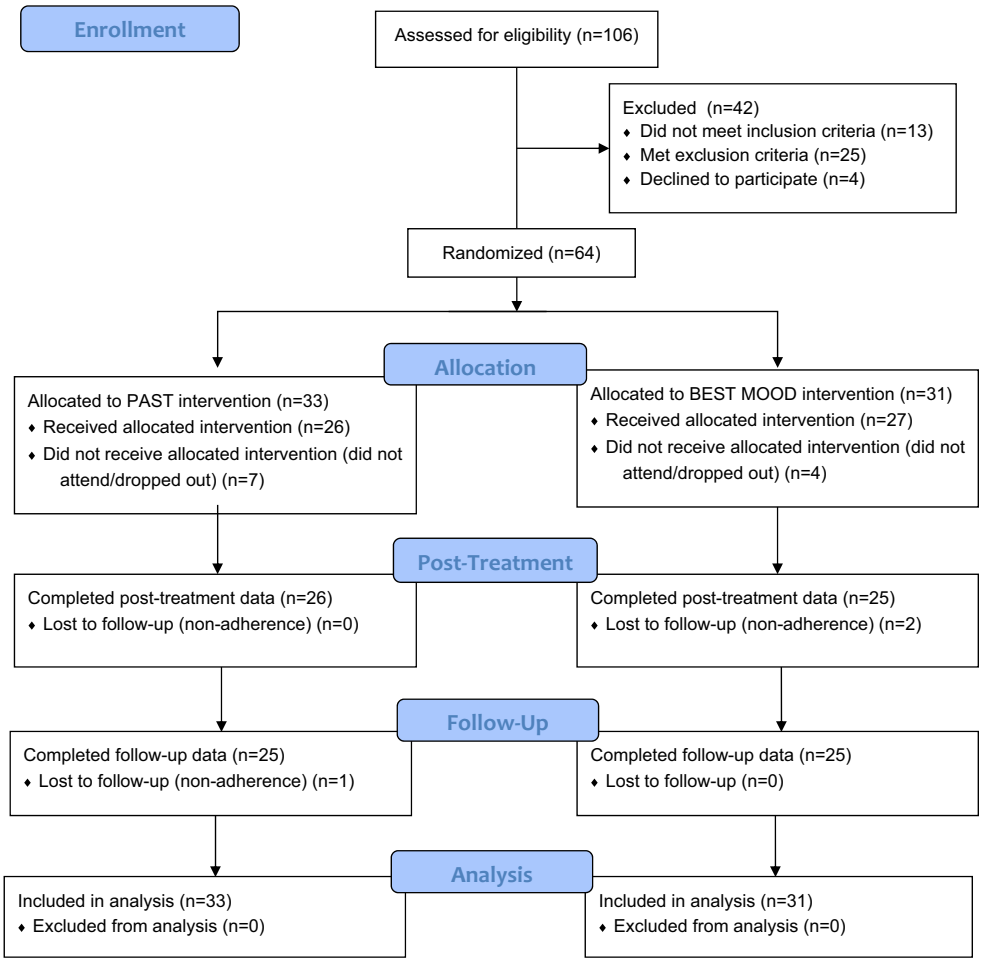

Fig. 1 Flow chart of participant progress through enrollment, intervention allocation, post-treatment, follow-up and data analysis phases of the Family Options study (PAST = Parenting Adolescents Support Training; BEST MOOD = Behaviour Exchange Systems Therapy for adolescent depression)

efficacy, dependency and self-criticism, there were no main effects for time or interactions between time and group, suggesting that improvements were not significant over time and did not differ between BEST MOOD and PAST.

At T3, there were main effects for time for adolescent depression, though the interaction between time and group was not significant, indicating that improvements did not differ between BEST MOOD and PAST. There were main effects for time on SDQ emotional symptoms, indicating a significant increase in emotional symptoms; the interaction between time and group was non-significant, indicating treatment groups did not differ statistically. There were no main effects for time or interactions between time and group were found for SDQ total difficulties, DEQ-A efficacy, dependency, self-criticism, and AUDIT alcohol consumption, indicating that change was not significant and there was no difference between BEST MOOD and PAST.

Discussion

This study reported secondary outcomes of a randomized clinical trial comparing a multi-family group intervention for adolescent depression (BEST MOOD) with a treatment-as-usual supportive parenting program (PAST). Findings were reported for both post-treatment and 3 months follow-up for parents and adolescents participating in the trial. The first study hypothesis was supported in that parental and youth mental health symptoms showed a general improvement in response to both treatment groups. The second hypothesis was only partially supported: parents showed significantly greater improvements in depression and stress in BEST MOOD relative to PAST; but there were no significant differences between conditions for youth because both groups improved equally in depressive symptoms.

The present study was consistent with many prior findings that parents of depressed adolescents often experience their own psychological distress (Mordoch and Hall 2002; Vostanis et al. 2006). In our trial, at baseline, parents in both treatment arms reported moderate levels of depressive symptoms and mild levels of stress. With regards to youth mental health at baseline, rates of depressive symptoms were high. This was expected given eligibility criteria included adolescent participants met criteria for a DSM-IV depressive disorder (major, minor or dysthymic). Interestingly, not all PAST youth reported clinically meaningful depression, however this

Table 1 Demographic characteristics and between groups difference tests across groups

Characteristics	Total (n = 64)	PAST (n = 33)	BEST MOOD (n = 31)	Between groups difference
Parent				
Age, mean (SD), y	47.1 (5.6)	46.8 (5.3)	47.5 (6.0)	p = 0.67
Female, %	92.2	97.0	87.1	p = 0.19
Education, %				
Up to Y10	24.1	24.1	24.1	
Completed Y12	12.1	13.8	10.3	
Tertiary	63.8	62.1	65.5	
Income, %				p = 0.39
$0–20,000	19	20	18.5	
$20,000–50,000	36.2	44	25.9	
$50,000–80,000	20.7	24	22.2	
> $80,000	24.1	12	33.3	
Marital status, %				p = 0.47
Married	37.5	35.7	39.3	
Divorced	37.5	42.9	32.1	
Single	17.9	17.9	17.9	
In a relationship	7.2	3.6	10.7	
Young person				
Age, mean (SD), y	15.2 (1.4)	15.3 (1.4)	15.0 (1.3)	p = 0.40
Female, %	73.4	72.7	74.2	p = 0.89
Studying, %	71.2	65.4	76.9	p = 0.36
Working, %	17.3	15.4	19.2	p = 0.71

PAST, parenting adolescents support training; BEST MOOD, behaviour exchange systems therapy—mood. Chi square test used to test between groups difference for categorical variables; independent samples t-test for continuous variables

was most likely due to disparities in the diagnostic versus self-report clinical cut-off scores (Lewis et al. 2014). Young people were also experiencing high levels of emotional problems such as excessive worrying, tearfulness, unhappiness, nervousness, low confidence, fearfulness, and somatic complaints. These types of emotional difficulties were expected

Table 2 Model Estimates, within-group effect sizes and type 3 fixed effects of time and group by time on parent self-report outcomes

		Model estimates and effect sizes						Type III fixed effects					
		BEST MOOD			PAST			Time			Group x time		
Measure	Time	M	SE	Cohen's d	M	SE	Cohen's d	dfs	F	p	dfs	F	p
DASS-21													
Depression	1	13.93	1.99		14.82	2.09							
	2	10.87	2.05	0.39	10.95	2.11	0.69	1, 43	11.898	**0.001**	1, 43	0.203	0.65
	3	8.17	2.16	0.65	13.37	2.18	0.22	2, 49	7.877	**0.001**	2,49	3.339	**0.04**
Stress	1	15.19	1.60		15.21	1.68							
	2	14.53	1.68	0.07	12.50	1.72	0.62	1, 44	2.572	0.12	1, 44	0.930	0.34
	3	10.04	1.79	0.60	14.86	1.79	0.05	2, 65	3.429	**0.04**	2, 65	5.063	**0.01**
Anxiety	1	5.70	1.28		7.29	1.34							
	2	4.81	1.31	0.16	6.71	1.35	0.15	1, 42	1.367	0.25	1, 42	0.089	0.77
	3	2.94	1.40	0.35	7.18	1.41	0.02	2, 50	1.576	0.22	2, 50	1.787	0.18

BEST MOOD, behaviour exchange systems therapy—mood; PAST, parenting adolescents support training; Depression, Depression anxiety stress scales-21–Depression subscale; Stress, Depression anxiety stress scales-21–Stress subscale; Anxiety , Depression anxiety stress scales-21–anxiety subscale

$p < 0.05$ is in bold

Table 3 Model estimates, within-group effect sizes and type 3 fixed effects of time and group by time on adolescent self-report outcomes

		Model estimates and effect sizes						Type III fixed effects					
		BEST MOOD			PAST			Time			Group x time		
Measure	Time	M	SE	Cohen's *d*	M	SE	Cohen's *d*	*dfs*	F	*p*	*dfs*	F	*p*
SMFQ													
Depression	1	18.80	1.38		17.50	1.35							
	2	13.23	1.47	0.83	13.33	1.44	0.80	1, 44	22.005	**0.000**	1, 44	0.364	0.55
	3	15.58	1.49	0.46	14.11	1.40	0.51	2, 82	12.031	**0.000**	2, 82	0.508	0.60
SDQ													
Hyperactivity/inattention	1	6.52	0.41		6.08	0.42							
	2	6.12	0.44	0.20	5.64	0.44	0.28	1, 39	1.262	0.27	1, 39	0.005	0.95
	3	7.10	0.51	-0.26	5.25	0.49	0.35	2, 70	0.947	0.39	2, 70	2.400	0.09
Peer problems	1	3.52	0.39		4.67	0.40							
	2	3.50	0.42	0.01	4.00	0.42	0.47	1, 38	1.841	0.18	1, 38	1.329	0.26
	3	3.18	0.48	0.21	4.21	0.46	0.26	2, 51	1.679	0.19	2, 51	1.081	0.35
Emotional problems	1	7.00	0.44		7.45	0.45							
	2	6.31	0.48	0.35	6.39	0.48	0.87	1, 38	7.788	**0.008**	1, 38	0.346	0.56
	3	7.41	0.56	-0.22	6.45	0.53	0.49	2, 59	3.344	**0.04**	2, 59	1.812	0.17
Conduct problems	1	3.64	0.40		2.88	0.41							
	2	3.53	0.42	0.09	2.60	0.42	0.22	1, 37	0.330	0.57	1, 37	0.033	0.86
	3	3.84	0.47	-0.16	2.43	0.45	0.29	2, 46	0.222	0.80	2, 46	0.516	0.60
Prosocial behaviour	1	7.32	0.36		7.46	0.37							
	2	7.60	0.39	0.17	7.71	0.39	0.16	1, 36	1.605	0.21	1, 36	0.003	0.95
	3	7.57	0.45	0.19	7.89	0.43	0.20	2, 51	0.899	0.41	2, 51	0.113	0.89
Total difficulties	1	20.68	1.03		21.05	1.06							
	2	19.45	1.11	0.26	18.64	1.11	0.74	1, 40	4.733	**0.04**	1, 40	0.455	0.50
	3	21.49	1.29	-0.20	18.35	1.23	0.53	2, 54	2.790	0.07	2, 54	1.776	0.18
DEQ-A													
Efficacy	1	9.88	0.47		10.09	0.47							
	2	10.33	0.50	0.17	10.66	0.51	0.43	1, 33	2.356	0.13	1, 33	0.077	0.78
	3	9.98	0.57	0.05	11.36	0.56	0.61	2, 48	2.604	0.08	2, 48	1.540	0.23
Dependency	1	24.44	0.81		24.73	0.81							
	2	24.05	0.86	0.10	23.59	0.86	0.38	1, 34	1.448	0.24	1, 34	0.446	0.51
	3	24.87	0.97	-0.14	23.49	0.96	0.33	2, 49	0.824	0.45	2, 49	0.545	0.58
Self-criticism	1	21.44	0.53		21.44	0.53							
	2	21.22	0.57	0.08	21.75	0.58	-0.12	1, 38	0.009	0.93	1, 38	0.244	0.62
	3	21.77	0.67	-0.17	21.44	0.66	0.00	2, 62	0.176	0.84	2, 62	0.634	0.53
AUDIT													
Alcohol consumption	1	2.00	0.55		1.87	0.54							
	2	2.13	0.56	-0.16	1.69	0.55	0.14	1, 35	0.046	0.83	1, 35	0.633	0.43
	3	2.18	0.59	-0.18	1.89	0.57	-0.01	2, 63	0.180	0.84	2, 63	0.378	0.69

Time 1, Baseline, Time 2, Post-treatment, Time 3, Three-month follow-up; BEST MOOD, behaviour exchange systems therapy—mood; PAST, Parenting adolescents support training; Depression, Short moods and feelings questionnaire; Hyperactivity, Strengths and difficulties questionnaire—Hyperactivity; Peer problems, Strengths and difficulties questionnaire—peer problems; Emotional symptoms, Strengths and difficulties questionnaire—Emotional symptoms; Conduct problems, Strengths and difficulties questionnaire—Conduct problems; Prosocial behaviour, Strengths and Difficulties questionnaire—Prosocial behaviour; Total difficulties, Strengths and Difficulties questionnaire—Total; Efficacy, Depressive experiences questionnaire for adolescents—efficacy; Dependency, Depressive experiences questionnaire for adolescents—dependency; Self-criticism, Depressive experiences questionnaire for adolescents—Self-criticism; DEQA Total, Depressive experiences questionnaire for adolescents—total; Alcohol consumption, Alcohol use disorders identification test—consumption

$p < 0.05$ is in bold

based on prior research indicating their co-occurrence with depression in adolescence (Hankin 2008). Young people also reported increased difficulties with hyperactivity/inattention and peer relationships at baseline. Given common symptoms of adolescent depression include poor concentration, indecisiveness, boredom, irritability, reckless behaviour, and social withdrawal (American Psychiatric Association 2013), these findings were not surprising. Conduct problems were in the normal range for young people in both groups at baseline. With regards to alcohol consumption, young people were considered low-risk at baseline.

This study provides evidence that a structured, multi-family group intervention for adolescent depression can improve both youth and parental mental health symptoms. Interestingly, treatment effects for parental depression and stress were larger in the PAST control group than the BEST MOOD intervention at post-treatment, indicating the immediate benefits of non-directive supportive counselling. However as hypothesized, improvements in parental mental health were greater in the BEST MOOD group at a follow up 3 months later than at post-treatment, suggesting that the intervention has long-term benefit to parents. This also suggests that the treatment effect of BEST MOOD increases even after treatment is withdrawn. This is an encouraging finding and suggests that families are able to continue to implement systemic changes derived from the areas targeted.

Our findings on parent mental health outcomes were expected, considering the previous findings from BEST (Forsberg et al. 2015; Toumbourou and Bamberg 2008; Toumbourou et al. 2001) and BEST Plus (Bertino et al. 2013), and for other programs that aim to encourage and empower parents, to improve patterns of communication and to reduce stressors in the family in order to better support their adolescent children. Although both BEST MOOD and PAST had the immediate benefit of social support amongst families, the BEST MOOD program contained a more focussed therapeutic strategy (as described above), which likely provided lasting benefits of changing beliefs and behaviours within families. For example, based on prior research indicating the benefit of parental self-care, urging parents to develop and execute self-care plans from early on in the program was expected to improve parental psychological distress, enhance their sense of coping and also model a positive stance for their adolescents. These beneficial effects would be cumulative over time. Self-care strategies also tend to be similar to behavioural activation techniques, which encourage resumption of pleasurable activities and reductions in avoidance; this likely led to reductions in parental depressive symptoms and stress since parents of youth with mental health difficulties tend to neglect their own needs. Another key component in BEST MOOD that was likely to have reduced parental depression was content designed to address major traumas and losses within a family context. Again, such experiences take time to process and the therapeutic benefit at a family system level is likely to unfold gradually over time.

Adolescent depressive symptoms reduced significantly over time, with BEST MOOD and PAST both largely effective in reducing youth depressive symptoms at post-treatment, and also evidence that these gains were maintained at 3-month follow up. However, contrary to expectation, the difference between groups was not significant. Since PAST was limited to providing non-directive supportive counselling to families, compared with BEST MOOD which included active therapeutic components, it was interesting that youth depressive symptoms improved at a similar rate in response to the PAST program, and did not differ statistically, particularly because adolescents attended up to four sessions in the BEST MOOD program compared to only one in PAST. One explanation for this finding is that the non-directive supportive approach adopted in PAST can also be an effective family based intervention for youth depression. PAST therapists employed strong attending, listening and empathy skills, which likely led families to feel validated and understood. This adjustment in family distress may have translated to youth, if they were now experiencing a less stressful family environment (a known risk factor for the maintenance of adolescent depression).

Another explanation for not finding a meaningful difference between groups in the reduction of youth depressive symptoms may relate to the active control condition used in this study. Comparing an experimental condition with an active control condition is a more rigorous comparison than between an experimental and a passive control such as no treatment or waitlist (Baskin et al. 2003). A meta-analysis on the effects of psychotherapy for youth depression concluded that between group effect sizes were much lower in studies that included an active control compared with those with a passive control (Weisz et al. 2006). As discussed above, the PAST program in the present study was matched to BEST MOOD in terms of hours of therapy provided, amount of training and quality of supervision. PAST provided families with eight weeks of supportive group therapy; in addition to this study's rigorous comparison between groups, the level of care provided in the control condition was extensive. Combined these factors may have contributed to strong youth outcomes in PAST, reducing the difference between groups over time. It is possible that a larger study and longer term follow up would be needed to identify if there is a between-group effect for adolescent depression.

While depression, the primary target of the intervention, decreased over time in the BEST MOOD group, adolescent levels of hyperactivity/inattention, emotional problems, conduct problems, dependency, and alcohol increased by 3 months post-treatment. It is important to note that our participants did not suffer with just depression, but reported a range of other problems at baseline. The BEST MOOD

program adopts a much more directive, active family component than PAST, focusing on family communication and aspects of interpersonal interactions in an effort to improve the emotional environment of family life. BEST MOOD promotes parent-child boundary setting, family goal setting, and family stress management (Poole et al. 2016). As such, while both programs saw a positive improvement in adolescent depression, changes in parent responding and family dynamics within the BEST MOOD may have led to a small increase in other adolescent problems in the short term, as adolescents and families adjusted to their new environments. In the long term, such change in family dynamics may lead to better outcomes for adolescents, as parenting skills become more established. This is consistent with other family-based adolescent depression programs that have been shown to produce effects on other adolescent problems (i.e., anxiety symptoms, hopelessness and suicidal ideation) at follow-ups six (Diamond et al. 2002; Diamond et al. 2010) and 12 (Gillham et al. 2006) months later. However, the current study only examined short-term responses to BEST MOOD and PAST, and research examining longer-term outcomes these programs is needed.

Given the relatively small sample size in this study, another reason for the groups not differing over time might be related to the few PAST youth who experienced very substantial reductions in depressive symptoms. For example, one PAST participant experienced an 88% reduction at follow-up, and two PAST participants experienced a 52% reduction.

One of the strengths of the present study was its randomized double blind design, which minimized selection bias and ensured the perceptions of participants and researchers did not bias the results. Another strength was the use of an objective assessment measure at intake, the KID-SCID, which enhanced the reliability and validity of participant selection and recruitment into the study. The training and supervision provided to therapists by a senior clinical psychologist was an additional strength of the present study, as was the use of intervention manuals in both the experimental and control groups, which ensured treatment delivery consistency between different therapists, and allows for treatment replication in different contexts.

There are some notable limitations to the study, including a general difficulty with the small sample size, which occurred despite initially screening a large number of families. This was particularly notable at the 3-month follow up stage, where comparative groups consisted of 25 families each. The smaller than optimal sample size limits the generalizability of these findings to the broader community, which raises the issue of representation. The study was also limited by its relatively short period for follow up. The Family Options study was originally designed with a six-month follow-up stage, however because recruitment was on the basis of diagnosed depression, and because suicidal youth were not excluded from participation, the ethics approval could only be obtained (without additional intervention) a three month follow up, at which point any adolescents still meeting diagnostic criteria were referred to additional services. A longer-term follow up may be required to observe group effects in adolescent symptoms. Lastly, while rates of parental depression across treatment groups were not were not significantly different at baseline, it is notable that more parents reported 'moderate' depressive symptoms in the control group. This variation may have biased the results, if parents in the experimental group were more responsive to the intervention because fewer were dealing with as severe depressive symptoms.

The current findings add to the small body of literature on family-based intervention programs designed specifically for the treatment of adolescent depression. Importantly, this study shows that a family-based intervention for youth depression can also significantly reduce symptoms of depression and stress in parents. Given existing evidence of the link between adolescent depression and family-related factors such as parent mental health and stressful home environments, improving parental depression- and stress- levels in families with a depressed adolescent has the potential to indirectly enhance treatment outcomes in youth. This study also confirms that such a family-based intervention can effectively reduce youth depressive symptoms, and maintain these gains three months after the cessation of treatment. While our study found minimal treatment effects for other youth mental health problems such as hyperactivity/inattention or alcohol consumption, the effect of BEST MOOD on youth depression substantial, and comparable to that of other established interventions.

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Compliance with Ethical Standards

Conflict of Interest The authors have no conflict of interest to report.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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