Preventing Adolescent Depression With the Family Check-Up: Examining Family Conflict as a Mechanism of Change

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Family-centered prevention programs are understudied for their effects on adolescent depression. Despite considerable evidence that supports their effectiveness for preventing escalation in problem behavior and substance use, this study was conducted with 2 overarching goals: (a) replicate previous work that has implicated the Family Check-Up (FCU), a multilevel, gated intervention model embedded in public middle schools, as an effective strategy for preventing growth in adolescent depressive symptoms and (b) test whether changes in family conflict may be an explanatory mechanism for the long-term, protective effects of the FCU with respect to adolescent depression. This trial was conducted with 593 ethnically diverse families who were randomized to intervention (offered the FCU) or middle school as usual. Complier average causal effect (CACE) analysis revealed that engagers in the FCU evidenced less growth in depressive symptoms and family conflict from 6th through 9th grade, and post hoc analyses indicated that the FCU is related to lower rates of major depressive disorder. The second set of analyses examined family conflict as a mechanism of change for families who participated in the FCU. Families who reported short-term intervention benefits had significantly less escalation in family conflict over the middle school years; in turn, growth in family conflict explained risk for adolescent depressive symptoms.

Keywords: Family Check-Up, family-centered prevention, adolescent depression, family conflict, mechanism of family intervention

Adolescent depression, and mood disorders in general, are quite prevalent; approximately 14% of adolescents in the United States qualify as having a mood disorder (Merikangas et al., 2010). Developmentally, mood disorders are considerably less common in childhood, suggesting that adolescence is a period of risk for problems with depression (Kessler, Chiu, Demler, & Walters, 2005). Recognition of this developmental timing has stimulated the creation of several prevention programs that work with adolescents to target individual factors, such as coping strategies, social skills, and cognitions (e.g., Lewinsohn, Clarke, Hops, & Andrews, 1990; Rohde, Clarke, Mace, Jorgensen, & Seeley, 2004).

More recently, there has been growing recognition that the family system can either elevate risk for depression or be a source of resilience for adolescent stress (Restifo & Bögels, 2009). As such, family-based programs are being evaluated toward the prevention and reduction of adolescent depression. Because family-based prevention models have primarily been used to treat or prevent child and adolescent problem behaviors, such as noncompliance, conduct problems, antisocial behavior, and substance use (Kaslow, Broth, Smith, & Collins, 2012), logic models for these family interventions have focused on the family risk and protective factors for youth problem behaviors. Only recently have efforts been made to articulate a framework that can guide family-centered programs toward addressing risk factors for adolescent depression (Restifo & Bögels, 2009). Thus, the theoretical models guiding family interventions for depression are less extensively developed and evaluated.

Growing evidence suggests that family involvement in treatment for adolescent depression can be beneficial (Asarnow, Scott, & Mintz, 2002; Diamond et al., 2010). Approaches range from family-centered interventions, such as attachment-based family therapy (e.g., Diamond et al., 2010) to the addition of a parent adjunct to existing interventions, such as the Resourceful Adolescent Parent Program (RAP–P; Pineda & Dadds, 2013). However, other research has documented challenges to family interventions for adolescent depression. In some cases, parents may find family-
based treatment of adolescent depression as less credible or even aversive (Stein et al., 2001). Also, there can be difficulties with parental engagement in supplemental parent training that has been added to individual treatment for depressed adolescents, with engagement rates as low as 10% (Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999; Lewinsohn et al., 1990; Shochet et al., 2001). Not surprisingly, poorly attended parent training sessions in these studies did not lead to incremental improvements in treatment outcome over the child-focused treatment components alone. Thus, there is mixed support for family-focused clinical interventions for depression, with parent engagement as a key obstacle.

Prevention programs aimed at reducing family risk factors for adolescent depression are also gaining momentum. One approach has been to target youth in families with a depressed parent for family-based intervention services. Because parental depression poses a risk for children’s development and well-being, interventions have been developed to target processes such as children’s cognitions about their parents’ depression or targeting children’s depressogenic cognitions within a family context (e.g., Beardslee, Gladstone, Wright, & Cooper, 2003; Beardslee, Wright, Gladstone, & Forbes, 2007; Compas et al., 2009; Compas et al., 2012). However, interventions that target adolescents of depressed parents seem to have the most promising effects in short-term follow-up, with less reliable effects for long-term outcomes.

We focus on another potentially fruitful approach that draws on strengths from established family-centered interventions that focus on key family management skills and family engagement that may reduce risk for adolescent depression. We hypothesize that interventions designed to prevent substance use or problem behavior target common risk factors that may also reduce risk for adolescent depression. Several family-centered programs now have documented effects for adolescent depression, such as the Iowa Strengthening Families Program (Trudeau, Spoth, Randall, & Azevedo, 2007), Preparing for the Drug Free Years (Mason et al., 2007), the Family Check-Up (Connell & Dishion, 2008), and the Strong African American Families Teen Program (Brody et al., 2012).

Further evaluation of family programs that may have preventive effects on depression would widen the scope of the public health benefits they already offer. It could also evoke interest in the cost-effective application of existing family-strengthening approaches to problems other than those classified in the externalizing spectrum. However, it is only through exploring the mechanisms that we will be able to understand how and why family-based interventions impact adolescent depression (Liddle, 2004). Such research is both important and lacking (Fosco, Bumbarger, Bamberger, & Van Ryzin, in press; Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011), and the rare exceptions offer important insights into how family-centered programs designed to address conduct problems or substance use may also impact adolescent depression. Mason and colleagues (2007) found that Preparing for the Drug Free Years may reduce risk through reductions in substance use. Another study by Perrino et al. (2014) indicates that improved family communication promoted in the Familias Unidas program can reduce risk for depression.

We explore family conflict as another potential avenue by which family-centered interventions may reduce risk for adolescent depression. Family conflict is a widely studied and empirically supported risk factor for adolescent depression (e.g., David, Steele, Forehand, & Armistead, 1996; Formoso, Gonzales, & Aiken, 2000). Families with frequent arguments, escalating hostility, criticism, or anger create a stressful family environment that can undermine adolescents’ coping resources and increase their risk for depression (Birmaher et al., 1996). Longitudinal evidence supports the view that family conflict during adolescence is associated with increases in adolescent depression 1 year later (Sheeber, Hops, Alpert, Davis, & Andrews, 1997).
tional intervention strategies where all participants receive identical services, the FCU is guided by an adaptive intervention framework and tailors intervention services to the individual needs of each family in an effort to optimize efficiency by allocating only the needed intervention resources to each family (Collins, Murphy, & Bierman, 2004).

Evaluating Tiered Interventions

The tiered intervention design used by the FCU model in schools calls for thoughtful attention to the implications of different methods for evaluating its effectiveness. An intent-to-treat (ITT) approach compares the outcomes for all participants in the control group with the outcomes for all participants assigned to the intervention group, regardless of their actual level of engagement with treatment services. A few studies have found ITT effects for the FCU model when evaluating substance use (Connell, Dishion, & Deater-Deckard, 2006), antisocial behavior (Smith, Noble, Zerr, Dishion, & Stormshak, 2014), and intervention targets, such as family relationship quality (Caruthers et al., 2014; Smith et al., 2014) and adolescent self-regulation (Fosco, Frank, Stormshak, & Dishion, 2013). These studies suggest that the FCU model can have net effects at the population level, regardless of the design intended to only engage families with indications of risk (i.e., selected, indicated levels).

Other studies have focused on a closer match between the tiered intervention design and the adaptive framework. ITT analyses implicitly assume that all participants allocated to the intervention group will receive the intervention. However, the FCU’s tiered approach is designed around the expectation that most families will not need a family intervention and thus offers a cost-effective allocation of resources to families who need them. In this approach, engagement in the intervention, particularly at selected and indicated levels of intervention, is what drives intervention effects (e.g., Connell & Dishion, 2008). To evaluate this approach, many of the studies testing the FCU’s efficacy have utilized complier average causal effect (CACE) modeling, which uses indications of engagement and nonengagement among the intervention group (Jo, 2002). Using mixture modeling techniques, observed complier behavior in the intervention group is used to estimate latent classes (compliers and noncompliers) in the control condition that match those observed in the intervention group. Subsequently, intervention effects can be calculated as the difference between the outcomes in the intervention compliers group and those of the matched latent class of complier families in the control group. As one might expect given the adaptive nature of the FCU, the noncompliers are typically families whose children are not demonstrating significant problems (Van Ryzin & Dishion, 2012); likewise, compliers may be more motivated to make changes in their family than noncompliers. CACE models offer insight into the degree to which the intervention is effective with those families that engage in support services as compared to a relevant group of families in the control condition.

This Study

To understand how and why the FCU might reduce risk for adolescent depression, analyses were conducted in two steps. The first set of analyses tested for FCU intervention effects for adolescent depressive symptoms and family conflict in the same model. Using ITT and CACE analytic approaches, we evaluated the degree to which the FCU might impact risk for depression for youth in middle school. These findings would replicate previous studies indicating effects for depression (Connell & Dishion, 2008) and family conflict (Van Ryzin & Dishion, 2012). Assuming significant effects of the FCU on depression and family conflict, the second set of analyses was conducted to test family conflict as a mechanism for long-term protective effects of the FCU with respect to adolescent depression. Given the complexity of CACE models, it is understandable that tests of mediation within an intervention framework are still evolving (Jo, 2008). Therefore, we conducted within-group analyses of intervention engagers using previously validated methods (Fosco, Van Ryzin, Stormshak, & Dishion, 2014). A latent growth modeling (LGM) approach was used to examine how caregivers’ reported improvements in FCU-targeted adolescent behaviors (e.g., self-management, behavior concerns), labeled FCU response, was related to trajectories of family conflict from sixth through eighth grade, which in turn was expected to predict adolescent depression in ninth grade.

Method

Participants

Participants were 593 adolescents and their families from three public middle schools in an urban area of the country. All three middle schools in this study served an at-risk population, with 35%, 89%, and 39% of families across the three schools receiving free or reduced-price lunches. All three schools were Title I schools, and approximately 20% of the school populations combined qualified for special education services. Youths and families were recruited in sixth grade across two cohorts. Parents of all sixth-grade students were invited to participate in the study, and 80% of all parents agreed to do so. Consent forms were mailed to families or sent home with youths. Youth gender was evenly split in the sample (49% female). The ethnicity of the sample was as follows: European American (36%), Latino or Hispanic (18%), African American (16%), Asian (8%), American Indian (3%), and Biracial or Mixed Ethnicity (19%).

A total of 386 families (65%) were randomly assigned to the intervention condition, and 207 families (35%) were randomly assigned to the control condition in which families experienced “school as usual” (see Figure 1), including regular services offered by the schools but no access to any of the intervention services available to families in the intervention condition. No differences were found between the intervention and control groups on any variables.

Student surveys were collected annually about all youths enrolled in the study. More than three quarters of the youths were retained across the 4 years of the study (Wave 2, n = 525, 89% of sample; Wave 3, n = 511, 86% of sample; Wave 4, n = 493, 83% of sample); 84% of the intervention group and 83% of the control group were retained by Wave 4.

Intervention Protocol

The FCU is a tiered intervention model. At the universal level, an FRC was established in each of the participating public middle...
schools; the FRC was available for services to the entire intervention group (see Stormshak, Dishion, Light, & Yasui, 2005, for more description). A parent consultant in each FRC provided information to parents about their student’s behavior, attendance, and homework completion and offered brief consultations to parents to support homework routines and home-to-school planning. Also, special seminars were provided about topics of interest to families in the school (e.g., supervising your teen during the summer).

The selected intervention was the FCU, a three-session intervention modeled on the Drinker’s Check-Up (Miller & Rollnick, 2002). Although all families were invited to participate in the FCU, concerted efforts were placed on engaging youth who were identified by school staff for behavior, attendance, or academic concerns. Families who participated in the selected intervention (42% of those in the intervention condition) completed three FCU sessions consisting of an initial interview, an assessment session, and a feedback session. The initial interview focused on exploring parent concerns and encouraging the parents to engage in a family assessment. The assessment session included survey assessments and video-recorded family interactions in families’ homes or at school to help therapists evaluate parent–child interactions. The feedback session was delivered using motivational interviewing strategies (Miller & Rollnick, 2002) to summarize the results of the assessment for parents and explore the need for indicated intervention services to target changes in family management practices at home. Indicated interventions were drawn from empirically validated sessions described in the Everyday Parenting curriculum (Dishion, Stormshak, & Kavanagh, 2011), which focuses on intensive support around four key domains of family management: positive behavior support, monitoring, limit setting, and family problem solving.

Of the 386 families in the intervention condition, 52% (n = 199) received consultation from a parent consultant, the majority of which (n = 163) received the full selected-level FCU intervention (42% of the 386 families). Only families who completed the FCU and received feedback were considered intervention compliers for CACE analyses. Of the families receiving the FCU, 80% (n = 131) received indicated-level support after the feedback, such as parent skills training or development of a home-to-school plan. Specifically, 36% received positive behavior support, 71% received support in limit setting and monitoring skills, and 73% received communication and problem-solving support. School-related support was received by 79%. The average intervention family received 365 min (or 6.1 hr) of intervention time. The majority of the FCU interventions were completed during seventh and eighth grade (73%). Interventionists received direct supervision from intervention developers, including direct consultation and feedback on video-recorded FCU sessions to ensure high levels of fidelity to the intervention model. Observer ratings of fidelity indicated consistently high fidelity to the FCU model that were invariant across family racial groups (Bustos, 2011).

A basic consideration is the level of engagement of families of all demographics, such as gender and ethnic status. With respect to gender, 47% (n = 76) of families who engaged in the FCU had a girl, and 53% (n = 87) of families had a boy as a target of the intervention. The percentages of families engaging in the intervention by family ethnicity were as follows: 47% (n = 33) Latino families, 42% (n = 59) European American families, 36% (n = 22) African American families, 51% (n = 37) youths from multiethnic backgrounds, and 7% (n = 12) youths from other ethnic backgrounds engaged in the FCU.

**Measurement Procedures**

Measurement was conducted in two ways. Data for the full sample (intervention and control groups) were collected by means of adolescent self-report on in-school surveys during the spring semester of sixth through ninth grade. This assessment was an instrument developed and reported on by colleagues at the Oregon Research Institute (Metzler, Biglan, Rushy, & Sprague, 2001). If students moved out of their original schools, we followed them up at their new location. Each youth who participated received $20 for each year he or she completed the assessment. These data were the basis for our first aim. Additional information was collected as part of the FCU assessment session; thus, caregiver data were available from families who engaged in the FCU intervention. For the second aim, we were therefore able to include caregiver reports of family resources as a covariate, which has been found to be an important predictor of family conflict (Fosco et al., 2014). These caregiver assessments were also used to create the change in FCU-targeted adolescent behavior scores, as described later.
Measures

Family resources. Caregivers who completed FCU assessment materials provided information on families’ ecological contexts with respect to access to resources or stress involved in meeting basic needs, consistent with the FCU model (Dishion & Stormshak, 2007). Similar to measures of socioeconomic status, this assessment surveyed families about circumstances such as income, employment, education, and use of financial aid programs and helped guide feedback about community resources that may benefit families. When data were available for both parents, the highest level of each variable among the two parents was chosen. These variables were standardized and averaged (α = .74) to create a single measure of family resources.

Parent depression. Depression was assessed as part of the FCU assessment using the Center for Epidemiological Studies—Depression Scale (CES–D; Radloff, 1977). The CES–D is a widely used measure of depression consisting of 20 items used to assess levels of symptoms during the past week. Sample items include “I felt depressed,” “I could not get going,” and “I felt that everything I did was an effort.” This scale had good internal consistency (α = .88).

Change in FCU-targeted adolescent behavior concerns. This index was created to capture caregivers’ concerns about their child’s behavior that they would like to see change. During the intake and 1-year follow-up assessments, parents reported their concerns in four general domains: youth behavior problems (e.g., stealing, defiance), youth self-management (e.g., self-control with peers, managing feelings and emotions), youth positive behavior concerns (e.g., wishing youth would help out around the house, engage in prosocial activities), and internalizing behavior concerns (e.g., being sad or depressed, fearful or anxious). Each scale had adequate internal consistency (as ranged from .61 to .70 on the three 4-item scales and from .73 to .78 for the eight-item behavior problem concerns scale). Comparisons of those who provided data at the follow-up assessment to those who did not indicated no differences in the groups. Confirmatory factor analysis indicated that these four domains converged on one factor. Following guidelines by McArdle and Nesselroade (1994), a latent change score was calculated for the latent variables over time, so that higher values reflected decreases in FCU-targeted adolescent behavior concerns from baseline to 1-year follow-up. The latent change model yielded good fit with the data and had statistically significant variance in the degree of change across families. These latent change scores were saved and used as a manifest variable for analysis in this study. Previous findings with this approach can be found elsewhere (Fosco et al., 2014).

Family conflict. Youth reports of conflict with parents were measured by averaging across four items. Youth were asked how many times in the past month did the following happen between you and someone in your family: “We got angry at each other,” “We argued,” “One of us got so mad, we hit the other person,” and “I got my way by being angry.” Responses were scored 0 (never), 1 (once), 2 (twice), 3 (three times), 4 (four or five times), 5 (six or seven times), or 6 (more than seven times). This scale had good reliability across waves (α = .80–.82).

Depressive symptoms. Depressive symptoms were assessed annually using a 14-item measure adapted from the Child Depression Inventory (Kovacs, 1984) to more directly correspond to the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM–IV–TR; American Psychiatric Association [APA], 2000). Adolescents were asked about the frequency of symptoms such as feeling sad, moody, or hopeless and having trouble sleeping, with all DSM–IV–TR diagnostic criteria for depression addressed by at least one item. Participants rated each symptom on a 5-point scale ranging from never or almost never to always or almost always for the past month. This adapted measure has been shown to have high internal reliability (Stormshak et al., 2010). In this study, Cronbach’s alpha was between .92 and .95 for this measure across the four waves of data.

Child gender. Gender was coded as male = 0 and female = 1 in the analyses.

Intervention status. Random assignment was coded as control = 0 and intervention = 1.

Engagement status. Consistent with CACE modeling guidelines (Jo, 2002), engagement status was coded with two dichotomous variables—comply and noncomply—to reflect family participation in the FCU. Families in the intervention condition who elected to receive the FCU were coded as comply = 1 and noncomply = 0. Families in the intervention condition who did not receive the FCU were coded as comply = 0 and noncomply = 1. Families in the control group were coded identically so that the software could make its determination of latent class membership (Jo, 2002).

Analysis Plan

The first aim of this study was to examine FCU intervention effects on adolescent depression and the proposed mechanism (family conflict). For this test of the FCU intervention effects, we conducted two types of analysis, drawing on ITT and CACE modeling approaches. All analyses were conducted with Mplus 6.1, using full information maximum likelihood estimation to account for missing data (Muthén & Muthén, 2008). ITT analyses were conducted to evaluate the effects of the FCU as a package within schools in a manner akin to a population-level effect. Significant findings would reflect an overall effect on the whole school population rather than on those families who were engaged by intervention services. To evaluate ITT effects, we fit growth models for adolescent depression and family conflict and regressed the slopes on intervention condition, controlling for ethnic minority status and adolescent gender.

A CACE analysis was also conducted to evaluate the specific effects of the FCU intervention model. The CACE model was computed to evaluate intervention effects for families who engaged with the FCU using a latent growth model (LGM) embedded in CACE analyses (Jo, 2002). In CACE models, researchers can examine outcomes specifically for participants who engaged in (or complied with) the intervention and compare effects with the matched portion of the control group. Model fit is evaluated using entropy, which is a summary measure of the probability of membership in the most likely class for each individual (i.e., complier or noncomplier). Possible values range from 0 to 1.0, with higher values representing better fit.

The LGM intercepts in the CACE model were parameterized to reflect the initial level of family conflict and depressive symptoms in sixth grade (prior to any intervention), and the slope was parameterized to reflect the linear rate of change from sixth through ninth grade. The intervention condition was used to pre-


dict the change over time (i.e., slope) in the complier class but not in the noncomplier class, since by definition this class did not receive the intervention. The intervention condition was not set to be a predictor of the initial levels (i.e., intercepts) in either class and was not set as a predictor of membership in the latent compliance classes. Also, to ensure that the latent compliance classes were the same for each outcome variable under consideration, we ran both family conflict and depression in a single CACE model.

The second aim of this study was to examine family conflict as a mechanism of the FCU intervention effects on long-term adolescent depression outcomes using a subsample comprised only of the intervention engagers. First, an unconditional LGM was estimated for family conflict; then, accounting for gender and family resources as covariates, response to the FCU intervention (measured by short-term change in FCU-targeted adolescent behavior concerns) was tested as a predictor of the rate of long-term growth (slope) in family conflict over time. In turn, family conflict slope was tested as a predictor of adolescent depressive symptoms in ninth grade, accounting for previous levels at baseline (sixth grade).

Results

As a preliminary step, we compared noncomplier (n = 223) and complier (n = 163) families in the intervention condition with regard to the proportion of the adolescents who were female, noncompliers = 49.8%; compliers = 46.0%; ethnic minority status, noncompliers = 65.4%, compliers = 62.6%; and family conflict, whereas the control compliers demonstrated an increase in family conflict over time. In turn, family conflict slope was tested as a predictor of adolescent depressive symptoms in ninth grade, accounting for previous levels at baseline (sixth grade).

FCU Intervention Effects on Family Conflict and Adolescent Depressive Symptoms

ITT analyses. First, unconditional growth models were computed for adolescent depression and family conflict separately. The adolescent depression unconditional model provided acceptable fit with the data, in which χ²(5) = 10.185, p = .07, Comparative Fit Index (CFI) = .99, Tucker Lewis Index (TLI) = .99, root mean square error of approximation (RMSEA) = .04, 90% confidence interval (CI) [.00, .08]. On average, the slope for depression was increasing over time (M = .04, SE = .01, p < .01), and there was statistically significant variance in the slope (variance of .05, SE = .01, p < .01). The family conflict unconditional model yielded marginal fit, where χ²(5) = 44.22, p = .00, CFI = .94, TLI = .92, RMSEA = .12, 90% CI [.08, .15]. However, there were meaningful patterns of change and variance in the slope parameter. On average, family conflict increased over time (M = .09, SE = .02, p < .05), and there was statistically significant variance in the slope across families (variance of .13, SE = .02, p < .01). We then regressed intervention group (intervention or control group), youth gender, and ethnic minority status on the slope coefficients for adolescent depression and family conflict. No ITT effects were detected predicting depression (β = .00, p = .99) or family conflict (β = −.04, p = .57).

CACE models. Second, we conducted CACE model analysis. In this model, entropy was acceptable (0.79). The results for predictors of engagement status and the results for within-class variation in trajectories of both family conflict and depressive symptoms are shown in Table 2.

Compliance class membership. Results for predictors of engagement followed a logistic regression framework, in that predictors attempted to discriminate between the complier and noncomplier classes. Our results indicated that none of the predictors was significantly related to family compliance with the FCU (see Table 2), suggesting equal participation among ethnicities and families of boys and of girls.

Predictors of within-class variation. Of primary interest is the finding that assignment to the intervention condition predicted rate of change in both outcomes (see Table 2). The negative coefficients indicate that the intervention compliers possessed a significantly lower rate of change across time compared with compliers in the control group. As can be seen in Figure 2, the intervention compliers maintained a relatively flat level of family conflict, whereas the control compliers demonstrated an increase over time (Figure 2A). Similar effects appeared for depressive symptoms (Figure 2B). Control variables also predicted significant within-group variance in the expected directions; for example, girls had higher levels of depressive symptoms than did boys, both in terms of initial levels (i.e., intercept) and in terms of change over time (i.e., slope).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Family conflict (by grade)</th>
<th>Depressive symptoms (by grade)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>1. Intervention status</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td>2. Gender</td>
<td>.08</td>
<td>.13***</td>
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<tr>
<td>3. Ethnicity</td>
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<td>−.06</td>
</tr>
<tr>
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<td>524</td>
</tr>
<tr>
<td>M</td>
<td>2.57</td>
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</tr>
<tr>
<td>SD</td>
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<td>1.46</td>
</tr>
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</table>

**Note.** Ethnicity was coded as a dichotomous variable such that 0 = European American or White, 1 = all other racial or ethnic groups.

*p < .05. **p < .01. ***p < .001.
Complier Average Causal Effect (CACE) Model Results

Table 2

<table>
<thead>
<tr>
<th>Variable or parameter</th>
<th>Within-class variation</th>
<th>Within-class variation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Noncomplier class</td>
<td>Complier class</td>
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<tr>
<td></td>
<td>Intercept estimate (SE)</td>
<td>Slope estimate (SE)</td>
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<tr>
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</tr>
<tr>
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<td>Residual variance</td>
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<td>.12 (.03)</td>
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Table 3

<table>
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<tbody>
<tr>
<td>Intercept</td>
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</tr>
<tr>
<td>Slope</td>
<td>.02 (.01)</td>
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<tr>
<td>Residual variance</td>
<td>.05 (.06)</td>
</tr>
</tbody>
</table>

*p < .05.

Effect sizes. To calculate effect sizes, complier class estimates were saved, and outcomes for individuals assigned to the complier class in the control and intervention groups were compared in ninth grade. Based upon Cohen’s criteria (i.e., moderate, $d = .50$; large, $d = .80$), effect sizes were small for family conflict (.14) and depressive symptoms (.24). To assess clinical significance, we conducted a post hoc analysis of symptom counts and approximated diagnoses of major depressive disorder (MDD). To do so, we rescored depression items rated as often or almost always as symptoms and summed the total number of depressive symptoms for each participant. In addition, diagnosis of MDD was assigned when youth reported having at least five symptoms of depression, with at least one being feelings of depressed mood or diminished interest in activities (APA, 2000). Symptom counts and proportion of youths with MDD are reported in Table 3. Complier youth in the control condition had more symptoms of depression, $t(172) = 2.34, p < .05$, and nearly double the rate of MDD than the intervention group compliers by Wave 4. However, categorical comparisons for MDD diagnosis failed to reach statistical significance, $\chi^2(1) = 2.12, p = .15$.

Testing Intervening Effects of Family Conflict on Adolescent Depression

Building on the intervention effects on family conflict and depressive symptoms when comparing compliers in the intervention and control groups, we then examined family conflict as an intervening process by which the FCU intervention may impact adolescent depressive symptoms. This was accomplished by evaluating the intervention complier group, including all families who initiated FCU services in schools. By using a measure of change in caregivers’ reports of adolescent behavior concerns that was validated in a previous study (Fosco et al., 2014), it was possible to test associations among short-term linear change in adolescent behavior concerns with trajectories of family conflict from sixth through eighth grade (the proposed mechanism) and ultimately adolescents’ levels of depression in ninth grade after accounting for sixth-grade depression. Table 4 reports correlations and descriptive statistics.

The unconditional model provided marginal fit with the data, in which $\chi^2(1) = 3.33, p = .07, CFI = .97, TLI = .92, RMSEA = .11, 90\% CI [.00, .26]$. On average, the slope for family conflict was increasing over time ($M = .22, SE = .06, p < .01$), and there was statistically significant variance in the slope across families (variance of .26, $SE = .12, p < .05$). The full model, as shown in Figure 3, demonstrated good fit with the data, $\chi^2(8) = 11.79, p = .17, CFI = .98; TLI = .92; RMSEA = .05, 90\% CI [.00, .11]$. Adolescent gender and family resources were included as covariates because of their association with family conflict or adolescent depression in previous studies (e.g., Fosco et al., 2014). None of these covariates was associated with change in FCU-targeted adolescent behavior concerns or with the slope in family conflict over time. Adolescent depressive symptoms were moderately stable over time ($\beta = .46$), and girls’ levels of depressive symptoms at ninth grade were higher than those of boys ($\beta = .17$). Consistent with our hypothesis, improvement in the FCU-targeted adolescent behavior concerns over the course of 1 year was associated with less growth in family conflict over time ($\beta = -.20$). In turn, increasing levels of family conflict during middle school were associated with higher levels of adolescents’ depressive symptoms by ninth grade ($\beta = .47$) after accounting for previous levels of depressive symptoms in sixth grade. We then examined the indirect effect by which improvements in FCU-targeted adolescent behavior concerns were associated with depressive symptoms as a function of a reduction in the growth in family conflict. The standardized indirect effect was marginally significant, $\beta = -.11, p = .08, 95\% CI [-.02, .24]$. Due to the relatively small sample for these analyses, we suspected that limited power may affect the test of indirect effects. Thus, we tested a model in which all nonsignificant predictive paths to depression were constrained to zero; this did not change model fit, $\chi^2(4) = 4.79, ns$, but the indirect effect achieved trend-level statistical significance, $\beta = -.08, p = .051, 95\% CI [.00, .15]$.

Discussion

Family-centered interventions have been underutilized in efforts to prevent adolescent depressive symptoms (Restifo & Bögels, 2009). Effective interventions for prevention of problem behaviors in adolescents have articulated key aspects of family functioning that should be targeted for optimal benefits, such as the family environment (e.g., conflict, cohesion, bonding) and effective parenting skills (Kumpfer & Alvarado, 2003). Interestingly, many of these components are also implicated in the development of ado-
lescent depression (Restifo & Bögels, 2009). As such, family-centered programs have potential to help forestall adolescent depression. Although the scant existing literature about family interventions for depression has indicated mixed results (and has highlighted the challenge of engaging families in treatments for depression), several family-focused prevention programs designed for adolescent conduct problems and substance use have been found to yield improvements in depressive symptoms (Brody et al., 2012; Mason et al., 2007; Trudeau et al., 2007).

Our study had two goals: (a) evaluate FCU intervention effects for adolescent depression using an ITT and CACE approach and (b) examine family conflict as a possible intervening process in these intervention effects. Regarding the first goal, our findings did not find support for an overall ITT effect of the FCU on adolescent depression. However, within a CACE model approach, the FCU does appear to have enduring intervention effects over 4 years, from sixth through ninth grade, for those families who engage in the FCU. These findings are consistent with those of an earlier reported randomized controlled trial of the FCU for adolescent depression (Connell & Dishion, 2008) and replicated findings that revealed the FCU’s effectiveness for adolescent depression. Such findings bolster the evidence for the value of embedding a family-centered prevention program in public middle schools, in that the scope of benefits can be expanded from problem behaviors to include depressive symptoms.

Based on family models of depression (e.g., Sheeber et al., 1997), logic models of family interventions for depression (Restifo & Bögels, 2009), and findings that the FCU can reduce escalation in family conflict (Van Ryzin & Dishion, 2012), the second goal of this study was to examine family conflict as an intervening process linking engagement in the FCU with adolescent depression. We examined the subsample of families who participated in the FCU intervention and found that caregiver-reported improvements in FCU-targeted adolescent behavior concerns were related to long-term rates of growth in family conflict from sixth through eighth grade. Specifically, the degree to which the FCU helped parents address problems with adolescent behavior was associated with less escalation in family conflict over time. In turn, the rate of escalation in family conflict predicted change in adolescents’ depressive symptoms from sixth to ninth grade. These findings are the first test of an FCU intervention mechanism for adolescent depression and lend insight into the ways in which family-centered services targeting substance use and problem behavior can also diminish growth in adolescent depression.

These findings are a promising step toward a comprehensive prevention approach that can be embedded in public middle schools to maximize public health impact. They suggest the possibility of using a multilevel, tiered prevention approach to identify youths at risk for developing depression and directing them and their families to receive appropriate services before problems escalate and become entrenched. Through the use of an adaptive and tailored approach to intervention, the FCU offers a cost-effective and efficient approach that capitalizes on the school environment in which youths are ob-

Table 3

<table>
<thead>
<tr>
<th></th>
<th>Grade 6</th>
<th></th>
<th>Grade 7</th>
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<th>Grade 8</th>
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<th>Grade 9</th>
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<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>% MDD</td>
<td>M (SD)</td>
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<td>M (SD)</td>
<td>% MDD</td>
</tr>
<tr>
<td>Intervention: compliers</td>
<td>1.47 (2.85)</td>
<td>13</td>
<td>1.48 (2.78)</td>
<td>13</td>
<td>1.74 (3.08)</td>
<td>13</td>
<td>1.34 (2.68)</td>
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<tr>
<td>Control: compliers</td>
<td>2.60 (3.91)</td>
<td>20</td>
<td>2.77 (3.90)</td>
<td>21</td>
<td>3.17 (3.89)</td>
<td>28</td>
<td>3.25 (4.42)</td>
<td>18</td>
</tr>
<tr>
<td>Intervention: noncompliers</td>
<td>1.32 (2.47)</td>
<td>9</td>
<td>1.66 (2.67)</td>
<td>11</td>
<td>1.97 (3.41)</td>
<td>13</td>
<td>2.11 (3.54)</td>
<td>16</td>
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<tr>
<td>Control: noncompliers</td>
<td>1.05 (2.15)</td>
<td>5</td>
<td>1.27 (2.68)</td>
<td>9</td>
<td>1.24 (2.61)</td>
<td>10</td>
<td>1.11 (2.23)</td>
<td>8</td>
</tr>
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Note. MDD = major depressive disorder.
served for considerable periods of time, enabling early detection of problems (Dishion & Kavanagh, 2003).

This family-centered approach to reducing risk for adolescent depression may have advantages to other programs that focus primarily on the adolescent. By engaging parents at the start of the intervention, targeting their motivation to change in important family domains, and providing a strengths-based approach, parents may be more involved in implementing intervention strategies at home and less likely to become defensive or resistant to intervention services. The current findings support a future direction for the FCU that broadens screening approaches to specifically identify risk for adolescent depression and to develop depression-specific intervention modules for parents and adolescents.

**Limitations**

This study is not without limitations. It was limited primarily to adolescent self-report data. Although self-report data are preferred for measures of depression (e.g., Lagattuta, Sayfan, & Bamford, 2012), integrating a multimethod assessment of family conflict would strengthen our confidence in the findings. Our test of indirect effects is limited to a within-group analysis of the intervention group engagers, with a relatively small sample that had some retention issues. Although we found direct effects of the FCU intervention for family conflict over time, in our test of indirect effects, it was not possible to further compare this mechanism across intervention and control groups, thereby precluding causal interpretations. Further interpretation of the indirect effects in this study warrants caution until replicated, given the marginally significant results.

Our post hoc analyses should also be interpreted with caution. The measure of depression was not based on a diagnostic interview, it did not assess for thoughts of death or suicide (because the data collection occurred in schools), and it focused on past-month levels rather than focusing on a 2-week period. Our intention was to provide a descriptive approximation of MDD diagnoses.

Finally, this study is limited to only one family mechanism that may account for adolescent depression. Other mechanisms warrant testing, such as positive family relations (Caruthers et al., 2014) and youth individual factors, such as self-regulation (e.g., Fosco et al., 2013), that have been found to explain linkages with other outcomes. In addition, other studies suggest that engaging in substance use or conduct problem behavior may be risk factors for later depression (e.g., Miettunen et al., 2014; O’Neil, Conner, & Kendall, 2011). Given the established effects of the FCU on antisocial behavior and substance use (e.g., Stormshak et al., 2011; Van Ryzin & Dishion, 2012), future research might examine these processes as potential explanatory mechanisms for preventing risk for depression.
Conclusion

This study responds to the call for increased attention to mechanisms of family interventions (Sandler et al., 2011) and provides compelling support, through replication and extension of previous work, for the role of family-centered prevention in addressing adolescent depression symptoms. By capitalizing on the early adolescence years, a noted developmental period for risk of onset and development of depression (Kessler, Chiu et al., 2005), family-centered prevention programs can have enduring effects with lasting implications for youth well-being. Although the current findings offer promise for preventing adolescent depression, the small effect sizes suggest that it would be valuable to develop depression-specific family and youth components that can be integrated into the menu of treatment options in the FCU.

References

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