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Developmental Cascade Models of a Parenting-focused Program for Divorced Families on Mental Health Problems and Substance Use in Emerging Adulthood

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Abstract

A developmental cascade model from functioning in adolescence to emerging adulthood was tested using data from a 15-year longitudinal follow-up of 240 emerging adults whose families participated in a randomized, experimental trial of a preventive program for divorced families. Families participated in the program or literature control condition when the offspring were ages 9 – 12. Short-term follow-ups were conducted 3 months and 6 months following completion of the program when the offspring were in middle to late adolescence. Long-term follow-ups were conducted 6 years and 15 years after program completion when the offspring were in emerging adulthood. It was hypothesized that the impact of the program on mental health and substance use outcomes in emerging adulthood would be explained by developmental cascade effects of program effects in adolescence. The results provided support for a cascade effects model. Specifically, academic competence in adolescence had spillover effects on internalizing problems and externalizing problems in emerging adulthood. Also, adaptive coping in adolescence was significantly, negatively related to binge drinking. Unexpectedly, internalizing symptoms in adolescence were significantly negatively related to marijuana use and alcohol use. Gender differences occurred in the links between mental health and substance use outcomes in adolescence and mental health and substance use outcomes in emerging adulthood.

Identifying the developmental pathways that lead to positive and negative adaptation outcomes is a central scientific goal of developmental psychopathology (e.g., Cicchetti & Sroufe, 2000; Masten, Burt, & Coatsworth, 2006). One approach to identifying developmental pathways involves modeling cascading effects, or the progressive associations among various domains of functioning (Masten et al., 2005; Rutter & Sroufe, 2000). In this framework, change in one area of functioning is viewed as leading to effects on other areas of adaptation in later developmental periods (Sameroff, 2000). Research on cascade effects models has important theoretical and applied implications. Such research can examine developmental theory concerning how achievements and mental health problems in one developmental period contribute to future adaptation outcomes (Masten et al., 2006) and test causal theories about spreading effects and processes underlying these cascades in development (Obradovi , Burt & Masten, 2009). Also, knowledge of cascading effects can

be useful in the design of preventive interventions that can have significant individual and societal benefits (Masten, 2009; Masten & Wright, 2009).

The present study examined cascade effects models to predict mental health problems and substance use in emerging adulthood using data from a randomized trial of a preventive intervention, the New Beginnings Program (NBP), which was designed to improve children's short-term and long-term adaptation outcomes. This study builds on our earlier work that showed that program-induced improvements in positive parenting affected mental health problems in childhood to early adolescence, which in turn affected competencies and problems in adolescence (Bonds McClain et al., 2010). In the current study, we focused on the developmental period from adolescence to emerging adulthood. Specifically, we examined linkages between competencies, mental health problems and substance use in adolescence and mental health problems and substance use in emerging adulthood. Below, we briefly review the research on divorce as a risk factor and describe the findings from the efficacy trials of the NBP. We then discuss the research that provides support for the links in the proposed models and describe the results of the tests of the cascade effects models. We end by discussing the contributions of the current study and directions for future research.

Parental Divorce Confers Risk across the Lifespan

Although the rate of divorce in the United States has decreased gradually from the 1980s (U.S. Census Bureau, 2008) and most children do *not* manifest serious mental health or social adaptation problems after parental divorce (e.g., Amato, 2001), parental divorce remains a significant public health concern. Currently, 30–50% of children in the U.S. are expected to experience parental divorce (National Center for Health Statistics, 2008). Compelling evidence demonstrates that this family transition confers risk for multiple problems in childhood and adolescence, including elevated levels of problematic substance use (Arkes, 2013; Brown & Rinelli, 2010), cigarette smoking (Arkes, 2013; Brown & Rinelli, 2010; Deleire & Kalil, 2002), mental health problems (Amato & Keith, 1991; Amato, 2001; Kim, 2011), early onset of sexual activity (Aseltine, Doucet & Schilling, 2010; McLanahan, 1999), poor academic performance (Frisco, Muller, & Frank, 2007), school dropout (Biblarz & Gottainer, 2000; McLanahan, 1999; Strohschein, Roos, & Brownell, 2009); and physical health problems (Langton & Berger, 2011; Troxel & Matthews, 2004; Yannakoulia et al, 2008).

For a sizeable minority, the effects of parental divorce continue into adulthood, with some research showing that the difference in adaptation outcomes between those from two-parent and divorced homes increases from childhood to adulthood (Cherlin, Chase-Lansdale, & McRae, 1998). Parental divorce has been related to increases in substance use, mental health problems, mental health service use, suicide attempts, and psychiatric hospitalization in adulthood (Alonzo, Thompson, Stohl, & Hasin, 2014; Cherlin et al., 1998; Gilman, Kawachi, Fitzmaurice & Buka, 2003; Kessler, Davis, & Kendler, 1997). Illustratively, in the National Comorbidity Study, Kessler et al. (1997) found that parental divorce was related to elevated rates of multiple addictive (odds ratios [ORs] range=1.46–2.38) and mental (ORs range = 1.39–2.61) disorders, controlling for demographics. Parental divorce is also related to lower educational attainment (e.g., Amato & Cheadle, 2005; Larson & Halfon, 2013; Sun

& Li, 2008), lower job prestige and income (Larson & Halfon, 2013, Sun & Li, 2008), poorer marital quality (e.g., Amato, 2000), higher rates of divorce (e.g., Amato & Sobolewski 2001), worse health practices (Larson & Halfon, 2013), more health problems (Lacey, Kumari, & McMunn, 2013; Maier & Lachman, 2000), and increased mortality risk (Martin, Friedman, Clark, & Tucker, 2005; Larson & Halfon, 2013).

There is also evidence that the negative consequences of parental divorce extend beyond the effects on offspring whose parents divorced. Using data from a national, representative sample, Amato and Cheadle (2005) found that divorce in the first generation was related to their grandchildren's lower education, higher marital discord, and weaker ties with both parents.

The high prevalence of divorce and its broad, far-reaching effects mean that the impact of parental divorce on youth and adult problems is substantial. The population attributable risk fraction (PAF; the proportion of an outcome due to a risk factor or percent of cases that could be prevented by removing the factor or its consequences [Schoenbach, 2000]) provides compelling data on the magnitude of the public health burden of parental divorce. For example, PAFs for parental divorce are 23% for school dropout, 36% for clinical levels of mental health problems between ages 18–22, and 30% for teen pregnancy based on relative risk figures from a prospective study of a national probability sample, controlling for pre-divorce stressors, SES, and child vocabulary (Furstenberg & Teitler, 1994; Zill, Morrison & Coiro, 1993). Using data comparing adults from divorced and two-parent families in Kessler et al.'s (1997) nationally representative survey, the PAF for drug dependence is 20%, controlling for demographics, prior disorders, and adversities (Wolchik et al., 2013).

Underlying Theory and Short-term Effects of the NBP

The NBP is a theory-based preventive intervention designed to improve children's post-divorce adaptation. The underlying theoretical framework of the NBP combined elements of the risk and protective factor and person-environment transactional models. The risk and protective factor model posits that the likelihood of problematic outcomes is affected by exposure to risk factors and the availability of protective resources (Institute of Medicine, 1994). Transactional models posit that dynamic person-environment processes underlie development across time in which aspects of social environments affect the development of problems and competencies, which in turn influence social environments and the development of competencies and problems later in development (Cicchetti, & Schneider-Rosen, 1986; Sameroff, 1975).

The NBP targeted four risk and protective factors that have been associated with children's outcomes in correlational studies of children from divorced families: parent-child relationship quality, effective discipline, contact with the non-residential parent, and exposure to interparental conflict (For a discussion of empirical support for selecting these correlates, see Wolchik, Sandler, Weiss, & Winslow, 2007; Wolchik et al., 2000). Two randomized trials have evaluated this parenting program (Wolchik et al., 1993; 2000). In the first trial, children ranged in age from 8 to 15 years; the age range in the second trial was 9 to 12 years. A wait-list control condition was used in the first trial; a literature control

condition was used in the second trial. In addition to providing a replication of the first trial, the second trial tested the additive effects of a child component by comparing the parenting program alone to a dual-component program that included the parenting program and a child coping program. In both trials, the NBP significantly improved parenting and reduced children's mental health problems at posttest compared to the control condition. The parenting-plus-child coping condition did *not* produce additive effects on children's mental health outcomes at posttest or 6-month follow-up (Wolchik et al., 2000).

Long-term Effects of the NBP

Given that the parenting-plus-child coping condition did *not* produce additive effects on children's mental health outcomes at posttest or 6-month, 6-year, or 15-year follow-up (Wolchik et al., 2000; 2002; 2013), the data from the two active conditions were combined to provide a more parsimonious perspective on the program effects at the follow-ups. As shown in Table 1, at the 6-year follow-up, program effects were found on a wide range of outcomes, including internalizing and externalizing problems, diagnosis of mental disorder in the last year, symptoms of mental disorder, alcohol use, marijuana use, other drug use, polydrug use, number of sexual partners, grade-point average, and self-esteem (Wolchik et al., 2007). For several effects at posttest and the short-term and 6-year follow-ups, benefits were greater for those with higher risk at program entry.

Similar to the findings at the 6-year follow-up, the NBP led to improvements in multiple problem outcomes at the 15-year follow-up. Both males and females in the NBP had a significantly lower incidence of internalizing disorders from adolescence to emerging adulthood than those in the literature control condition (7.55% vs. 24.4%; OR = .26) (Wolchik et al., 2013). Also, for males, the NBP reduced the number of substance use disorders from adolescence to emerging adulthood, polydrug use and other drug use in the past year, and substance use problems in the past six months. Although females in the NBP drank more alcohol in the past month than those in the control group, both groups reported low levels of drinking (i.e., 3–5 drinks in the past month). Also, emerging adults in the NBP spent less time in jail and used fewer services for psychological problems than those in the control group (Herman et al., 2015). The NBP led to increases in multiple competencies. Among those with higher risk at program entry, those in the NBP reported greater self-regulation, coping efficacy, self-esteem (Vélez, Wolchik, Kim, Tein, & Sandler, 2014), work functioning (Christopher, Wolchik, Tein, & Sandler, 2015) and positive attitudes toward parenting than their counterparts in the control condition (Mahrer, Winslow, Wolchik, Tein, & Sandler, 2014).

Mediators of Short- and Long-term Program Effects

Mediational analyses in the first trial indicated that improvement in mother-child relationship quality partially mediated improvements in children's mental health problems (Wolchik et al., 1993). Mediational analyses in the second trial showed that the effects of the NBP on internalizing problems at posttest were accounted for by improvements in mother-child relationship quality; the effects on externalizing problems at posttest and 6-month

follow-up were mediated by improvements in relationship quality and effective discipline (Tein, Sandler, MacKinnon, & Wolchik, 2004).

Zhou, Sandler, Millsap, Wolchik, and Dawson-McClure (2008) found that program-induced improvements in maternal effective discipline at posttest mediated the program effect on grade-point average at the 6-year follow-up. Also, program-induced improvement in mother-child relationship quality mediated the program effect on adolescents' mental health problems for those with high baseline risk for maladjustment. Examining parental monitoring and substance use at the 6-year follow-up, Soper, Wolchik, Tein, and Sandler (2010) found that parental monitoring mediated reductions in alcohol and marijuana use, polydrug use, and other drug use for those with high risk for maladjustment at program entry. Also, program-induced increases in mother-child relationship quality at posttest led to increased coping efficacy and active coping in adolescence (Velez, Wolchik, Tein & Sandler, 2011).

Current study

The current study extends our earlier research on the cascading effects of the NBP (Bonds McClain et al., 2010) from posttest to the 6-year follow-up. In that study, we found that the NBP led to an increase in positive parenting at posttest, which was related to a decrease in externalizing and internalizing problems at short-term follow-up. Fewer externalizing problems at short-term follow-up were related to reductions in substance use and symptoms of externalizing disorders and higher grades; fewer internalizing problems at short-term follow-up were related to increases in self-esteem and fewer symptoms of internalizing disorders in adolescence.

In the current study, we test cascade effects models of the links between mental health problems, substance use and competencies in adolescence and mental health problems and substance use in emerging adulthood. Examining the cascades that may occur between these two periods of development in youth who have experienced parental divorce is important for several reasons. First, some problems associated with parental divorce involve the accomplishment of salient developmental tasks of both adolescence and emerging adulthood--education, work, romantic relationships, and friendships. Second, several of the mental disorders that are associated with parental divorce and have significant public health burden have a median age of onset (Burke, Burke, Regier & Rae, 1990) and/or increase or peak in prevalence during emerging adulthood (e.g., Kessler et al., 1994; Regier & Kaelber, 1995). Third, emerging adulthood involves multiple changes in social and contextual roles and individuals make key choices in multiple life spheres during this period (e.g., Schulenberg, Sameroff, & Cicchetti, 2004). Thus, the stakes for successful functioning in this stage are particularly high and significant difficulties may have even more serious and long-lasting consequences in this stage than in others (e.g., Newman et al., 1996). Examining the links between behavior problems and competencies in adolescence and those in emerging adulthood can further our theories about spreading effects across development and identify the pathways through which program effects occur across stages of development.

Empirical support for predicting cascading effects from adolescence to emerging adulthood

There is strong support from non-experimental longitudinal studies for continuity in mental health problems from adolescence to emerging adulthood and for spillover effects across domains of functioning across these periods of development. Illustratively, externalizing problems in adolescence predict externalizing problems in young adulthood (e.g., Achenbach, Howell, McConaughy, & Stanger, 1995; Brook, Whiteman, Finch, & Cohen, 1996; Fleming, Mason, Mazza, Abbott, & Catalano, 2008; Masten et al., 2005). Adolescent conduct disorder and externalizing symptoms also predict internalizing disorders (Bardone, Moffitt, Caspi, & Dickson, 1996; Chassin, Pitts, DeLucia, & Todd, 1999; Masten et al., 2005) and substance use (e.g., Chassin et al., 1999) in young adulthood. Processes that may underlie these relations include cumulative continuity, in which individuals select environments that strengthen externalizing problems and interactional continuity, in which externalizing problems are sustained by the reciprocal responses they evoke in others (Caspi, Bem, & Elder, 1989). Adolescent externalizing problems may also lead to later problems by reducing environmental and interpersonal opportunities, increasing exposure to at-risk contexts (Bardone et al., 1996; Capaldi & Stoolmiller, 1999), or leading to developmental “snares,” such as school dropout (Moffitt, 1993). Longitudinal non-experimental studies have shown continuity between internalizing problems in adolescence and young adulthood (e.g., Achenbach et al., 1995; Pine, Cohen, Gurley, Brook, & Ma, 1998; Reinherz, Paradis, Giaconia, Stashwick, & Fitzmaurice, 2003). Research has also shown significant relations between internalizing problems in adolescence and externalizing problems, mental disorder, and drug use (Bardone et al., 1996; Devine, Kempton, & Forehand, 1994) in young adulthood. Plausible mechanisms include a negative cycle in which internalizing problems lead to an ongoing cycle of poor social relationships (Capaldi & Stoolmiller, 1999) and increased vulnerability to later stressors (Reinherz, Giaconia, Hauf, Wasserman, & Silverman, 1999). Also, substance use might be motivated by the expectation that substance use will alleviate the distress associated with internalizing symptoms (Hussong et al., 2011). Further, the deficits in interpersonal skills associated with internalizing problems can lead to association with marginalized peers who engage in deviant behaviors, which increases the risk for engaging in deviant activities, such as substance use and externalizing problems (Hussong et al., 2011).

For many youth, engaging in risky behaviors, such as alcohol use and drug use, represents a brief period of experimentation (e.g., Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990), with a “maturing out” occurring in young adulthood (e.g., Chen & Kandel, 1995). However, research consistently shows that substance use in adolescence predicts substance use in young adulthood (Brook et al., 1996; Chassin et al., 1999, 2002; Guo, Collins, Hill, & Hawkins, 2000; McCambridge, McAlaey, & Rowe, 2011). Although some studies have shown that adolescent drug use is related to depression, anxiety, and antisocial problems (Brook et al., 1996; Brook, Cohen, & Brook, 1998; Chassin et al., 1999) in young adulthood, a large birth cohort study found nonsignificant relations between adolescent substance use and anxiety disorder and depression in young adulthood (e.g., Wells, Horwood, & Fergusson, 2004). Plausible mechanisms for the effects of adolescent substance use and

young adult functioning include the pharmacological effects of substance use on performance (Newcomb & Bentler, 1988), greater exposure to at-risk developmental contexts (Newcomb & Bentler, 1988; Tapert, Aarons, Sedlar, & Brown, 2001), lack of development of adaptive coping strategies (Baumrind & Moselle, 1985), and negative effects of substance use on relationships (Baumrind & Moselle, 1985).

Three of the adolescent competencies that were impacted by the NBP have been found to predict functioning in young adulthood. Adolescent academic performance is related to internalizing problems in young adulthood (Masten et al., 2005). This relation may be due to the influence of academic performance on opportunities for achievement and occupation choices (Kokko & Pulkkinen, 2000) or the effects of poor academic performance on self-perceptions that lead to increased internalizing problems (Masten et al., 2005). Self-esteem in adolescence is related to depression (Hoffmann, Baldwin, & Cerbone, 2003; Pelkonen, Marttunen, & Aro, 2003) and psychological distress (Kaplan & Robbins, 1983) in young adulthood. High self-esteem may promote adaptive coping efforts and increase opportunities for mastery (Kliewer & Sandler, 1992), which could lead to lower internalizing problems. Research also shows that adaptive coping in adolescence is related to lower substance use in young adulthood (Hussong & Chassin, 2004). This relation might be accounted for by the ability to reframe problems in a positive way or more effectively manage negative affect that could lead to substance use.

Contributions of the Current Study and Hypotheses

The 15-year follow-up of the NBP sample provides a rare opportunity to test the pathways by which program-induced improvements in adaptation in adolescence lead to improved functioning in emerging adulthood. In this study, we examined how domains of problems behaviors and competencies on which significant or marginal program effects (direct or indirect) occurred at the follow-up in adolescence relate to mental health problems and substance use in emerging adulthood. The randomized experimental design allows a more rigorous test of the relations observed in non-experimental longitudinal research because it disentangles the program effects from variables with which they are naturally correlated in non-experimental studies (e.g., maternal personality, shared genes, pre-existing economic stress) (Patterson & Fisher, 2002).

This study contributes to the literature on cascade effects models of developmental processes in three ways. First, it goes beyond testing passive longitudinal models by examining program-induced changes in parenting and problem outcomes and competencies in subsequent developmental stages. Second, the 15-year period in which assessments occurred spans three developmental periods, late childhood to early adolescence, adolescence, and emerging adulthood, which is a longer window of development than that examined in most other studies. Third, unlike most previous longitudinal studies that have examined functioning across adolescence and emerging adulthood, the current study controlled for the longitudinal stability of functioning in these domains and for the within time period covariance among functioning in these domains in adolescence.

Given previous research and theory, we expected that there would be continuity within domains of functioning, so that functioning in adolescence (e.g., decreased externalizing problems) would be related to functioning in the same domain in emerging adulthood (e.g., decreased externalizing problems). Also, based on theory and our review of findings from non-experimental longitudinal studies, we predicted cross-domain effects over time such that externalizing problems in adolescence would be related to internalizing problems and substance use problems in emerging adulthood, internalizing problems in adolescence would be related to externalizing problems and substance use in emerging adulthood, and substance use in adolescence would be related to internalizing problems and externalizing problems in emerging adulthood. We predicted that self-esteem, academic performance and adaptive coping would predict internalizing problems. Adaptive coping was expected to be related to substance use.

We also examined gender differences in the link between outcomes in adolescence and outcomes in emerging adulthood. Some researchers have suggested that substance use in adolescence may constitute higher risk for later problem drinking in males than females because the transition to emerging adulthood may involve roles and life situations that place greater restraint on continuing heavy drinking than do the roles assumed by most males during this developmental transition. It is also possible that there is less stability in problematic substance use across gender because as adolescents, females may never have been as involved in problem drinking as their male counterparts (Donovan, Jessor & Jessor, 1983). Although some research has shown significant gender differences in the predictors of problem drinking, as well as internalizing problems and externalizing problems from adolescence to young adulthood (e.g., Chassin, Pitts & Prost, 2002; Miettunen et al., 2013; Pulkkinen & Pitkanen, 1994), there is significant inconsistency in the findings on such gender differences (e.g., Guo, Hawkins, Hill & Abbott, 2001; Nolen-Hoeksema, 2004; Zimmermann, et al., 2003). Thus, we did not make specific hypotheses about the tests of gender differences.

Method

Participants

The study included 240 children from divorced families and their mothers who participated in a randomized controlled trial of the NBP in late childhood or early adolescence. Potential participants for the trial were identified primarily through court records of divorce decrees in a large Southwestern metropolitan county (20% were recruited by media advertisements or word of mouth). Eligibility criteria were: a) divorced in past two years, b) primary residential parent was female, c) at least one 9–12 year-old child resided (at least 50%) with their mothers¹, d) neither mother nor any child was in treatment for mental health problems, e) mother had not remarried, did not plan to remarry during the program, and did not have a live-in boyfriend, f) custody was expected to remain stable, g) family resided within an hour drive of program site, h) mother and child could complete assessments in English, i) child was not learning disabled or in special education, and j) if diagnosed with attention deficit

¹Because at the time of the study, the majority of children lived primarily with their mothers after divorce (Cancian & Meyer, 1998), we required that children resided with their mothers 50% or more of the time.

disorder, child was taking medication. In families with multiple children in the age range, one was randomly selected as the target child for the assessment of program effects to ensure independence of responses. Because of the preventive nature of the intervention and ethical concerns, families were excluded and referred for treatment if the child endorsed an item about suicidality or exhibited severe levels of depressive symptomatology or externalizing problems at pretest.

Families were randomly assigned to (a) a mother-only program (MP, $n = 81$ families), (b) a mother-plus-child program (MPCP; separate, concurrent groups for mothers and children, $n = 83$ families), or (c) a literature control condition (LC, $n = 76$ families). Given the lack of differences between the MP and MPCP programs at posttest, 3- and 6-month follow-ups, and 6-year and 15-year follow-ups, including tests of all of the mediators and outcome variables in this study, these conditions were combined and labeled as NBP. At pretest, the average age of the children was 10.4 years ($SD = 1.1$); 49% were girls. Mothers' mean age was 37.3 years ($SD = 4.8$); 98% had at least a high school education. Mothers' ethnicity was 88% non-Hispanic White, 8% Hispanic, 2% Black, 1% Asian or Pacific Islander, and 1% other. Parents had been separated and divorced an average of 2.2 years ($SD = 1.4$) and 1.0 year ($SD = 0.5$), respectively.

Comparison of program acceptors and refusers (i.e., refused to participate in the evaluation of the program but completed the pretest, $N = 50$) showed that pretest child maladjustment and family income/needs ratio positively predicted enrollment (Winslow, Bonds, Wolchik, Sandler, & Braver, 2009). The three experimental conditions did not differ significantly on child mental health problems or demographic variables at pretest.

Figure 1 shows the screening and enrollment process. At the 6-year and 15-year follow-up, 218 (91%) families and 215 families (90%) were interviewed, respectively. At the 6-year and 15-year follow-up, the average age was 16.9 ($SD = 1.1$, range = 15.1–19.1) and 25.6 ($SD = 1.2$, range = 24–28). At both follow-ups, 50% of those interviewed were female. EA ethnicity was 88.7% Non-Hispanic White, 6.7% Hispanic, 2.1% African-American, and 2.5% other. Educational attainment of EAs was: Less than high school – 2.6%; High school only – 22.1%; Some college – 45.4%; College graduate – 29.4%; Post-graduate – 3.1%. Of the EAs, 51% were married or living as if married. EA median annual income was in the \$30,000 range (choices were \$5,000 categories ranging from \$5,000 to \$200,000).

Intervention conditions—The parent program consisted of 11 group sessions (1.75-hours) and two individual sessions. The program taught skills to improve mother-child relationship quality and effective discipline, decrease barriers to father-child contact, and reduce children's exposure to interparental conflict. Clinical methods, based on social learning and cognitive behavioral theories, were derived from intervention research on relationship quality (Guerney, 1978; Guerney, Coufal, & Vogelson, 1981), discipline (Patterson, 1976), and anger management (Novaco, 1975). Based on Marlatt and Gordon's (1985) work, maintenance strategies, such as giving parents handouts on skills and leaders attributing change to maternal efforts, were included. The highly structured program used active learning methods, videotaped modeling and role plays. Homework assignments

focused on practicing the program skills. There were 18 mother groups (nine in the mother-program condition and nine in the dual-component condition).

In the mother-plus-child program, mothers participated in the mother program and children participated concurrently in an 11-session group program. The child program targeted active coping, avoidant coping, threat appraisals of divorce stressors, and mother-child relationship quality. The change strategies, based on social learning and social cognitive theory, were derived from intervention research (e.g., coping and appraisals: Pedro-Carroll & Cowen [1985]; relationship quality: Guerney, Coufal, & Vogelsong, [1981]). Didactic presentations, videotapes, leader modeling, role plays, and games were used to teach the program skills. Homework involved practicing the program skills. There were nine child groups with an average group size of nine (range nine to 10). For more information about the programs, see Wolchik et al. (2000; 2007).

Each group was led by two master's-level clinicians (13 leaders for mother groups; nine for child groups). The leaders used highly detailed manuals to deliver the sessions. Extensive training (30 hours before the program and 1.5 hours/week during delivery) and supervision (1.5 hours/week) were provided by doctoral-level clinicians. Before delivering each session, leaders were required to score 90% on a quiz about the session. Videotapes of sessions were rated by trained coders for completion of session activities. The mean degree of session completion was 2.86 ($SD = 0.39$) and 3.00 ($SD = 0.02$) for the mother and child sessions, respectively.

In the literature control condition (LC) mothers and children each received three books about children's divorce adjustment and a syllabus to guide their reading. Books were mailed at 1-month intervals. Mothers and children reported reading about half the books.

Procedure

Families were interviewed on six occasions: pretest at Time 1 (T1), posttest at Time 2 (T2), 3-month follow-up at Time 3 (T3), 6-month follow-up at Time 4 (T4), 6-year follow-up at Time 5 (T5), and 15-year follow-up (T6). Although the current study focuses on relations between outcomes at the 6-year and 15-year follow-ups, the cascade effects models use data from all waves.

Trained staff conducted separate home interviews with parents and youth. Confidentiality was explained, and parents and youth signed consent/assent forms. Families received \$45 compensation at T1, T2, T3, and T4; parents and youth each received \$100 compensation at T5. At T6, EAs received \$225, and parents received \$50. All 240 families randomized to condition completed assessments at T1 and T2. Participation rate at the family level was 98% at T3 and T4, 91% at T5, and 90% at T6.

Measures

The measures are described below in terms of the developmental period in which they were administered.

Measures in childhood

Demographics: At pretest, mothers completed items about their children's age, their own ethnicity and income, and other demographics.

Positive parenting: Positive parenting was a composite of two parenting constructs, mother-child relationship quality and effective discipline.

Mother-child relationship quality: At T1 and T2, mothers and children completed shortened versions of the acceptance (10 items) and rejection subscales (10 items) of the Child Report of Parental Behavior Inventory (CRPBI; Schaefer, 1965). The internal consistency reliability coefficients (Cronbach alpha, α) for the acceptance and rejection subscales were .78 and .81 for mother report at T1 and T2, respectively, and .84 and .89 for child report, respectively. Mothers and children also completed the open family communication subscale (10 items) of the Parent-Adolescent Communication Scale (Barnes & Olson, 1982). The α 's were .72 and .75 for mothers at T1 and T2, and .82 and .87 for children at T1 and T2, respectively. Mothers also completed an abbreviated 7-item version of the Family Routines Inventory (Jensen, Boyce, & Hartnett, 1983). The items were selected because they assessed dyadic interactions between mother and child. The α 's were .67 and .63 for mothers at T1 and T2, respectively. Mother and child reports were standardized and averaged to create a multi-measure, multi-reporter composite. The weighted α 's (Lord & Novick, 1968) across the variables were .88 and .90 at T1 and T2, respectively.

Effective discipline: Mothers and children completed the 8-item inconsistent discipline subscale of CRPBI (Schaefer, 1965). The α 's were .81 and .80 for mothers at T1 and T2, and .72 and .73 for children at T1 and T2, respectively. Mothers completed 14 items on appropriate/inappropriate discipline (T1 α = 0.70, T2 α = 0.71) and 11 items on follow-through subscale (T1 α = 0.80, T2 α = 0.76) from the Oregon Discipline Scale (Oregon Social Learning Center, 1991). These four scales (i.e., mother report of inconsistent discipline, child report of inconsistent discipline, mother report of appropriate/inappropriate discipline, and mother report of follow-through) were standardized and averaged to create a composite. The weighted α 's across the variables were .84 and .89 at T1 and T2, respectively.

Children's internalizing and externalizing problems: Mother report of mental health problems during the last month was assessed with the 31-item internalizing and 33-item externalizing subscales of the Child Behavior Checklist (Achenbach, 1991a; Achenbach & Edelbrock, 1983). At T1 a = .88, at T3 a = .86 and at T4 a = .85 for internalizing problems and .87 at T1, .87 at T3 and .87 at T4 for externalizing problems. Adequate reliability and validity have been reported (Achenbach, 1991b).

Child report of depression was measured using the 27-item Child Depression Inventory (CDI; Kovacs, 1981). The CDI has been shown to have high internal consistency, test-retest reliability, and validity (Saylor, Finch, Spirito, & Bennett 1984). In this study, a 's were .76 at T1, .78 at T3, and .80 at T4. Youth report of anxiety was assessed using the 28-item Revised

Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richard, 1978). Convergent and discriminant validity has been supported by high positive correlations with other trait measures of anxiety (Reynolds & Paget, 1981). In this study, a 's were .88 at T1, .91 at T3, and .91 at T4. A composite of reports on the CDI and RCMAS was formed as the mean of the standardized scores to represent child report of internalizing problems. Children completed 27 items from the aggression and delinquency subscales of the Youth Self Report (YSR; Achenbach, 1991b) (T1 $a = .87$, T3 $a = .86$, and T4, $a = .88$). Reliability and validity of these subscales has been demonstrated (Achenbach, 1991b). On average the correlation of mother and child report of internalizing problems across assessment points was .29 and externalizing problems was .28. Given the short period of time between T3 and T4 (3 months), we summed scores for externalizing problems/internalizing problems across T3 and T4 and then averaged them.

Measures in adolescence

Adolescent symptoms of externalizing and internalizing disorders: Symptoms of externalizing disorders and internalizing disorders over the past year were assessed using mother and adolescent versions of the computer-assisted Diagnostic Interview Schedule for Children (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) at T5. Total symptom scores were derived separately for internalizing disorders (i.e., agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, panic disorder, post-traumatic stress disorder, social phobia, specific phobia, eating disorders, and major depression) and externalizing disorders (i.e., conduct disorder, oppositional defiant disorder, and attention-deficit/hyperactivity disorder), according to symptoms endorsed by either the parent or adolescent. Compton and Cottler (2000) reported reliabilities of diagnoses ranging from K 's=.33-.86 ($M=.58$). The DIS has been validated against the WHO Schedules for Clinical Assessment in Neuropsychiatry (Wing et al., 1990).

Adolescent substance use: Adolescents completed the Monitoring the Future Scale (Johnston, Bachman, & O'Malley, 1993) at T5. The following scores were used: frequency of marijuana use and alcohol use in the past year (7-point scale, 1= 0 occasions to 7= 40 or more occasions). This scale has adequate validity (Johnston et al., 1993).

Adolescent self-esteem: The 6-item Global Self-Worth subscale of Harter's (1985) Self Perception Profile for Children (SPPC) was used to assess global self-esteem ($\alpha = .71$ at T1 and .86 at T5). Scores on this measure have been negatively related to youth reports of depressive symptoms and clinical depression (Renouf & Harter, 1990).

Adolescent academic performance: Archival data were collected for all participants, whether or not they were currently attending school. Questionnaires requesting the unweighted (based on 4.0 scale) cumulative GPA for high school were mailed to school principals, along with an Authorization to Release Information form. Cumulative high school GPA was used to measure academic performance.

Adolescent adaptive coping: Adolescent report of active coping efforts and coping efficacy were used to assess adaptive coping. The 24-item active coping dimension of the Children's

Coping Strategies Checklist–Revised (Ayers, Sandler, West, & Roosa, 1996) reflects positive coping strategies that youth generally used when faced with a problem in the previous month, including behavioral actions to fix the problem and cognitive engagement strategies that reduce the threatening implications of the stressor. The 7-item Coping Efficacy Scale (Sandler et al., 2000) assessed satisfaction with handling problems in the past and anticipated effectiveness in handling future problems. Alphas for active coping and coping efficacy were .88 and .71, respectively, for T1, and .92 and .82 for T5. The two measures were standardized and averaged. The correlation between active coping and coping efficacy was .53 at T1 and .89 at T2.

Measures in emerging adulthood

Emerging adult internalizing problems and externalizing problems: The internalizing problems and externalizing problems subscales of the Adult Self Report (ASR; Achenbach & Rescorla, 2003) and Adult Behavior Checklist (ABCL; Achenbach & Rescorla, 2003) were used. These scales, which assess mental health problems in the past 6 months, have adequate reliability and validity (Achenbach & Rescorla, 2003). Alphas for internalizing problems were .90 and .92 for emerging adult and mother reports, respectively. Alphas for externalizing problems were .84 and .92 for emerging adult and mother reports, respectively. The correlation of mother and emerging adult scores of internalizing problems was .46 and externalizing problems was .27. Mother and emerging adult scores were standardized and then averaged.

Emerging adult substance use outcomes: At 15-year follow-up, the same items from the Monitoring the Future Scale (MTF) (Johnston et al., 1993) as were used to measure substance use at the 6-year follow-up were used to assess alcohol use and marijuana use in the past year. In addition, binge drinking was measured using an adaptation of an item from the Quantity and Frequency of Alcohol and Drugs Scale (Sher, Walitzer, Wood, & Brent, 1991) that assessed the frequency of binge drinking in the past year (1 = *less than five times*, 2 = *more than 5 times but less than once a month*, 3 = *1–3 times a month*, 4 = *1–2 times a week*, 5 = *3–5 times a week*, 6 = *every day*).

Baseline covariates and risk—Using the current sample, Dawson-McClure and colleagues (2004) developed a risk measure for children from divorced family and demonstrated that were the most consistent predictors of adaptation problems in the literature control condition at the 6-year follow-up. The index comprised children's externalizing problems and a composite of environmental stress (i.e., composite of negative events that occurred to the child, interparental conflict, maternal distress, reduced contact with father, and per capita income at pretest). Children's externalizing problems and environmental stress were correlated at .23. Analyses have shown that program benefits at the 6-year follow-up were greater for those youth with higher baseline risk scores (e.g.,; Wolchik et al., 2000; 2002; 2007). Given that the effects of the NBP at the 6-year follow-up depended on level of risk at baseline, it is possible that risk could moderate the relations between outcomes in adolescence and those in emerging adulthood. We expanded the risk measure used by Dawson-McClure et al. (2004) to include baseline internalizing problems. Thus, a risk measure which assessed baseline measures of children's internalizing problems,

children's externalizing problems, and environmental stress were included as a covariate for each of the mediator and outcome variables and as a potential moderator of the program effects on these variables. For any of the post intervention (T2 to T6) measures, in addition to including the risk measure as a covariate, the baseline (T1) variable of the same measure or similar measure, if existing, was also included as a covariate (e.g., controlling for T1 self-esteem for T5 self-esteem; controlling for T1 academic competence for T5 GPA). T1 academic competence was assessed with mother and child report of the 6-item subscale from the Coatsworth Competence Scale (Arizona State University Prevention Research Center, 2006). For mother report $\alpha = .91$ at T1; for child report $\alpha = .78$ at T1. Mother and child report of the measures were correlated at .56 at T1 and .68 at T2.

Statistical Analysis

Correlations and descriptive statistics of the study variables were conducted as preliminary analyses. Attrition analyses were conducted to compare the rates of attrition between the NBP and LC at 6- and 15-year follow-ups. For these follow-ups, we also compared those who participated with those who did not on the baseline demographic and study variables using χ^2 test (for categorical variables) or t-test (for continuous variables). The interaction between attrition status and group membership on these variables was also evaluated, using 2-way analyses of variance (for continuous variables) or logistic regression (for categorical variables).

Structural equation modeling with observed variables (i.e., path modeling) was used to test the hypothesized cascade effects models. We hypothesized that intervention-induced improvement in parenting (posttest) would be related to reductions in internalizing problems and externalizing problems in childhood (3- and 6-month follow-up), which would be related to reductions in substance use and internalizing symptoms and externalizing symptoms as well as increased competencies in adolescence (6-year follow-up). We hypothesized that the intervention effects on the outcomes in adolescence (6-year follow-up) would have spillover effects on the behavioral problem outcomes in emerging adulthood (15-year follow-up). That is, reductions in internalizing symptoms, externalizing symptoms, and substance use, and increased competencies in adolescence were predicted to be related to decreased internalizing problems, externalizing problems and substance use in emerging adulthood. Note that including all of the outcomes in emerging adulthood in the same model resulted a large number of the parameters to be estimated and issues of getting proper solutions (e.g., non-convergent issues), we examine one outcome in emerging adult at a time. For each mediator and outcome, we also included paths from the program condition (to test direct intervention effects), T1 measure of the same variable, if existing, and the risk measure, as well as intervention \times risk interaction (to examine possible moderated effects by baseline risk). For any interaction that was not significant or marginally significant, we deleted the interaction and reran the model. A previous study (Wolchik et al., 2000) showed that the program effect on parenting was stronger for families that had lower baseline parenting scores. Thus, we also examined whether baseline positive parenting moderated the program effect on posttest positive parenting. For significant moderation effects, we probed the direction of the moderation effects. Included in the model but not shown in the figures are the effects from the covariates and all of the correlations among the study variables

measured at the same time point, including the outcome variables (e.g., all of the covariates at T1; internalizing symptoms, externalizing symptoms, and substance use at T5).

To test gender differences in the cascade effects paths, we examined which regression parameters were substantially different between gender groups. Because there were restricted sample sizes relative to the complicated cascade effects models, we employed a heuristic method to test only the parameters that appeared to be different between groups based on the following procedure. First, the cascade model was examined for males and females separately. Based on the results from the separate groups, two criteria were used to select regression parameters to test for differences: 1) when the regression coefficients were both significant and the signs were opposite for males (e.g., negative) and females (e.g., positive), or 2) when the regression coefficient was significantly different from zero for one group (e.g., males) but not for the other group (e.g., females), regardless of the signs. Then, the cascade model was conducted simultaneously including both groups (i.e., multi-group analysis) and the “MODEL CONSTRAINT” feature in Mplus was applied to examine the differences in these regression coefficients between males and females.

Mplus software (Version 7.12; Muthén & Muthén, 1998–2014) was used for the analyses with continuous or binary outcome variables. Maximum likelihood estimations with robust standard errors were used. Full information maximum likelihood (FIML) estimations were applied to handle missing data.

Results

Table 2 shows the zero-order correlations and descriptive statistics of the study variables, excluding baseline covariates. Positive parenting, posttest internalizing problems and externalizing problems in childhood had significant correlations with almost all of the outcomes in adolescence and emerging adulthood. The skewness and kurtosis of all of the study variables fell within the acceptable range (skewness cut-off ≤ 2 and kurtosis cut-off ≤ 7 ; West, Finch & Curren, 1995). Rates of attrition did not differ significantly across the NBP and LC at either the 6-year or 15-year follow-up. No significant attrition or group \times attrition interaction effects on demographic or baseline variables were found at the 6-year or 15-year follow-up except that at 15-year follow-up baseline internalizing problems and self-esteem were significant predictors of attrition. EAs who participated in the 15-year follow-up had significantly more internalizing problems (-0.06 vs. -0.30 , $t = -2.05$, $p = .03$) and lower self-esteem (20.45 vs. 21.53 ; $t = 2.33$, $p = .03$) at baseline than EAs who did not participate. The intraclass correlations of the studied mediators and outcomes across all assessment points among the mothers/children in the same intervention group were generally very low (mean = $.02$, $sd = .02$).

Figures 2–5 show the model fit indices and standardized regression coefficients of four cascade models for 1) internalizing problems, 2) externalizing problems, 3) alcohol use and binge drinking, and 4) marijuana use at 15-year follow-up, respectively. In the figures, for the paths representing the spillover effects (outcomes in adolescence to those in emerging adulthood), we only show those that were significant. Because these models had the same pathway structure from program condition to the 6-year follow-up outcomes and the results

were consistent, we present the pathways up to the 6-year follow-up outcomes first. Although the results were consistent across the four models, the use of the maximum likelihood method produced slightly different parameter estimations. For illustration, we present the results using the model with externalizing symptoms at the 6-year follow-up as the outcome. We then describe the effects from the 6-year follow-up outcomes to the 15-year follow-up outcomes.

Cascade Model from Intervention to Adolescent Outcomes

The hypothesized cascade model for externalizing symptoms fit the data well. Families in the NBP on average had significantly higher posttest scores on positive parenting than families in the LC. Also, families that had lower baseline scores on parenting benefited more from the NBP. Positive parenting at posttest was associated with lower internalizing problems and externalizing problems in later childhood (T3+T4). Childhood internalizing problems were significantly associated with higher internalizing symptoms and lower self-esteem in adolescence. Childhood externalizing problems were significantly or marginally associated with higher externalizing symptoms, greater alcohol and marijuana use, as well as lower scores in self-esteem in adolescence. After taking problem behaviors and academic competence in childhood into account, NBP had a direct effect on increasing adolescent academic performance. Baseline risk significantly or marginally moderated the program effects on internalizing symptoms, adaptive coping, and self-esteem in adolescence. Specifically, NBP was related to lower internalizing symptoms as well as higher adaptive coping and self-esteem for adolescents who had higher baseline risk. As indicated in Table 3, externalizing problems in childhood were positively related to internalizing symptoms in adolescence for males but not for females.

Cascade Model from Adolescent Outcomes to Emerging Adulthood Outcomes

The expected continuity within domain of behavior across developmental stage was found for three of the four outcomes that were assessed at both periods of development; externalizing symptoms, internalizing symptoms, and alcohol use in adolescence were related to externalizing problems, internalizing problems and drinking frequency in emerging adulthood, respectively. Unexpectedly, internalizing symptoms in adolescence were significantly, negatively related to marijuana use. Higher competence in adolescence was associated with reduced problem behaviors in emerging adulthood. Specifically, academic performance in adolescence was significantly related to lower internalizing problems and externalizing problems. Also, adaptive coping was significantly negatively related to binge drinking.

Gender Differences in Cascade Effects Pathways from Adolescence to Emerging Adulthood

Table 3 summarizes the regression paths that were significantly different between males and females. For males, internalizing symptoms in adolescence were positively related to externalizing problems in EA. However, for females, internalizing symptoms in adolescence were negatively related to externalizing problems in EA. For females, internalizing symptoms in adolescence were negatively related to binge drinking but externalizing

symptoms in adolescence were positively related to binge drinking. Also, for females, alcohol use in adolescence was positively related to marijuana use in EA.

Discussion

Using a developmental cascade conceptual framework, the current study tested models that proposed linkages between mental health problems, substance use and competencies in adolescence and mental health problems and substance use in emerging adulthood. These tests were housed within a larger cascade model that included a positive cascade effect of a parenting-focused preventive intervention on mental health problems in childhood which led to lower levels of mental health problems and substance use and higher levels of competencies in adolescence.

The results provide support for the cascade model of development (Cicchetti & Sroufe, 2000) in which cascading effects occur from successes or difficulties in one domain of behavior to successes or difficulties in other domains of behavior later in development. Specifically, academic competence in adolescence had spillover effects on internalizing problems and externalizing problems in emerging adulthood. Also, adaptive coping in adolescence showed significant, negative relations with binge drinking. Unexpectedly, internalizing symptoms in adolescence were significantly negatively related to marijuana use. Some gender differences in the linkages between domains of problem behaviors in adolescence and outcomes in emerging adulthood occurred. Internalizing symptoms were significantly negatively related to externalizing problems and binge drinking for females but significantly positively related to externalizing problems for males. Also, for females only, externalizing problems were significantly positively related to binge drinking, and frequency of alcohol use predicted frequency of marijuana use.

The expected continuity over time within domains of behavior occurred. For three of the four outcomes assessed in adolescence and emerging adulthood, significant relations occurred between these constructs in adolescence and emerging adulthood. For the two constructs that had been assessed in late childhood as well, internalizing problems and externalizing problems, continuity occurred across the three developmental periods.

It is important to note that the analyses explicitly included attention to the interplay between these domains of behavior by controlling for the longitudinal stability of these domains and for the within time period covariance among the domains in adolescence. Thus, these models provide a conservative test of the predictive relations between functioning in adolescence and functioning in emerging adulthood.

Developmental Cascades

Effects of mental health problems and substance use in adolescence on mental health problems and substance use in emerging adulthood—Consistent with previous findings (e.g., Achenbach et al., 1995; Burt, Obradovi , Long, & Masten, 2008; Brook et al., 1996; Fleming, Boyle & Offord, 1993; Masten et al., 2005) continuity occurred for externalizing problems and internalizing problems. The stability of these problems from late childhood to emerging adulthood indicates that the occurrence of these

problems in late childhood/early adolescence should not be viewed as transient concerns. Children's externalizing problems, such as aggression and delinquency, are related to criminality and unemployment in adulthood (Loeber & Hay, 1997), which are estimated to cost the U.S. between \$335 and \$350 billion each year (Miller, 2004). Internalizing problems, such as depression, cost the U.S. more than \$83 billion annually in medical services, loss of lifetime earnings due to suicide, and lost workplace productivity (Greenberg et al., 2003). In the context of the substantial public health burden of these problems, the current findings highlight the importance of providing preventive interventions designed to reduce externalizing problems and internalizing problems early in development. The current study shows that such interventions have the capacity to reduce problems that cascade to increase other problems and reduce competencies later in development (Masten & Cicchetti, 2010).

Three aspects of drug use were assessed in emerging adulthood: frequency of binge drinking, alcohol use and marijuana use. Similar to other findings (e.g., Brook et al., 1996; Chassin et al., 1999; Chassin, Prost, & Pitts, 2002; Guo et al., 2000; McCambridge et al., 2011), continuity was observed between adolescence and emerging adulthood for frequency of alcohol use. Binge drinking was not assessed in adolescence and thus its continuity across adolescence could not be examined.

Cross-domain relations between internalizing problems in adolescence and externalizing problems in emerging adulthood differed across gender, with a positive relation occurring for males and a negative relation occurring for females. It is possible that the social withdrawal that accompanies internalizing symptoms may protect female, but not male adolescents, from engaging in social relationships that promote externalizing problems in emerging adulthood. Externalizing problems in adolescence did not predict later internalizing problems in emerging adulthood for males or females. Previous research has found positive (e.g., Bardone et al., 1998; Chassin et al., 1999), negative relations (e.g., Burt et al., 2008; Masten et al., 2005) and nonsignificant relations (e.g., Bond et al., 2010) between these two dimensions of mental health problems across developmental periods. The discrepancies across studies are possibly due to differences in initial level of problems, sample characteristics such as at-risk status and gender, inclusion of other aspects of mental health problems and competencies in the model, and interval between the assessments. Research is needed to identify the contexts which affect the direction of the relations between internalizing problems and externalizing problems across development.

Cross-domain effects were found for internalizing problems on substance use. However, in contrast to the findings of most other studies, higher internalizing problems were related to less marijuana use. It is important to note that negative relations have been found by a few researchers for internalizing problems and cannabis use earlier in development (Colder et al., 2013; Fleming et al., 2008; Rogosch, Oshri, & Cicchetti, 2010). It is possible that as Masten et al. (2005) suggest, internalizing problems may reflect a personality trait, such as inhibition, which may reduce risk for frequent substance use. Alternatively, the social withdrawal that accompanies internalizing symptoms may protect late adolescents from engaging in social relationships that promote substance use in emerging adulthood (Colder et al., 2013).

Gender differences occurred for some predictors of substance use. For females but not males, internalizing problems predicted less binge drinking, externalizing symptoms predicted more binge drinking, and alcohol use predicted more marijuana use. It may be that the social withdrawal that accompanies internalizing symptoms may protect female but not male adolescents from engaging in social relationships that promote binge drinking in emerging adulthood. Similarly, high externalizing symptoms and marijuana use in adolescence may be reflective of or lead to involvement in deviant peer groups that promotes binge drinking in emerging adulthood for females but not males. These gender differences were not predicted and given the number of comparisons, it is possible that these effects could be due to chance. However, in the context of other research that has found gender differences in predictors of substance use in emerging adulthood (e.g., Miettunen et al., 2014; Pullkkinen & Pitkanen, 1994; Chassin et al., 2002), the current findings highlight the importance of identifying the conditions under which gender differences occur and the processes that account for them.

Effects of adolescent competencies on mental health problems and substance use in emerging adulthood—Academic performance, assessed by high school grade point average, predicted both internalizing problems and externalizing problems in emerging adulthood. The finding for internalizing problems is similar to Masten et al.'s (2005) findings and is consistent with the theories of depression in which failures or difficulties in key developmental tasks in one period of development lead to susceptibility for failing to handle future challenges, which leads to increases in depression (Cicchetti & Schneider-Rosen, 1986). In the context of the larger model, the relation between academic performance and internalizing problems can be seen as consistent with Patterson and his colleagues' model of depression (DeBaryshe & Ramsey, 1989; Patterson, Reid, & Dishion, 1992) in which deficiencies in parenting lead to problems in competencies, which then lead to depressive symptoms. The positive association between poor academic performance and externalizing problems echoes findings in earlier developmental periods (e.g., Patterson, 1986). This spillover effect may be due to the link between academic problems and involvement in deviant peer groups (e.g., Dishion, Patterson, Stoolmiller & Skinner, 1991; Dishion & Patterson, 2006) that promote externalizing problems across developmental stages.

Support for a positive cross-domain effect of adaptive coping was also found. Adaptive coping was significantly negatively associated with binge drinking. These findings extend the limited research on the relation between coping in adolescence and drinking in emerging adulthood, which has shown that planful coping in adolescence reduced risk for heavy alcohol use (Hussong & Chassin, 2004). Plausible explanations for this association include adolescents with higher levels of adaptive coping experiencing less stress or managing negative affect more effectively than adolescents with lower levels of adaptive coping.

The finding that competencies have positive spillover effects on problem outcomes reinforces the importance of

Understanding the effects of positive parenting from childhood to emerging adulthood

The current study elucidated pathways through which the program-induced changes in positive parenting affected mental health problems and substance use in emerging adulthood. This study extended the previous study that showed that the NBP's effects on positive parenting in late childhood/early adolescence had cascade effects on mental health problems and competencies in adolescence (Bonds McClain et al., 2010) by demonstrating that both competencies and mental health problems in adolescence had cross-domain effects into the next developmental period of emerging adulthood. The finding that improvements in parenting have enduring effects on offspring outcomes is consistent with a large body of cross-sectional and longitudinal research that has identified positive parenting as a key resilience resource (e.g., Baumrind, 1971; Masten, 2001; Werner, 2013). The current findings add to a growing body of findings of experimental trials that have documented long-term effects of preventive parenting-focused programs on a broad range of adaptation outcomes as well as the results of mediational analyses that have demonstrated that program-induced improvements in parenting mediated program effects on long-term outcomes through multi-linkage cascade effects (Sandler, Ingram, Wolchik, Tein, & Winslow, 2015).

Limitations

There are several limitations that need to be noted. Several of these are related to the characteristics of the sample. The sample consisted of families in a randomized trial of a preventive intervention for divorced families that included multiple eligibility criteria and was almost exclusively middle-class and non-Hispanic White. Also, the youth were in late childhood or early adolescence when the study began. These aspects of the sample raise concerns about the generalizability of the findings. Further, the sample was relatively modest in size. Additionally, those who participated in the 15-year follow-up assessment had significantly higher internalizing problems and lower self-esteem those who did not participate. However, the analytical strategy that was used to deal with missing data likely diminished the effects of attrition (Graham, 2009). In terms of measurement, although the measures of mental health problems were based on reports of both offspring and their mothers, the measures of substance use and most of the measures of competencies were self-report.

Directions for future research

There are several areas that could advance our understanding of developmental cascade effects of positive parenting, competencies, mental health and substance use outcomes in earlier stages of development and outcomes in emerging adulthood. First, given the restricted nature of the sample in terms of ethnicity, social class and offspring age, replicating the findings with larger, community-based samples that are diverse in age, ethnicity, and socioeconomic background would be an important direction for future research. Second, additional attention to gender differences in predictors of substance use is needed to identify the conditions under which gender moderates the relations between competencies and mental health problems in adolescence and substance use in the next stage of development. Third, it would also be important to test cascade effects models of

competencies, mental health problems and substance use in adolescence and competencies in emerging adulthood. Finally, given that parenting interventions are considered among the most effective approaches to prevention (O'Connell, Boat, & Warner, 2009; Sandler, Schoenfelder, Wolchik & MacKinnon, 2011), future research should identify the processes underlying the cascade effects that are set in motion by programs that enhance parenting.

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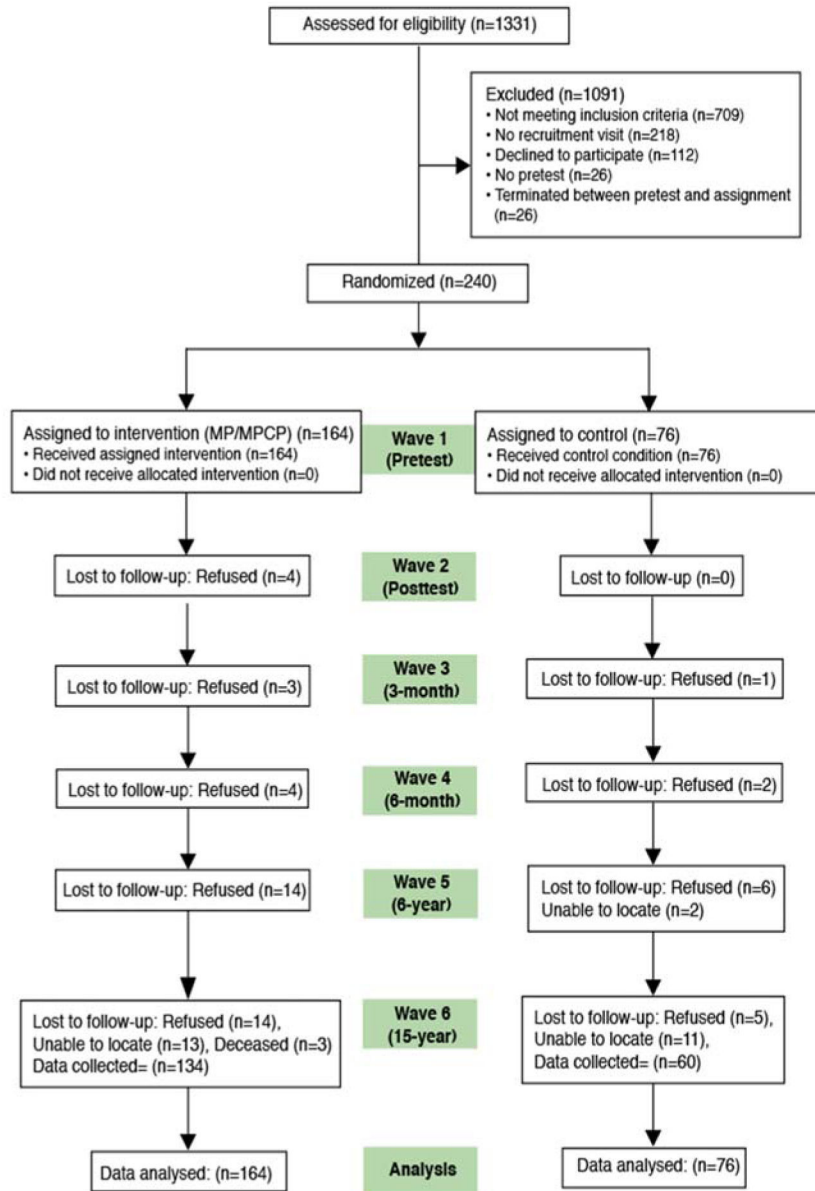


Figure 1.
Participant flow

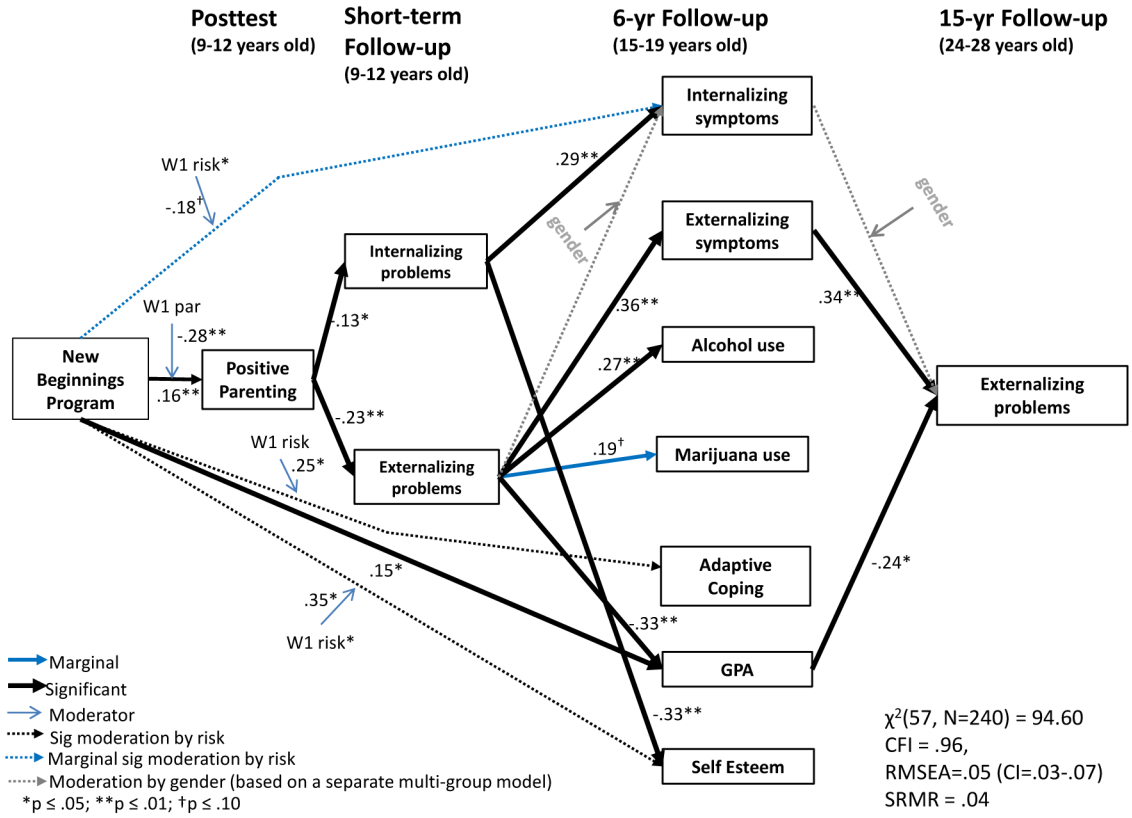


Figure 2. Cascade effects model of mental health problems, substance use and competencies in adolescence on externalizing problems in emerging adulthood

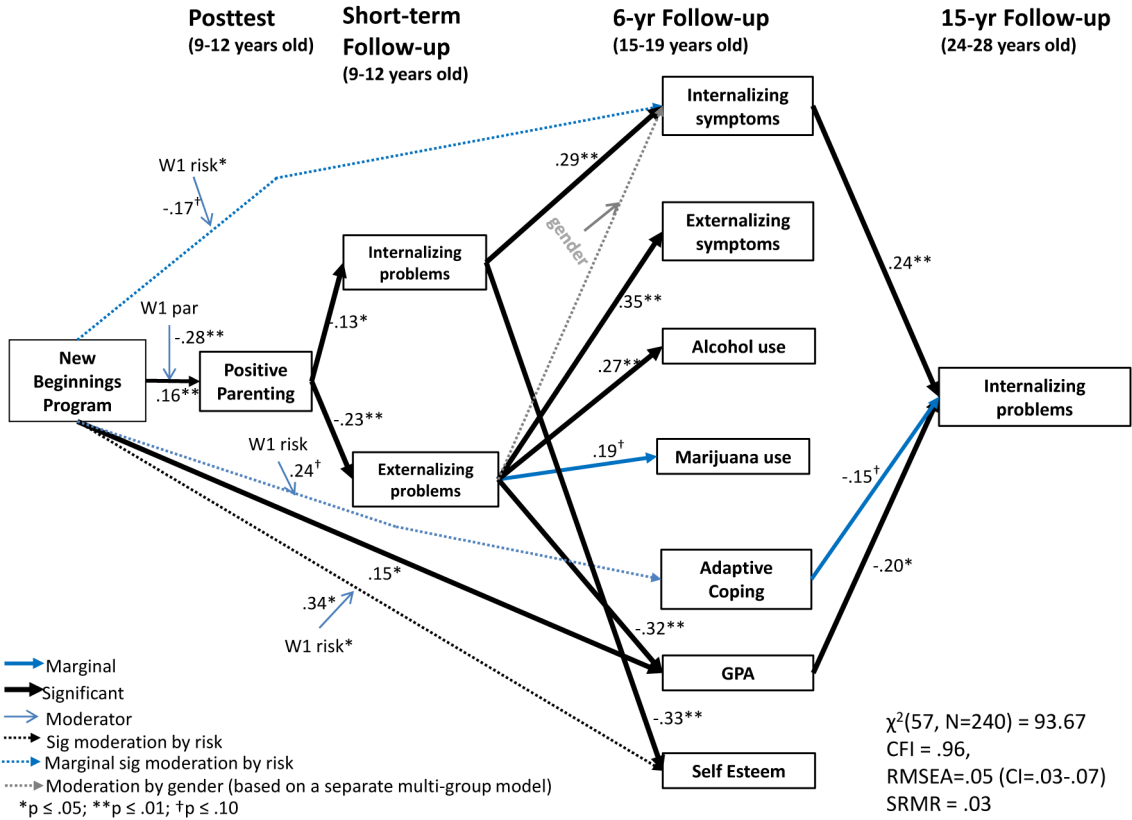


Figure 3. Cascade effects model of mental health problems, substance use and competencies in adolescence on internalizing problems in emerging adulthood

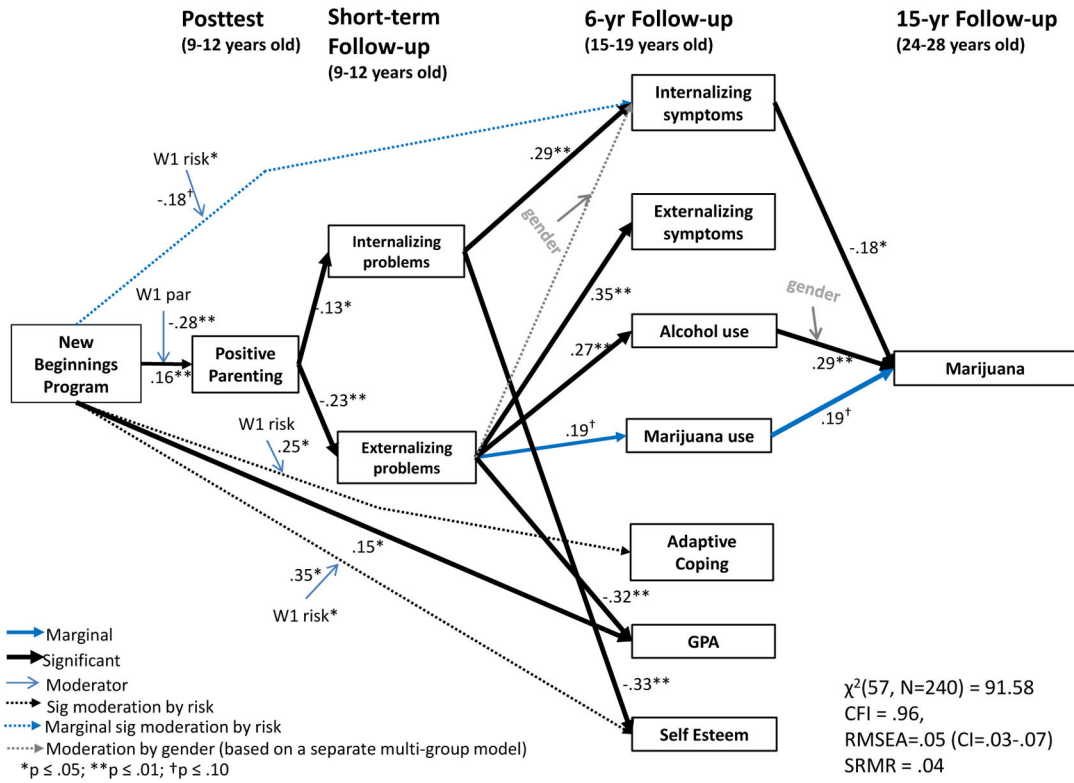


Figure 4. Cascade effects model of mental health problems, substance use and competencies in adolescence on marijuana use in emerging adulthood

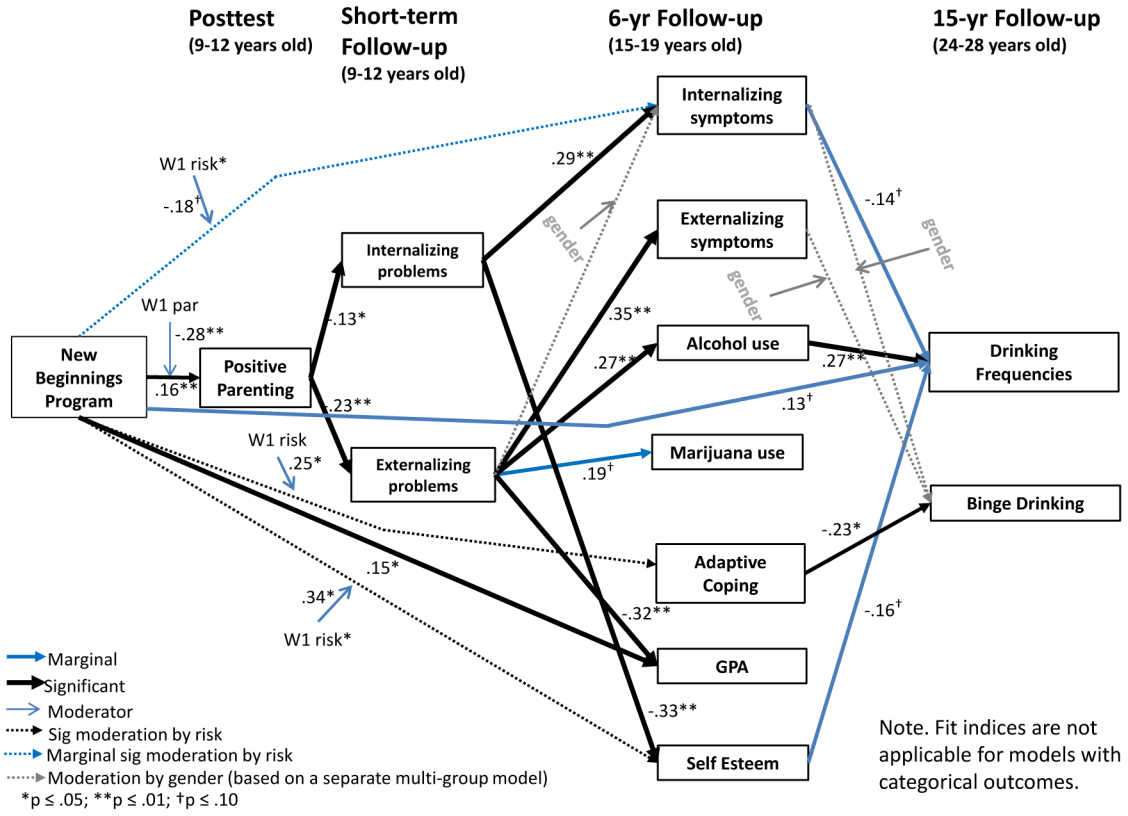


Figure 5. Cascade effects model of mental health problems, substance use and competencies in adolescence on frequency of drinking and binge drinking in emerging adulthood

Table 1

Direct Program Effects on Mental Health Problems, Substance Use and Competencies at Post-test, 6-Year Follow-up and 15-Year Follow-up

| Variable | posttest | 6-Year Follow-up | 15-Year Follow-up |
|--------------------------------------|----------------------|----------------------|------------------------|
| Internalizing problems | * moderation by risk | * moderation by risk | ns |
| Externalizing problems | * | * moderation by risk | ns |
| Internalizing disorders symptoms | -- | * moderation by risk | ns |
| Externalizing disorders symptoms | -- | ns | ns |
| Diagnosis of mental health disorders | -- | * | * |
| Substance use problems | -- | -- | * moderation by gender |
| Alcohol use frequency | -- | * moderation by risk | * moderation by gender |
| Marijuana use frequency | -- | * moderation by risk | ns |
| Binge drinking | -- | ns | ns |
| Other drug use | -- | * moderation by risk | * moderation by gender |
| Polydrug use | -- | * moderation by risk | * moderation by gender |
| Number of sexual partner | -- | * | * |
| Adaptive coping | ns | * moderation by risk | * moderation by risk |
| Grade point average | -- | * | na |
| Self-Esteem | * moderation by risk | * moderation by risk | * |

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Table 2

Correlations and descriptive statistics of study variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|--------------------------------|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|------------|-----|
| 1. Group | 1 | | | | | | | | | | | | | | | | |
| 2. T1 risk | .09 | 1 | | | | | | | | | | | | | | | |
| 3. T1 positive parenting | .08 | -.46 | 1 | | | | | | | | | | | | | | |
| 4. T3+4 internalizing problems | -.02 | .65 | -.41 | 1 | | | | | | | | | | | | | |
| 5. T3+4 externalizing problems | -.01 | .58 | -.45 | .60 | 1 | | | | | | | | | | | | |
| 6. T5 internalizing symptoms | -.01 | .43 | -.23 | .47 | .35 | 1 | | | | | | | | | | | |
| 7. T5 externalizing symptoms | .03 | .41 | -.26 | .33 | .46 | .51 | 1 | | | | | | | | | | |
| 8. T5 alcohol use | -.03 | .15 | -.13 | .20 | .29 | .22 | .34 | 1 | | | | | | | | | |
| 9. T5 marijuana use | -.05 | .20 | -.07 | .22 | .25 | .33 | .43 | .61 | 1 | | | | | | | | |
| 10. T5 adaptive coping | -.04 | -.26 | .13 | -.20 | -.17 | -.25 | -.30 | -.10 | -.23 | 1 | | | | | | | |
| 11. T5 GPA | .12 | -.25 | .29 | -.19 | -.39 | -.24 | -.42 | -.22 | -.28 | .22 | 1 | | | | | | |
| 12. T5 self-esteem | .01 | -.28 | .16 | -.40 | -.25 | -.44 | -.39 | -.19 | -.26 | .54 | .25 | 1 | | | | | |
| 13. T6 internalizing problems | -.00 | .31 | -.12 | .30 | .22 | .38 | .30 | .04 | .11 | -.28 | -.29 | -.28 | 1 | | | | |
| 14. T6 externalizing problems | -.03 | .26 | -.19 | .23 | .37 | .25 | .45 | .18 | .15 | -.19 | -.39 | -.18 | .66 | 1 | | | |
| 15. T6 drinking frequency | .13 | -.07 | .04 | .06 | .12 | -.07 | .02 | .25 | .15 | -.07 | .06 | -.12 | -.02 | .06 | 1 | | |
| 16. T6 binge drinking | .06 | .14 | -.06 | .15 | .26 | .08 | .28 | .20 | .25 | -.32 | -.21 | -.28 | .22 | .33 | .40 | 1 | |
| 17. T6 marijuana use | .01 | .08 | -.12 | .05 | .18 | -.01 | .16 | .40 | .34 | -.06 | -.15 | -.02 | .08 | .17 | .32 | .23 | 1 |
| Mean | .68 | .00 | .30 | -.61 | -.37 | 1.0 | 3.8 | 3.0 | 2.0 | .64 | 2.8 | -.18 | 48.9 | 50.0 | 5.0 | .57 | 2.2 |
| Standard deviation | .47 | .90 | .56 | .59 | .67 | .77 | 2.4 | 2.0 | 1.8 | .98 | .68 | .62 | 9.1 | 8.1 | 1.9 | .50 | 2.1 |
| Skewness | -.79 | .47 | -.47 | 1.2 | .76 | 1.2 | 1.0 | .68 | 1.8 | .09 | -.51 | -.64 | .24 | .19 | -.73 | -.29 | 1.4 |
| Kurtosis | -1.4 | -.09 | -.37 | 1.7 | .15 | 1.8 | 1.2 | -.82 | 2.0 | -.73 | -.03 | -.30 | -.28 | .87 | -.65 | -1.9 | .43 |

Note: The bold and italicized correlations were significant at $p < .05$.

Table 3

Gender differences on regression coefficients

| Criterion Variable | Predictor Variable | Gender | Unstandardized Regression Coefficient | Standard Error | t-value | p-value |
|---------------------------|--------------------------------|---------|---------------------------------------|----------------|---------|---------|
| T5 Internalizing symptoms | T3 + T4 externalizing problems | Males | 0.36 | 0.12 | 2.90 | 0.004 |
| | | Females | -0.02 | 0.14 | -0.16 | 0.875 |
| T6 Externalizing problems | T5 internalizing symptoms | Males | 2.15 | 0.88 | 2.44 | 0.015 |
| | | Females | -2.79 | 0.92 | -3.03 | 0.002 |
| T6 Binge drinking | T5 internalizing symptoms | Males | 0.13 | 0.50 | 0.26 | 0.793 |
| | | Females | -1.47 | 0.60 | -2.45 | 0.014 |
| T6 Binge drinking | T5 externalizing symptoms | Males | -0.09 | 0.16 | -0.56 | 0.576 |
| | | Females | 0.75 | 0.22 | 3.42 | 0.001 |
| T6 Marijuana | T5 alcohol use | Males | 0.06 | 0.10 | 0.61 | 0.542 |
| | | Females | 0.50 | 0.13 | 3.76 | 0.000 |