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Marijuana Use Among Clinic-Referred Hispanic American Adolescents with Substance Use Disorders: Gender Differences in Predictors of Growth Trajectory Parameters

Karen Jill Kaczynski

University of Miami, karen_kaczynski@yahoo.com

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MARIJUANA USE AMONG CLINIC-REFERRED HISPANIC AMERICAN
ADOLESCENTS WITH SUBSTANCE USE DISORDERS:
GENDER DIFFERENCES IN PREDICTORS OF GROWTH TRAJECTORY
PARAMETERS

By

Karen Jill Kaczynski

A DISSERTATION

Submitted to the Faculty
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Karen Jill Kaczynski

Approved:

Dr. Kristin M. Lindahl
Associate Professor of Psychology

Dr. Terri A. Scandura
Dean of the Graduate School

Dr. Neena M. Malik
Assistant Professor of Psychology

Dr. Maria M. Llabre
Professor of Psychology

Dr. Michael S. Robbins
Research Associate Professor of
Psychiatry and Behavior Sciences
University of Miami School of Medicine

Dr. José Szapocznik
Professor of
Psychiatry and Behavior Sciences
University of Miami School of Medicine

KACZYNSKI, KAREN J.
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This study was undertaken to evaluate gender differences in predictors of substance use in clinic-referred, Hispanic American adolescents with substance use disorders.

Individual (disruptive behavior disorders, depression) and family variables (family conflict, parental monitoring) were evaluated as predictors of the initial level and change over time in marijuana use, and gender was evaluated as a moderator of the associations.

The study involved an analysis of an existing dataset of 113 Hispanic American adolescents (93 boys; age 12 to 17) referred for outpatient treatment for substance abuse and their parental guardian. Participants and parental guardians completed questionnaires and a structured interview to report on predictor variables at baseline and marijuana use at baseline and 3-, 6-, 12-, and 18-months post-baseline. Latent growth curve modeling was conducted to evaluate the study hypotheses. Adolescents reported high levels of marijuana use at baseline and relatively stable levels of marijuana use over time.

Treatment and gender effects influenced the marijuana use trajectory. Girls exhibited more impaired psychosocial functioning than boys, including worse disruptive behavior problems and depression and lower levels of parental monitoring. Depression was negatively associated with marijuana use longitudinally. Overall, individual and family risk factors are associated with adolescent marijuana use in complex ways. Implications for intervention are discussed.

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Introduction

Substance abuse is a significant problem for American youth (Johnson, O'Malley, & Bachman, 2001; Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002), impacting male and female adolescents from all ethnic backgrounds, with the exception of Asian Americans (Johnson, O'Malley, & Bachman, 2001). Experimental substance use is extremely prevalent (Johnson, O'Malley, & Bachman, 2001), and a substantial subset of adolescents who use drugs become substance dependent (Kandel, Chen, Warner, Kessler, & Grant, 1997). Substance abuse is associated with immediate and long-term consequences, including school failure, significant emotional and behavior problems, and an increased risk of accidental injury or death (Hawkins, Catalano, & Miller, 1992). Furthermore, substance use in adolescence is associated with continued substance use and dependence in adulthood (Lewinsohn, Rohde, & Seeley, 1996), in part because interventions for adolescent substance abusers often fail, with as many as 80% relapsing following treatment (Brown, Vik, & Creamer, 1989; Latimer, Newcomb, Winters, & Stinchfield, 2000). Several risk factors for adolescent substance use have been identified, including peer and parental substance use, emotional distress, behavior problems, disrupted parenting, and family conflict (Hawkins, Catalano, & Miller, 1992). An improved understanding of the ways in which these and other risk factors influence adolescent substance use in diverse samples is imperative in order to improve prevention and treatment efforts.

The majority of research on adolescent substance use has been conducted with community-based, European American samples (Dishion & Skaggs, 2000; Disney, Elkins, McGue, Iacono, 1999; Grella, Joshi, & Hser, 2004; Grilo, Becker, Fehon, Walker, Edell, & McGlasham, 1998; Henry, Robinson, & Wilson, 2003; Latimer, Newcomb,

Winters, & Stinchfield, 2000; Locke & Newcomb, 2003; Opland, Winters, & Stinchfield 1995). There is some evidence, however, that risk factors for substance use may differ in adolescents from different ethnic backgrounds (Berman, Kurtines, Silverman, & Serafini, 1996) and in clinic-referred samples (Winters, Latimer, Stinchfield, & Henley, 1999). For example, compared with European American adolescents, Hispanic American adolescents are more likely to live in poor neighborhoods in which crime and drug use are common (García Coll & Garrido, 2000; US Bureau of the Census, 1996), and such neighborhood risk factors are among the strongest predictors of substance use among Hispanic Americans (Strait, 1999). In addition, delinquency and emotional distress appear to be the primary predictors of level and frequency of substance use among clinic-referred youth with substance use disorders (Winters, Latimer, Stinchfield, & Henley, 1999), whereas peer use has been found to be the most salient predictor of adolescent substance use in community-based samples (Newcomb & Bentler, 1986). Gender differences in risk factors for adolescent substance use have also been identified (Hoffmann & Su, 1998; Thomas, 1996; Vaccaro & Wills, 1998). Specifically, in both community and clinic-based settings, female adolescent substance users appear to exhibit more emotional problems and to experience greater family-related stress, whereas males appear to display more behavior and school problems (Dakof, 2000; Hsieh & Hollister, 2004). Scant prior research, however, has evaluated gender differences in predictors of level and change in substance use in clinic-referred, inner city, ethnic minority adolescents with substance use disorders (for exception, see Rowe, Liddle, Caruso & Dakof, 2004).

The current study was designed to examine gender differences in predictors of initial level and change in substance use over time in a sample of urban, low-income, Hispanic American adolescents with diagnosed substance use disorders. Marijuana use was selected as the outcome variable because it is the primary illicit substance of abuse among adolescents (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002). The following individual and contextual predictors of adolescent substance use were evaluated: disruptive behavior problems [i.e., conduct disorder (CD) and oppositional defiant disorder (ODD)], depression, family conflict, and parental monitoring.

The following literature review first provides information regarding the prevalence and consequences of substance use in adolescence. Second, findings related to gender and ethnic differences in adolescent substance use are presented. Third, several theoretical frameworks developed to organize patterns of risk and protective factors for adolescent substance use are presented, with particular emphasis on Ecodevelopmental theory (Szapocznik & Coatsworth, 1999). Fourth, the model proposed in the current study is presented, including evidence linking adolescent substance use with disruptive behavior disorders, depression, family conflict, and parental monitoring.

Prevalence of Adolescent Substance Abuse

Substance use is extremely prevalent among youth in the United States. Several recent studies evaluating adolescent substance use in large, nationally representative community samples have generated rates ranging from 38% to 70% for tobacco use, 70% to 80% for alcohol use, and 20% to 47% for marijuana use (CDC, 2000; Johnston, O'Malley, & Bachman, 2001; SAMSHA, 2001). Thus, alcohol and tobacco use are pervasive among American youth (Johnston, O'Malley, & Bachman, 2001) and

marijuana is the primary illicit substance of use among adolescents (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002). In addition, adolescent use of cocaine, hallucinogens, and “club drugs” (e.g., ecstasy) has also become more prevalent recently (Johnston, O’Malley, & Bachman, 2001). Overall, substance use among American adolescents is remarkably widespread, with over 50% trying one or more illicit substances and the vast majority trying alcohol or tobacco before the end of high school (Johnston, O’Malley, & Bachman, 2001). Furthermore, adolescents who use substances tend to engage in polysubstance use. Specifically, 47.5% of adolescent cigarette smokers also reported illicit drug use, as compared to 5.6% of non-smokers (SAMHSA, 2005). Among youth who reported frequent use of alcohol, 65.6% also reported illicit drug use, compared with 5.0% of nondrinkers (SAMHSA, 2005). Lastly, among youth who reported both smoking cigarettes and drinking alcohol, 70.1% used illicit drugs, compared with 3.5% of youth who did not smoke or drink (SAMHSA, 2005). Given the high prevalence of adolescent substance use, it is likely that many adolescents are engaging in dangerous polysubstance use.

Experimental substance use has been considered a normative part of adolescence in the United States (Newcomb, 1996). Although a majority of adolescents experiment with one or more substances without significant negative consequences (Newcomb & Bentler, 1988), it is important to note that a significant subset of adolescent users becomes substance dependent. Specifically, of adolescents using the respective substances, 8% became dependent on alcohol, 20% became dependent on tobacco, 14% became dependent on marijuana, and 11% became dependent on cocaine (Kandel, Chen, Warner, Kessler, & Grant, 1997). In one large community-based study, 25% of

adolescents met lifetime criteria for abuse of one or more substances, and 20% met criteria for dependence (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002).

Substance use has also been found to be quite prevalent among clinic-referred youth. In an evaluation of adolescents receiving treatment for a variety of problems at a psychiatric outpatient clinic, it was found that 11% met criteria for a comorbid substance use disorder (Wilens, Biederman, Abrantes, & Spencer, 1997). Among youth receiving psychiatric treatment for behavior problems, as many as 50% may also meet criteria for a substance use disorder (Reebye, Moretti, & Lessard, 1995). Thus, psychiatric comorbidity, in particular behavior problems, appears to be an important factor to consider in working with clinic-referred adolescents with substance use problems.

Consequences of Substance Use in Adolescence

Early onset of substance use and dependence is associated with significant negative consequences, including continued substance use and dependence in adulthood and related psychopathology, such as antisocial behavior and depression (Lewinsohn, Rohde, & Seeley, 1996). A negative relation has been identified between age of onset and problem severity (Kandel, 1982), suggesting the earlier substance use is initiated, the more severe the consequences. Adolescents who use substances have been found to display faulty individual functioning, including poor school performance due to lack of motivation and disrupted cognitive processes, significant mood disorders that may be maintained by substance use, and an increased risk of accidental injury or death (Hawkins, Catalano, & Miller, 1992).

There are also significant long-term consequences of substance abuse, including an elevated risk of adjudication for violent crimes, dysfunctional family functioning in

adulthood, an increased likelihood of becoming a perpetrator of child abuse and neglect, and financial instability due to unemployment (Hawkins, Catalano, & Miller, 1992). Longitudinal research has demonstrated a strong prospective relation between early alcohol and marijuana use and poor work history in early adulthood in both men and women (Friedman, Granick, Bransfield, Kreisher, & Schwartz, 1996; Friedman, Terras, & Zhu, 2004). Furthermore, adolescent substance use has been found to be associated with deleterious consequences for physical health, such as an increased risk of cancer, coronary heart disease, and HIV/AIDS (Blum, 1987; Hawkins, Catalano, & Miller, 1992). Thus, it is imperative that researchers attempt to isolate risk factors for adolescent substance use to develop effective interventions focused on prevention. It will also be important to understand variations in patterns of use based on factors such as gender and ethnicity to appropriately tailor intervention efforts.

Gender and Substance Abuse

Gender differences have generally not been found in overall rates of substance use (Kandel, Chen, Warner, Kessler, & Grant, 1997). Results of a recent community-based study indicate that although patterns of use may differ by gender, adolescent males and females are more similar than different in terms of the prevalence of substance use (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002). Specifically, rates of alcohol and marijuana use were comparable in boys and girls, although boys tended to initiate marijuana use earlier than girls. The prevalence of alcohol and marijuana abuse and/or dependence was also similar in girls and boys (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002). Results of nationally representative surveys indicate girls and boys demonstrate similar rates of experimentation with alcohol, although boys engage in

more repeated use than girls (CDC, 2000; SAMHSA, 2005). Similarly, males have been found to be more likely to drink to intoxication than females (Beck & Summons, 1987; SAMHSA, 2005). In contrast, females exhibit higher rates of tobacco use and progress more rapidly to nicotine dependence than males (Vaccaro & Wills, 1998). Females are also more likely to show signs of misuse, such as withdrawal (Stewart & Brown, 1995), perhaps due to gender differences in drug metabolism (Blume, 1990). Despite these gender differences in patterns of use, recent epidemiological research suggests overall rates of substance use problems do not differ by gender, with approximately 8.7% of male adolescents and 9.0% of female adolescents meeting criteria for a substance use disorder (SAMHSA, 2005).

Similarly, research conducted with drug clinic referred youth indicates few gender differences in the patterns of drug use (Opland, Winters, Stinchfield, 1995). Specifically, no gender differences were found for frequency of alcohol use, and although boys tended to use marijuana more frequently than girls and reported earlier onset of marijuana use, differences were not clinically meaningful (Opland, Winters, Stinchfield, 1995). Thus, evidence from both community and clinic-referred samples suggests boys and girls demonstrate comparable levels of substance use.

Although girls and boys may engage in similar levels of substance use overall, there is evidence that different risk factors may be associated with substance use in male and female adolescents (Hsieh & Hollister, 2004; Martin, Milich, Martin, Hartung, & Haigler, 1997; Kandel, Raveis, & Davies, 1991). Research supports gender differences in the following factors associated with substance abuse: delinquency (Newcomb, 1997; Brown, Gleghorn, Schuckit, Myers, & Mott, 1996); psychological problems (Davis &

DiNitto, 1996; Hoffmann & Su, 1998; Newcomb, 1997); family conflict and school problems (Hsieh & Hollister, 2004). Specifically, results of several studies conducted with clinic-referred youth suggest female adolescents with substance use disorders may exhibit more psychological problems (e.g., depression, low self-esteem) and family problems (e.g., family substance use, family stress) than males, whereas male adolescents with substance use disorders may exhibit more school and legal problems than females (Dakof, 2000; Hsieh & Hollister, 2004; Opland, Winters, Stinchfield, 1995).

Substance Use in Hispanic American Adolescents

Individuals of Hispanic descent represent a large but understudied population in the US (US Bureau of the Census, 1996). In addition to the large population of Hispanic Americans, 50% of immigrants to the U.S. are of Hispanic descent (Lollock, 2001). Thus, it is important to evaluate patterns of adolescent substance use within this rapidly growing population. Hispanic and Hispanic American youth tend to experience high levels of risk factors related to substance use, including barriers to social mobility, exclusion from resources such as education, health care, and employment, and the compounding effects of poverty and growing up in potentially violent neighborhoods in which drug use is prevalent (Berman, Kurtines, Silverman, & Serafini, 1996; García Coll & Garrido, 2000). Family processes related to differential acculturation among family members may also place Hispanic American youth at risk for substance use (Ary, Duncan, Duncan, & Hops, 1999; Coatsworth, Pantin, McBride, Briones, Kurtines, Szapocznik, 2002; Pantin, Schwartz, Sullivan, Coatsworth, & Szapocznik, 2003; Szapocznik & Kurtines, 1993). It will be important to determine the ways in which these

and other factors are associated with initiation and change in substance use within this high-risk population.

Substance use is common among Hispanic American adolescents (SAMSHA, 2005). Although prior research suggested Hispanic American youth demonstrated lower rates of substance use than European American youth (Vega, Zimmerman, Warheit, Apospori, & Gil, 1993; Windle, 1991), rates of substance use among Hispanic American youth are rising (SAMHSA, 2005), and more recent studies indicate Hispanic American adolescents exhibit equal or greater rates of substance use than European Americans and African Americans (Johnston, O'Malley, & Bachman, 2001; SAMHSA, 2005).

Specifically, according to the most recent National Survey on Drug Use and Health, a large annual survey of a nationally representative sample, 9.1% of Hispanic American adolescents reported using tobacco, 26.6% reported using alcohol, and 10.2% reported using illicit substances, primarily marijuana (SAMHSA, 2005). Additional epidemiological data suggests up to 67% of Hispanic American adolescents have been intoxicated, and that Hispanic Americans may be more likely than European Americans to become daily marijuana users (Johnston, O'Malley, & Bachman, 2001). Furthermore, 9.8% of Hispanic Americans meet criteria for substance abuse or dependence, as compared with 9.6% of European Americans and 8.3% of African Americans (SAMHSA, 2005). Prior analyses conducted with the current sample of clinic-referred adolescents with substance use disorders, however indicate equivalent levels of substance use between the Hispanic American and African American participants (Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). Thus, evaluations of both

community and clinic samples indicate high rates of substance use and abuse among Hispanic American adolescents.

Substance Use Trajectories

Once adolescents initiate substance use, they are likely to progress to more frequent use (Botvin, Scheier, & Griffin, 2002). In a large, community-based, longitudinal evaluation of a predominantly European American sample (Windle & Wiesner, 2004), five different trajectories of adolescent marijuana use were identified. Abstainers (82.4%) did not report marijuana use in adolescence. Experimental users (8.8%) reported minimal and infrequent marijuana use. Increasesers reported (3.6%) minimal use in early adolescence with increasing use over time. Decreasers (3.4%) reported heavy use in early adolescence with decreasing use over time. High chronics (1.8%) reported consistently heavy use of marijuana during the adolescent years. No gender differences were found in trajectory membership (Windle & Wiesner, 2004). Not surprisingly, high chronics exhibited the highest lifetime prevalence of cannabis use disorder (77.8%), although increasesers (60.0%), decreaseers (48.0%), and experimental users (42.9%) also exhibited high rates of lifetime cannabis use disorder (Windle & Wiesner, 2004). In addition, a substantial subset of adolescent abstainers (12.5%) developed cannabis use disorder later in life (Windle & Wiesner, 2004). Thus, across trajectory groups, it appears that adolescent marijuana use tends to increase over time following initial onset of drug use.

Drug clinic-referred youth also exhibit different trajectories of drug use based on associated psychological and family factors (Rowe, Liddle, Caruso, & Dakof, 2004). In a sample of predominantly male, African American adolescents receiving treatment for

substance use disorders (primarily marijuana dependence, 89%), three subgroups were identified (Rowe, Liddle, Caruso, & Dakof, 2004). Juvenile justice involved substance abusers (41%) exhibited the lowest level of substance use and the highest level of legal involvement. Comorbid substance abusers (33%) exhibited an intermediate level of substance use and reported the most comorbid psychiatric disorders and family problems. Heavy substance abusers (26%) exhibited the highest level of substance use and the most psychological preoccupation with substance use. Thus, adolescents with substance use disorders represent a heterogeneous group, and certain individual and family risk factors may be associated with different trajectories of use.

Risk and Protective Factors

Given that substance use is so common in adolescence and is associated with significant concurrent and long-term consequences, a great deal of research has focused on identifying related factors to better understand the causes of substance use initiation and maintenance. The risk and protective factors model (Hawkins, Catalano, & Miller, 1992) attempts to identify variables that are associated with increased or decreased likelihood of substance use. Research conducted a decade ago has already identified as many as 72 different risk and protective factors for substance use (Leshner, 1996). Consistent with Bronfenbrenner's (1979; 1989) ecological developmental model, risk factors for substance use have been identified in multiple domains of development (Hawkins, Catalano, & Miller, 1992), and risk factors appear to be interrelated in complex patterns that transact with the individual adolescent over the course of development (Lynch & Cicchetti, 1998; Szapocznik & Coatsworth, 1999). It appears that the effect of risk factors is cumulative (Loeber & Stouthamer-Loeber, 1986; Randolph,

2004); thus, the more risk factors present, the stronger the risk for adolescent substance use (Newcomb & Felix-Ortiz, 1992). Furthermore, the effect appears to be interactive rather than additive, that is, as the number of risk factors present increases, the effects combine such that the total influence is greater than the sum of the individual risk factors (Newcomb, Maddahian, & Bentler, 1986). Thus, it is necessary to progress beyond identifying risk and protective factors and rather to evaluate patterns of association among risk and protective factors from a developmental, contextual perspective (Szapocznik & Coatsworth, 1999).

Ecodevelopmental Theory

Based on extensive research with Hispanic families, Szapocznik and colleagues (e.g., Szapocznik & Coatsworth, 1999) developed ecodevelopmental theory in order to expand upon Bronfenbrenner's (1979; 1989) model. Ecodevelopmental theory also draws from social interactional frameworks (Kurtines & Szapocznik, 1996; Minuchin, 1974; Szapocznik & Kurtines, 1989), as well as research on multisystemic interventions for problem behavior (Borduin & Henggeler 1990). Similar to the ecological-developmental model (Bronfenbrenner, 1979), ecodevelopmental theory involves highlighting the different domains in which children operate, takes a developmental perspective, and focuses on interactions among domains (Szapocznik & Coatsworth, 1999). Factors in each domain of development, as well as the pattern of interrelations among domains, influence developmental trajectories, according to ecodevelopmental theory (Szapocznik & Coatsworth, 1999). In the treatment context, structural principles (Minuchin, 1974) are applied to organize interactions within and between individuals in various domains of the ecosystem (Robbins, Schwartz, Szapocznik, 2004). When

interrelations among domains are strong and complementary, the child develops adaptively (Coatsworth, Pantin, & Szapocznik, 2002). However, when interrelations among domains are weak or antagonistic, there is an increased risk for behavior problems and substance use (Szapocznik & Coatsworth, 1999).

The family is viewed as the most important context for development in ecodevelopmental theory (Szapocznik & Coatsworth, 1999). This view is supported by considerable empirical research, as elements of family functioning are among the strongest predictors of both adaptive and maladaptive development (Coatsworth, Pantin, McBride, Briones, Kurtines, & Szapocznik, 2000; Pantin, Schwartz, Sullivan, Coatsworth, & Szapocznik, 2003). In addition, a focus on family functioning is appropriate for work with Hispanic Americans because it is consistent with “familism,” a core Hispanic value, which refers to a sense of obligation towards and reliance on family members for support (Coatsworth, Pantin, McBride, Briones, Kurtines, & Szapocznik, 2000; Marín & Marín, 1991; Szapocznik & Kurtines, 1993). Indeed, results of a recent school-based study with a sample of Hispanic American adolescent girls (Coatsworth, Pantin, McBride, Briones, Kurtines, & Szapocznik, 2000) indicate family functioning (i.e., conflict and support) may be the most salient microsystemic correlate of internalizing and externalizing symptomatology. It will be important to determine whether family functioning is equally important in predicting level and change in substance use in a sample of clinic-referred Hispanic American youth with substance use disorders.

The Current Study: Individual and Contextual Risk

The current study was designed to evaluate a model of risk factors for substance abuse in inner city, low-income, clinic-referred Hispanic American adolescents with substance use disorders in order to inform treatment efforts with this challenging population. Building on theoretical and empirical support, both individual and contextual factors will be included in the model (Armstrong & Costello, 2002; Bronfenbrenner, 1979; Hawkins, Catalano, & Miller, 1992; Robbins, Kumar, et al., 2002; Robbins, Schwartz, & Szapocznik, 2004; Szapocznik & Coatsworth, 1999), as substance use appears to result from an interaction between individual and environmental factors (Blackson, 1994; Cadoret, Yates, Troughton, Woodworth, & Stewart, 1996). Of the many factors shown to be related to adolescent substance use, the present study focuses on factors that may be amenable to intervention, that is, psychiatric comorbidity and family functioning. Specifically, disruptive behavior problems (i.e., CD and ODD), emotional distress (i.e., depression), and family functioning (i.e., parental monitoring and family conflict) will be examined as predictors of initial level and change over time in adolescent substance use.

Psychiatric Comorbidity

One individual factor that has been found to be strongly associated with substance use in adolescents is comorbid psychopathology. Comorbid psychiatric conditions are extremely prevalent in adolescent substance users, and it has been posited that substance abuse may be part of larger syndrome involving affective instability and/or deviant behavior (Buydens-Branchey, Branchey, & Noumair, 1989; Newcomb, 1997). Adult substance use literature indicates 50-80% of substance abusers have had a comorbid

psychiatric condition at some point during their lives (Helzer, 1988; Khantzian & Treece, 1985), with the most common conditions being antisocial personality disorder (Cadoret, O’Gorman, Troughton, & Heywood, 1985), depression (Schuckit, 1986), and anxiety disorders (Stockwell & Bolderston, 1987). Specifically, 59.5% of individuals with a lifetime history of CD, and 78.7% of individuals with a lifetime history of antisocial personality disorder, have also been found to report a lifetime history of at least one substance use disorder (Kessler, Nelson, McGonagle, Eklund, Frank, & Leaf, 1996). Similarly, lifetime psychiatric comorbidity rates for youth with substance use disorders are over 60% (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993), with disruptive behavior disorders (e.g., ODD, CD) and depression being the most prevalent comorbid conditions (Armstrong & Costello, 2002). As untreated comorbid psychiatric conditions may be related to high rates of relapse among adolescents treated for substance use disorders (Brown, Vik, & Creamer, 1989; Latimer, Newcomb, Winters, & Stinchfield, 2000), it will be important to elucidate the relation between substance use and psychiatric problems to improve treatment for adolescent substance abuse.

Disruptive Behavior Disorders

Armstrong and Costello (2002) conducted a review of studies documenting an association between psychiatric comorbidity and substance use in adolescence. Across studies, the median prevalence of disruptive behavior disorders in adolescent substance users was 46%, compared with a median prevalence of 7-8% in abstinent adolescents. The presence of substance use was associated with a fourfold increase in the risk for disruptive behavior disorders (Armstrong & Costello, 2002). Furthermore, in a drug clinic-referred sample, deviant, uncontrolled behavior accounted for the majority of

variance in substance use (Winters, Latimer, Stinchfield, & Henley, 1999). In the current sample of clinic-referred ethnic minority adolescents with substance use disorders, approximately 77% met criteria for a comorbid disruptive behavior disorder (Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002).

Longitudinal evaluations with community samples suggest that, while disruptive behavior problems are associated with concurrent level of substance use, behavior problems are not associated with change in substance use over time (Lillehoj, Trudeau, Spoth, & Madon, 2005; Windle & Wiesner, 2004). For example, delinquent activity was associated with consistently high levels of marijuana use during the course of adolescence, but did not appear to be associated with change in marijuana use (Windle & Wiesner, 2004). It may be that there is no relation between disruptive behavior problems and change in substance use because adolescent substance users with comorbid disruptive behavior disorders tend to exhibit consistently high levels of substance use. For example, CD is associated with poor treatment outcome (Crowley, Mikulich, MacDonald, Young, & Zerbe, 1998), suggesting adolescents with CD who receive treatment for substance use disorders are less likely to change their level of substance use during or post-treatment. Research with clinic-referred adolescents with substance use disorders indicates CD is associated with poorer treatment response and the greatest risk of continued use following treatment (Rowe, Liddle, Caruso, Dakof, 2004). Thus, disruptive behavior disorders appear to be associated with a pattern of chronic, long-term substance use.

Results of several studies suggest psychiatric problems in childhood, particularly disruptive behavior problems, predispose adolescents to develop substance use problems (Biederman, Faraone, & Kiely, 1996; Bukstein, Glancy, & Kaminer, 1992; DeMilio,

1989; Disney, Elkins, McGue, & Iacono, 1999; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Riggs, Baker, Mikulich, Young, & Crowley, 1995). Patterson's well-validated model (Elliott, Huizinga, & Menard, 1989; Maddahian, Newcomb, & Bentler, 1988; Patterson, Dishion, & Bank, 1984) indicates early aggressive behavior predicts later delinquency, including substance use, due to coercive family processes and association with deviant peers. Among clinic-referred youth with comorbid CD and substance use disorders, the vast majority (97.1%) reported the onset of CD prior to the development of a substance use disorder (Reebye, Moretti, & Lessard, 1995). Conduct problems may also predict earlier age of onset of substance use in clinic samples (Reebye, Moretti, & Lessard, 1995), as adolescents with psychiatric disorders by age 16 were found to initiate substance use earlier than adolescents with no psychiatric disorders (Armstrong & Costello, 2002).

Gender differences have been found in associations between disruptive behavior disorders and substance use. Specifically, male adolescent substance abusers appear to be more likely to exhibit comorbid disruptive behavior disorders than females (Bukstein, Glancy, & Kaminer, 1992). In both community and clinic samples, male substance abusers have been found to display higher rates of CD than females (Boyle, Offord, Racine, Szatmari, et al., 1992; Hovens, Cantwell, & Kiriakos, 1994). Consistent with this finding, males who are using substances appear to report more school and legal problems than girls who are using substances (Hsieh & Hollister, 2004), and report more behavioral consequences of substance use (Opland, Winters, & Stinchfield, 1995). In a predominantly European American sample of adolescent substance users, Latimer and colleagues (2002) found that, while both girls and boys exhibited high rates of comorbid

conduct problems, the rates were nearly three times higher for boys. Despite these findings, however, some studies have not supported such gender differences in comorbid disruptive behavior problems (Armstrong & Costello, 2002; Boyle & Offord, 1991; Disney et al., 1999). For example, in a clinic-referred sample of adolescents with substance use problems, no gender differences were found in externalizing symptomatology, as both boys and girls exhibited extensive externalizing problems (Dakof, 2000). Furthermore, preliminary analyses conducted with the current clinic-referred sample suggest girls may exhibit more externalizing symptomatology than boys (Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). It may be that ethnic variability accounts for the discrepant findings related to gender differences in relations between substance use and behavior problems. Thus, it will be important to carefully examine gender differences in the association between substance use and disruptive behavior problems in clinic-referred Hispanic American youth.

One goal of the current study is to examine gender differences in relations between substance use and comorbid disruptive behavior problems in an urban, clinic-referred sample of Hispanic American adolescents with substance use disorders. Based on prior analyses conducted with the current sample (Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002), it is expected that girls will exhibit higher levels of disruptive behavior disorders than boys. However, it is also expected that disruptive behavior disorders will predict the initial level of substance use more strongly in boys than girls. Disruptive behavior disorders are not expected to be associated with change in substance use during or post-treatment.

Depression

There appears to be a strong association between depression and substance use in adolescence (Armstrong & Costello, 2002). The prevalence of depression among adolescents who use substances regularly is approximately 24%, while only about 5% of abstinent adolescents exhibit depression (Kandel, Johnson, Bird, Canino, Goodman, Lahey, et al., 1997). Results of studies with clinic-referred youth indicated depressed adolescents exhibit higher rates of substance use than non-depressed adolescents (Kovacs, Obrosky, & Sherrill, 2003), and that youth with substance use disorders are more likely to exhibit depression than abstinent psychiatric controls (Wilens, Biederman, Abrantes, & Spencer, 1997). In addition, among drug clinic-referred youth, psychological disturbance (i.e., mood disturbance, distress) was a significant predictor of the extent of drug involvement (Winters, Latimer, Stinchfield, & Henley, 1999). In the current sample of drug clinic-referred ethnic minority youth, approximately 30% also met criteria for major depressive disorder (Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). Furthermore, 41.4% of individuals with a lifetime history of major depression also report a lifetime history of a substance use disorder, while 26.6% of individuals with a history of a substance use disorder also meet criteria for major depression in their lifetime (Kessler, Nelson, McGonagle, Edlund, Frank, & Leaf, 1996). Concurrent comorbidity with depression appears to range from 11.1% to 32%, with the median 18.8% (Anderson, Williams, McGee, & Silva, 1987; Armstrong & Costello, 2002; Fergusson, Horwood, & Lynskey, 1993; Fergusson, Lynskey, & Horwood, 1996), suggesting substance use and depression may occur simultaneously in some adolescents.

Longitudinal research has yielded inconsistent results regarding the association between depression and change in substance use over time. In an evaluation of a community sample, Windle and Wiesner (2004) found that depression was associated with increasing substance use, specifically marijuana use, during the adolescent years. Similarly, research with a drug clinic-referred sample suggests adolescents with comorbid depression are likely to continue to exhibit problematic substance use over time, although treatment was found to be effective in reducing substance use in these youth (Rowe, Liddle, Caruso, & Dakof, 2004). Other research has not supported an association between depression and change in substance use over time (Chassin, Flora, & King, 2004; White, Xie, Thompson, Loeber, & Stouthamer-Loeber, 2001), although findings may be limited due to the exclusion of girls from one sample (White, Xie, Thompson, Loeber, & Stouthamer-Loeber, 2001). These discrepant findings may be due to variability associated with ethnicity and gender, and it will be important to examine gender differences in the association between depression and change in substance use over time in the current sample of Hispanic American adolescents with substance use disorders.

The direction of effect between depression and substance use is unclear (Armstrong & Costello, 2002; Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). Research conducted with clinic-referred youth indicates depressive symptomatology precedes the onset of a substance use disorder (Reebye, Moretti, & Lessard, 1995; Wilens, Biederman, Abrantes, & Spencer, 1997). Thus, it has been suggested substance use may represent a maladaptive coping mechanism for depression in high-risk samples (Wills, Vaccaro, & Benson, 1995; Windle & Wiesner, 2004). In

contrast, longitudinal research shows that substance use in adolescence, including tobacco, alcohol, and illicit drug use, predicts depression in adulthood (Robins & Przybeck, 1993), even when early psychiatric problems are taken into account (Brook, Cohen, & Brook, 1998). Thus, it is likely the relation between substance use and depression is bi-directional.

Gender differences have been found in the relation between depression and substance use. In general, adolescent girls exhibit higher rates of depressive disorders than boys (Hankin & Abramson, 1999; Nolen-Hoeksema & Girgus, 1994). Similarly, compared with males, female substance users have been found to display higher rates of emotional rather than behavioral disorders, including anxiety and depression (Beitchman, Douglas, Wilson, Johnson, Young, Atkinson, et al., 1999; Deykin, Levy, & Wells, 1987; Lewinsohn, Rohde, & Seeley, 1995; Windle & Davies, 1999). In fact, Latimer and colleagues (2002) found that female adolescent substance users were almost four times as likely as males to meet criteria for major depressive disorder. Research with clinic referred adolescents with substance use disorders indicates girls exhibit higher rates of internalizing disorders, including depression, than boys (Dakof, 2000; Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). In a clinic-referred sample of adolescents with a history of depression, substance use and depression tended to covary in the female participants but not the male participants (Kovacs, Obrosky, & Sherrill, 2003). That is, girls exhibited higher levels of substance use during depressive episodes than during periods they were not depressed, whereas boys exhibited similar levels of substance use regardless of whether they were depressed (Kovacs, Obrosky, & Sherrill, 2003), consistent with findings that drug use in females is associated with emotional

distress (Thompson & Wilsnack, 1984). Moreover, females seeking treatment for substance use disorders report more behavioral indicators of extreme emotional distress than males, such as suicidal ideation, suicide attempts, and self-mutilation (Thomas, Deas, & Grindlinger, 2003). Thus, depression appears to be a particularly salient correlate of substance abuse in adolescent girls.

Thus, a second goal of the current study is to examine gender differences in relations between substance use and comorbid depression in drug clinic-referred Hispanic American adolescents. Based on prior research with community and clinic-referred samples (Dakof, 2000; Hawkins, Catalano, & Miller, 1992), it is expected that girls will exhibit higher levels of depression than boys, and that the association between depression and initial level of substance use will be stronger in girls than in boys. In addition, based on prior research with ethnic minority, inner city, drug clinic-referred youth (Rowe, Liddle, Caruso, & Dakof, 2004), it is expected that depression will predict change in substance use during treatment and post-treatment more strongly in girls than boys. Specifically, it is expected that, in girls, depression will be associated with decreased substance use during treatment, and increased substance use during the post-treatment period.

Family Functioning

The family is considered an important context in which to examine risk for adolescent substance use (Bronfenbrenner, 1979; Szapocznik & Coatsworth, 1999). However, little is known about gender differences in associations between family functioning (i.e., parental monitoring and family conflict) and substance use in Hispanic American adolescents.

Parental Monitoring

Research consistently shows that parental monitoring, or knowing where and with whom one's child is spending time, is an important protective factor for both girls and boys for a variety of negative adolescent outcomes, including substance abuse (Dishion, Capaldi, Spracklen, & Li, 1995; Foxcroft & Lowe, 1991; Patterson & Stouthamer-Loeber, 1984; Steinberg, Fletcher, & Darling, 1994; Vazsoni & Flannery, 1997). In contrast, parenting behavior defined by permissiveness and lack of involvement is associated with increased substance use in adolescents (Baumrind, 1983). Specifically, research with community samples indicates decreased parental monitoring is associated with increased substance use in adolescents (Steinberg, Fletcher, & Darling, 1994), whereas increased parental monitoring is associated with fewer substance abusing peers and less overall substance use (Brown, Mounts, Lamborn, & Steinberg, 1993). Parental monitoring has also been found to be related to decreased substance use longitudinally (Barnes, Reifman, Farrell, & Dintcheff, 2000). It appears the protective influence of parental monitoring on substance use may be mediated by peer activity (Dishion, Capaldi, Spracklen, & Li, 1995), as parental monitoring may prevent adolescents from associating with substance abusing peers (Brown, Mounts, Lamborn, & Steinberg, 1993). Additionally, youth who are supervised by their parents may be less susceptible to peer pressure (Steinberg, 1986). Thus, parental monitoring appears to disrupt the potential negative influence of substance using peers and to protect adolescents from engaging in substance use concurrently and in the future.

Among clinic referred youth, parental monitoring has also been found to be an important protective factor for adolescent substance use. In a sample of medical clinic-

referred adolescents, parental monitoring was found to be inversely related to adolescent alcohol use (Beck, Boyle, & Boekeloo, 2003). In addition, it appears lower levels of parental monitoring are associated with increased rates of marijuana abuse and dependence in clinic-referred ethnic minority youth with substance use problems (Robbins, Briones, Schwartz, Dillon, & Mitrani, 2006). Among youth with substance use disorders, adequate parental monitoring may interfere with adolescent attempts to acquire and use substances, thereby reducing the frequency of adolescent substance use.

Parental monitoring may be a particularly important family factor to evaluate in Hispanic families due to issues related to immigration. Hispanic immigrant parents may not be aware that their children may be exposed to risky adolescent behavior, such as substance use, and may not know the importance of parental monitoring in preventing such negative outcomes (Ary, Duncan, Duncan, & Hops, 1999; Mounts, 2001).

Furthermore, immigrant parents may be used to receiving assistance with childcare from members of their extended family in their countries of origin (Pantin, Schwartz, Sullivan, Coatsworth, & Szapocznik, 2003). The extended family is very important and serves as a support network for parents in Hispanic culture (Pantin, Schwartz, Sullivan, Coatsworth, & Szapocznik, 2003; Santisteban, Szapocznik, & Rio, 1993; Valle & Benussen, 1985).

The family disruption involved in immigration may lead to decreased parental monitoring as a result of the loss of extended family support in parenting, resulting in increased risk for adolescent substance use (Kail, 1993). Without extended family support, parents may become uninvolved with adolescents who display behavior and substance use problems (Simons, Lorenz, Wu, & Conger, 1993), potentially resulting in increased adolescent substance use.

Furthermore, ethnic minority youth are more likely to experience divorce and to grow up in single-parent homes than are European American youth (United States Bureau of the Census, 1996). Youth from single-parent homes tend to report more substance use than youth from two-parent homes, perhaps due to differences in parental monitoring (Farrell, Barnes, & Banerjee, 1995; Flewelling & Bauman, 1990). Single parents may have a more difficult time adequately monitoring their children, resulting in increased adolescent substance use (Scheier, Miller, Ifill-Williams, & Botvin, 2001). Overall, parental monitoring appears to be an important factor to consider in evaluating risk for substance use in Hispanic American youth.

A third goal of the current study is to examine gender differences in relations between parental monitoring and substance use in drug clinic-referred Hispanic American adolescents. Based on prior research with community and clinic-referred samples (Barnes, Reifman, Farrell, & Dintcheff, 2000; Robbins, Briones, Schwartz, Dillon, & Mitrani, 2006), it is expected parental monitoring will be inversely related to the initial level of adolescent substance use. In addition, it is expected that parental monitoring will predict change in substance use during the treatment and post-treatment periods. Specifically, it is expected that parental monitoring will be inversely related to substance use during both treatment and post-treatment. No gender differences are predicted in levels of parental monitoring, or in associations between parental monitoring and level of and change in adolescent substance use.

Family Conflict

Family interaction patterns characterized by negative affect and conflict are among the strongest predictors of adolescent substance use and other problem behaviors

in community samples (Forgatch & Stoolmiller, 1994; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998; Loeber, Green, Lahey, Frick, & McBurnett, 2000).

Family conflict has also been found to be a salient correlate of substance use in clinic-referred adolescents with substance use disorders (Dakof, 2000; Rowe, Liddle, Caruso, & Dakof, 2004), and drug treatment focusing on improving family functioning has been found to be successful with some Hispanic American adolescents (Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation). Family conflict may be more important in predicting substance use than family structure (Farrington, Gallagher, Morley, Ledger, & West, 1985; McCord, 1979; Rutter & Giller, 1983). Specifically, while children from divorced families are at greater risk for substance use (Baumrind, 1983; Penning & Barnes, 1982; Robins, 1980), it appears to be the conflict associated with divorce, rather than the divorce per se, that is associated with an increased likelihood of adolescent substance use (Rutter & Giller, 1983; Hetherington, Cox, & Cox, 1979). Family conflict may represent a significant stressor for adolescents, and may also interfere with the development of appropriate strategies to cope with stress (Wills, 1990; Wills, Schreibman, Benson, & Vaccaro, 1994; Wills, Vaccaro, & McNamara, 1992), increasing the likelihood of substance use (Wills, Vaccaro, & Benson, 1995). Once substance use has been initiated, family conflict may maintain adolescent substance use by increasing negativity in parent-adolescent interactions and unintentionally reinforcing substance use (Patterson, Bank, & Stoolmiller, 1990). Indeed, high levels of family conflict have been found to be related to increased adolescent substance use longitudinally (Duncan, Duncan, Biglan, & Ary, 1998).

Hispanic families may experience significant levels of conflict related to differential acculturation among family members, resulting in increased risk for adolescent substance use (Szapocznik, Santisteban, Rio, Perez-Vidal, Kurtines, & Hervis, 1986; Szapocznik, Santisteban, Rio, Perez-Vidal, & Kurtines, 1989). In general, Hispanic youth tend to acculturate to American culture more rapidly than their parents (Szapocznik & Kurtines, 1993). Acculturating youth tend to adopt American values of independence and autonomy (Santisteban, Muir-Malcolm, Mitrani, Szapocznik, 2002), which are contrary to traditional Hispanic values of respect and obedience (Gil, Wagner, & Vega, 2000). Such cultural differences may exacerbate normative parent-adolescent conflict (Felix-Ortiz, Fernandez, & Newcomb, 1998). Specifically, conflict may escalate as parents try to reassert their authority, while adolescents become more frustrated about parental control attempts (Kurtines & Szapocznik, 1996). Parent-adolescent conflict related to an acculturative gap may lead adolescents to rely too heavily on their similarly acculturated peers, which places them at greater risk for substance use (Perrino, Gonzalez-Soldevilla, Pantin, & Szapocznik, 2000). Indeed, compared with less acculturated Hispanic youth, Hispanic American adolescents who have been in the United States longer and are more integrated into American culture appear to exhibit higher rates of substance use, similar to rates exhibited by European American adolescents (Epstein, Botvin, & Diaz, 2002).

Gender differences have been found in the strength of the relationship between family conflict and adolescent substance use, although results are inconsistent. In an evaluation of a clinic-referred sample, Dakof (2000) reported families of substance abusing girls exhibit higher levels of family conflict than families of substance abusing

boys. Similarly, Wu and colleagues (2004) found that girls in treatment for substance abuse endorse more family conflict than boys, and some research indicates girls may be more vulnerable to the effects of family problems than boys (Hsieh & Hollister, 2004). Other research, however, suggests the relation between family conflict and substance use is stronger in boys than in girls (Wu, Lu, Sterling, & Weisner, 2004). In traditional Hispanic culture, girls tend to be more involved in family functioning than boys (Carrillo, 1982), suggesting family conflict may be a more salient stressor for Hispanic American girls than boys. However, it remains unclear whether there are gender differences in the association between family conflict and substance use in Hispanic American adolescents.

A fourth goal of the current study is to examine gender differences in relations between substance use and family conflict in clinic-referred Hispanic American adolescents with substance use disorders. Based on prior research with community and clinic-referred samples (Dakof, 2000; Duncan, Duncan, Biglan, & Ary, 1998; Hsieh & Hollister, 2004), it is expected that girls will exhibit higher levels of family conflict than boys, and that family conflict will be more strongly associated the initial level of substance use in girls than boys. In addition, it is expected that family conflict will predict change in substance use during the treatment and post-treatment periods (Duncan, Duncan, Biglan, & Ary, 1998). Specifically, it is expected that family conflict will be more strongly associated with increased substance use during both the treatment and post-treatment periods in girls than boys.

Summary

Substance abuse is a significant problem for male and female adolescents from all ethnic backgrounds in the U.S., with exception of Asian Americans (Johnson, O'Malley,

& Bachman, 2001; Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002), and is associated with significant immediate and long-term consequences (Hawkins, Catalano, & Miller, 1992). Multiple risk factors for adolescent substance use have been examined, including both individual and contextual factors (Hawkins, Catalano, & Miller, 1992). However, most prior research on adolescent substance use has been conducted with community-based, European American samples (Dishion & Skaggs, 2000; Disney, Elkins, McGue, Iacono, 1999; Grella, Joshi, & Hser, 2004; Grilo, Becker, Fehon, Walker, Edell, & McGlashan, 1998; Henry, Robinson, & Wilson, 2003; Latimer, Newcomb, Winters, & Stinchfield, 2000; Locke & Newcomb, 2003; Opland, Winters, & Stinchfield 1995), despite evidence that different risk factors may be important in clinic-referred, ethnic minority youth (Berman, Kurtines, Silverman, & Serafini, 1996; Rowe, Liddle, Caruso, & Dakof, 2004; Winters, Latimer, Stinchfield, & Henley, 1999). Furthermore, research suggests there may be gender differences in associations between various risk factors and patterns of substance use in adolescence (Dakof, 2000; Hoffmann & Su, 1998; Hsieh & Hollister, 2004; Thomas, 1996; Vaccaro & Wills, 1998). Limited prior research, however, has evaluated gender differences in risk factors for substance use in clinic-referred, Hispanic American adolescents with substance use disorders.

The current study was designed to examine gender differences in predictors of substance use in a sample of urban, low-income, Hispanic American adolescents seeking treatment for substance abuse/dependence. The sample represents an understudied but important subset of the population, given the large proportion of adolescents of Hispanic descent in the US (US Bureau of the Census, 1996), and the increasing prevalence of substance use and abuse within this population (SAMHSA, 2005). Thus, it will be

important to improve understanding of potential gender differences in predictors of substance use in this sample. Specifically, disruptive behavior disorders and depression will be examined as individual risk factors for adolescent substance use and parental monitoring and family conflict will be examined as contextual risk factors for adolescent substance use. The following specific hypotheses will be evaluated:

Hypotheses:

Disruptive Behavior Disorders

Hypothesis One: Mean levels of disruptive behavior problems will be significantly greater in male Hispanic American adolescents with substance use disorders than in female Hispanic American adolescents with substance use disorders.

Hypothesis Two: Disruptive behavior problems will be more strongly associated with the initial level of marijuana use (intercept) in male Hispanic American adolescents than in female Hispanic American adolescents. Specifically, it is expected that disruptive behavior problems will be positively associated with initial level of marijuana use. Disruptive behavior problems will not be associated with change in marijuana use during or after treatment (slope) in male and female adolescents.

Depression

Hypothesis Three: Mean levels of depression will be significantly greater in female Hispanic American adolescents with substance use disorders than in male Hispanic American adolescents with substance use disorders.

Hypothesis Four: Depression will be more strongly associated with the initial level of marijuana use (intercept) in female Hispanic American adolescents than in male Hispanic American adolescents. Specifically, depression will be positively related to the initial

level of marijuana use. Depression will also be more strongly related to change (slope) during the intervention and change post-intervention in female Hispanic American adolescents than in male Hispanic American adolescents. Specifically, it is expected that depression will be negatively related to marijuana use during treatment, and positively related to marijuana use post-treatment.

Parental Monitoring

Hypothesis Five: Mean levels of parental monitoring will not be significantly different in male and female Hispanic American adolescents with substance use disorders.

Hypothesis Six: Parental monitoring will predict initial level (intercept) and change (slope) in marijuana use in male and female Hispanic American adolescents.

Specifically, parental monitoring will be negatively related to the initial level, change during treatment, and change post-treatment in marijuana use in both male and female adolescents.

Family Conflict

Hypothesis Seven: Mean levels of family conflict will be significantly greater in female Hispanic American adolescents with substance use disorders than in male Hispanic American adolescents with substance use disorders.

Hypothesis Eight: Family conflict will be more strongly associated with the initial level of marijuana use (intercept) in female Hispanic American adolescents than in male Hispanic American adolescents. Specifically, family conflict will be positively related to the initial level of marijuana use. Family conflict will also be more strongly related to change (slope) during the intervention and change post-intervention in female Hispanic American adolescents than in male Hispanic American adolescents. Specifically, it is

expected that family conflict will be positively related to marijuana use during treatment and post-treatment periods.

Method

Participants

This study will involve the analysis of an existing longitudinal dataset collected by Szapocznik and colleagues (for further description of methods, see Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation). The original study was designed to evaluate the efficacy of two interventions (i.e., structural ecosystems therapy and family therapy), as compared to a control condition, in treating ethnic minority adolescents with substance use disorders. Structural ecosystems therapy is an intervention developed by Szapocznik and colleagues based on the tenets of ecodevelopmental theory to treat substance use and behavior problems (Robbins, Schwartz, & Szapocznik, 2004). For more specific information regarding randomization, intervention content and operationalization, and treatment outcome, see Robbins, Szapocznik, Dillon, Turner, & Mitrani (manuscript in preparation). One hundred ninety (190) substance-abusing adolescents and their family members living in Miami-Dade County participated in the original study. Adolescent participants met the following inclusion criteria: 1) age 12 through 17; 2) DSM-IV (APA, 1994) diagnosis of substance abuse and/or dependence; 3) African-American or Hispanic; and 4) living with a formal or informal parental guardian. Parental guardian was defined as any adult who functioned in a parent-like role (e.g., providing instrumental and emotional support). Exclusion criteria included: 1) prior psychiatric hospitalizations for psychotic symptoms; 2) current acute psychotic symptoms; 3) institutionalization (e.g., incarceration, hospitalization) in the 30 days preceding the intake assessment; and 4) identification as a serious and violent habitual offender.

Inclusion/exclusion criteria were selected in order to allow the evaluation of outpatient therapy. Serious mental illness and criminal behaviors were excluded because more restrictive placements are typically required for these youth. Violent offenders were also excluded because they pose significant risks to therapists conducting home-based services. Exclusion due to institutionalization in the 30 days preceding intake permitted the establishment of an appropriate baseline comparison.

Participants in the original study included 113 Hispanic and 77 African American adolescents referred for outpatient treatment for substance abuse. Participants were predominantly male (163 boys and 27 girls) and had a mean age of 15.57 years ($SD = 1.15$ years; range = 12 to 17 years). The majority of adolescents lived with one biological parent (primarily mother; 44%) or members of their extended family (primarily grandparents; 24%), although 18% lived with both biological parents, 9% with blended family compositions, 0.5% with adoptive parents, and 3.2% were identified as “other.” Families were generally from the lower socioeconomic status (41% reported annual household income below \$15,000, 42% reported income between \$15,000 and \$35,000, and 17% reported income above \$35,000) and parental caregivers generally reported lower levels of educational attainment (40% less than high school, 34.5% high school, 6.1% technical training, 10.3% some college, and 9.1% completed college or more). The majority of parental caregivers (68% fathers, 67% mothers) reported that they were currently employed. Only the Hispanic American adolescents (93 boys, 20 girls) were included in the current analyses. There were no significant differences between the African American and Hispanic samples in age, gender, parents’ education, employment, or household income.

Procedure

A total of 608 adolescents were referred to the study from the juvenile justice system (80%), mental health agencies (16%), or schools, families, and other community organizations (4%). One hundred eight (108) of the referred adolescents/families could not be contacted and, of those that were contacted, 206 did not meet inclusion/exclusion criteria and 91 refused to participate, cancelled, did not respond to attempts to schedule assessments, or did not show for repeatedly scheduled assessments. Thirteen adolescents were not included because they did not complete the baseline assessment.

Adolescents and their parental guardians came to a clinic setting for an assessment that lasted several hours. Signed informed consent and assent were obtained for all participating parents and adolescents, respectively. Following screening, consent/assent procedures, and randomization to a treatment condition, a baseline assessment was completed. Adolescents and parental guardians completed questionnaires and a structured interview (i.e., DISC-PI) to evaluate adolescent substance use, psychiatric comorbidity (i.e., disruptive behavior disorders and depression), parenting behaviors, family functioning, and a variety of other variables of interest in the larger treatment study. Adolescents and their parents were re-administered the majority of measures at follow-up assessments, conducted at 3-, 6-, 12-, and 18-months post-baseline. The 6-month assessment point corresponded to the end of treatment for most participants. Procedures and measures were administered in Spanish when appropriate. Measures were translated into Spanish using a method of back translation and committee (Brislin, 1980; Kurtines & Szapocznik, 1995). The original measure developed in Language 1 (English) was translated into Language 2 (Spanish) and then back translated

into Language 1 by a separate translator. At this point, the two versions of the measure in Language 1 (original and back translation) were compared. Items that were the same were included in the measure. Differences were resolved by a committee of individuals with expertise in test construction and Spanish and English.

Measures

For the current study, measures were selected that addressed substance use, psychiatric comorbidity (i.e., disruptive behavior disorders and depression), parental monitoring, and family conflict. Multiple measures completed by multiple respondents were used to evaluate each construct. Measures of the predictor variables from the baseline assessment only and measures of substance use at all five timepoints were included in the analyses.

Client Information Form was used to gather information on basic demographic variables, family composition, presenting complaints at the point of referral to the study, and clinical screening criteria (e.g. adolescent substance use).

Predictors

Disruptive Behavior Disorders

Adolescents and parents completed the Diagnostic Interview Schedule for Children-Predictive Scales (Version 4.21; Lucas, Zhang, Fisher, et al., 2001). This measure is a screening instrument for psychiatric disorders. Scores are obtained for each psychiatric disorder, and the presence of a diagnosis is based on cutoffs for psychiatric disorders established in previous research with clinical samples (Lahey, Flagg, Bird, Schwab-Stone, 1996). Scores are interpreted as estimates of the likelihood of whether or not the youth meets criteria for different psychiatric disorders. One benefit of the

predictive scales is that specific disorders can be selected and administered to participants without jeopardizing the validity of the instrument. The results of this measure have been shown to converge (i.e., sensitivity, specificity, and predictive value) with the full version of the Diagnostic Interview Schedule for Children (Lucas, 1999; Lucas et al., 2001).

Because this screening instrument does not assess duration, onset, and impairment, results are presented as indicators of above threshold symptoms for a disorder.

Adolescents and parents were interviewed about the presence of symptoms of oppositional defiant disorder and conduct disorder.

Revised Behavior Problem Checklist (RBPC; Quay and Peterson, 1987) is an established measure for identifying youth behavior problems (Long, Slater, Forehand, and Fauber, 1987; Rio, Quay, Santisteban, and Szapocznik, 1989; Shapiro, Quay, Hogan, and Schwartz, 1988). To assess caregivers' reports of their adolescents' disruptive behavior problems, the Conduct Disorder and Socialized Aggression Scales of the RBPC were administered (Quay & Peterson, 1987; Rio et al., 1989). Conduct Disorder (22 items, $\alpha = .94$) and Socialized Aggression (17 items, $\alpha = .91$) consists of 39 problem behaviors that the caregiver rates on a three-point scale (0 = not a problem; 1 = mild problem; 2 = severe problem).

Depression

The Diagnostic Interview Schedule for Children-Predictive Scales (Version 4.21; Lucas et al., 2001) was used to assess adolescents' reports of internalizing symptomatology. Parents were only asked about externalizing disorders because parents directly observe many of the behaviors addressed in the externalizing scales, whereas they rely predominately on adolescent reports for the behaviors addressed by the

internalizing scales. Adolescents were interviewed about the presence of symptoms of major depression.

The Youth Self Report (YSR; Achenbach & Edelbrock, 1979) is a widely used 112-item self-report measure of emotional and behavioral problems for youth ages 11 to 18 years. Adolescents report whether they have experienced past or current symptomatology on a 3-point Likert-type scale: 0 (not true or not at all), 1 (sometimes or somewhat true), and 2 (very true or often). Test-retest reliability for the YSR has been established (Achenbach, Dumenci, & Rescorla, 2002). In the present study, only the Anxiety-Depression scale was administered (16 items, $\alpha = .83$).

To assess caregivers' reports of their adolescents' observed internalizing behavior, the Anxiety-Withdrawal scale from the RBPC (Quay and Peterson, 1987) was administered (11 items, $\alpha = .89$).

Parental Monitoring

The Parenting Practices Scale (PPS) is a self-report instrument that was administered to both caregivers (30 questions) and adolescents (23 questions). The scale includes questions from the Pittsburgh Youth Survey (Thornberry, Huizinga, & Loeber, 1995) and was originally designed to measure (a) Positive Parenting, (b) Discipline Effectiveness, (c) Avoidance of Discipline, and (d) Monitoring. Factor analyses conducted on the questionnaire have supported the four-factor model (Gorman-Smith, Tolan, Zelli, & Huesmann, 1996). Only scales pertaining to Monitoring were included in the present study, specifically, subscales for adolescent report of parental monitoring and parent report of involvement in daily activities and knowledge of youth's whereabouts.

The monitoring subscales had adequate internal consistency (12 items, caregiver $\alpha = .76$, and adolescent $\alpha = .85$).

Family Conflict

The Family Environment Scale (FES; Moos & Moos, 1984) is a widely used self-report measure that assesses a variety of family processes. The FES consists of 90 dichotomous items (yes and no) covering 10 areas of family functioning, including conflict, cohesion, and organization. For this project, the 9-item conflict scale was used to capture caregiver ($\alpha = .71$) and adolescent reports ($\alpha = .57$) of overall within-family conflict.

The Conflict Behavior Questionnaire (CBQ; Prinz, Foster, Kent, & O'Leary, 1979) was used to assess adolescent and caregiver reports of dyadic caregiver-adolescent conflict. The CBQ consists of 75 dichotomous (yes and no) items assessing communication-conflict behavior between caregivers and adolescents. The measure taps into two potential sources of complaints: (a) dissatisfaction with the other person's behavior, and (b) evaluations of the interactions between the two members. The present study used only 7 items pertaining to the caregivers' ($\alpha = .72$) and adolescent's ($\alpha = .77$) appraisals of their dyadic interaction.

Outcome

Adolescent Substance Use

The Timeline Follow Back (TLFB; Sobell & Sobell, 1992) was used to identify adolescent marijuana use in the 30-day period that preceded the assessment. Marijuana use was selected as the outcome variable because it was reported as the primary substance of abuse by a majority (82.5%) of study participants (Robbins, Kumar, Walker-

Barnes, Feaster, Briones, & Szapocznik, 2002) and marijuana is the primary illicit substance of use among adolescents (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002). The TLFB has been adapted for use with adolescents (Bry & Krinsley, 1992). This measure obtains retrospective reports of daily drug use by using a calendar and other memory prompts to stimulate recall. Information is gathered on specific drugs used and amount of use. Test-retest reliability for the TLFB is consistently high over periods of up to 1 year (Carey, 1997), and the TLFB has been shown to correlate with other self-reports as well as collateral reports (Sobell & Sobell, 1992).

The Adolescent Drug Abuse Diagnosis (Friedman & Utada, 1989) was also used to assess for the frequency of alcohol, marijuana, cocaine, and other drug use ("How many days in the past 30 days have you used...?"). The ADAD is a 150-item structured interview, modeled after the Addiction Severity Index (McLellan et al., 1992). The interviewer produces 10-point severity ratings, resulting in a broad-spectrum, comprehensive evaluation of the client for each of 9 life problem areas (medical, school, employment, social, family, psychological, legal, alcohol, and drug) that are often relevant to the treatment needs of adolescent drug abuse clients. The ADAD has been found to be reliable and valid (Friedman & Utada, 1989).

The primary dependent variable was a composite representing the mean number of days used and times used in the past 30-days, as reported by adolescents on the Timeline Follow Back and Adolescent Drug Abuse Diagnosis. Correlations between the 30-day use indicators for the two measures were 0.60 at baseline, 0.69 at the 6-month and 0.76 at the 18-month post randomization assessment points.

Results

Statistical Analyses

Structural equation modeling (SEM), as implemented by Mplus software (Muthén & Muthén, 2004), was employed to evaluate the study hypotheses. In addition, hierarchical regression analyses and t-tests were employed to follow-up on analyses conducted with SEM. SEM provides several advantages over more traditional data analytic techniques, including the ability to account for measurement error and to test for relationships among variables with latent constructs. The full information maximum likelihood estimation method (FIML) was employed and model parameters reported represent standardized values. Within the SEM framework, latent growth curve modeling (LGCM) with exogenous predictors of intercept and slope (see Figure 1) was employed. LGCM is a multilevel method for analyzing longitudinal data that allows repeated measures for each subject to be nested within a hierarchical structure (Hser, Huang, Chou, Teruya, & Anglin, 2003). LGCM improves on conventional group comparisons by accounting for intercorrelations among repeated measures over time.

Level I Model

The LGCM employed in this study includes a model with two levels. The level one model represents the average growth trajectory of substance use for all participants based on repeated measures across the 5 time points. The growth trajectory is specified by an intercept, representing the level of substance use at a particular time point, and slope, representing the amount of change in substance use over time from the intercept. The baseline assessment (i.e., time point 1) was selected as the intercept, in order to allow for evaluation of associations between the predictor variables and concurrent substance

use. Based on findings that patterns of substance use differ based on whether users are in concurrent treatment (Hser, Huang, Chou, Teruya, & Anglin, 2003), a piecewise model was tested in which separate slope parameters were specified for the intervention (i.e., timepoints 2 and 3) and post-intervention periods (i.e., timepoints 4 and 5). As there were unequal intervals between time points, the factor loadings of the slope latent constructs were constrained to be equal to the number of months between each time point in order to represent a linear slope (i.e., slope during intervention: 0, 1, 2; slope post-intervention: 0, 2, 4).

Due to sample limitations, particularly the small sample of girls, the piecewise model could not be identified. The model was simply too complex for a sample of 113 total subjects (Kline, 2005). Therefore, the model was simplified to allow for identification. Specifically, rather than the piecewise model, a model with a single linear slope was evaluated. Again, the linear slope was specified by constraining the factor loadings of the slope latent construct to be equal to the number of months between time points (i.e., 0, 1, 2, 4, 6). The linear model fit the data well, with minor modifications (see below), and allowed for evaluation of study hypotheses.

Level II Model

The level two model involves proposed exogenous predictors of inter-individual variability in the trajectory of substance use. Thus, the level 1 growth trajectory parameters (i.e., intercept, linear slope) were regressed on the proposed predictors of substance use, that is, disruptive behavior problems, depression, parental monitoring, and family conflict, to determine whether the predictors accounted for variability in initial level or change over time in substance use. As there were multiple indicators of each

exogenous predictor variable, latent predictor variables were proposed, and confirmatory factor analysis was conducted to determine whether the indicators loaded adequately on the proposed latent constructs.

Model Modification

The primary purpose of this study was to determine whether there were gender differences in associations between the exogenous predictor variables and the growth trajectory parameters. In order to examine gender differences, multi-group analyses were proposed in which separate models for girls and boys would be specified simultaneously within the same overall LGCM. Gender differences would be tested by constraining specific model parameters to be equal for girls and boys, and comparing the constrained model with a model in which parameters for girls and boys are free to vary, as recommended by Holmbeck (1997). Equality constraints that resulted in a significant deterioration in model fit, as indicated by a significant change in χ^2 , would support the prediction that gender modifies the constrained model parameter.

First, it was proposed that a multi-group level one model would be evaluated in order to determine whether there were gender differences in initial level and change over time in marijuana use. Second, a multi-group level two model would be evaluated in which latent exogenous predictor variables would be added to the multi-group level one model to evaluate whether associations between predictor variables and growth trajectory parameters were modified by gender. In order to simplify the model and improve the likelihood of model estimation given the small sample size, model parameters not of interest in the current study were constrained to be equal in girls and boys (i.e., predictor variable factor loadings, latent construct variances, and indicator error variances).

A multi-group model including only the level one component of the LGCM could not be identified due to sample limitations. Furthermore, although separate multi-group CFA models for each exogenous predictor variable fit the data adequately with some minor modifications¹, a single multi-group model including all latent predictor variables simultaneously would not converge. Thus, it was determined that the multi-group LGCM with latent exogenous predictor variables was too complex for the limited sample of 113 participants (Kline, 2005).

Next, a single-group model was tested in which girls and boys were combined in one overall model. Specifically, a single growth curve including both girls' and boys' data was estimated. In order to further simplify the model by reducing the number of parameters to be estimated, exogenous predictor variables were represented by factor scores rather than latent constructs. Factor scores (i.e., weighted averages of the indicators) were generated in Mplus based on the four separate CFA models. Equality constraints were retained in the CFA models, providing for measurement invariance across participant gender. Factor scores were later included in the model as continuous, single indicator predictors of growth trajectory parameters. Gender differences were evaluated by including gender as a dichotomous predictor variable in the model. Gender-by-predictor interactions were computed and growth trajectory parameters were regressed on gender, a predictor variable (i.e., factor score), and their interaction, to test whether gender modified associations between the proposed exogenous predictor variables and the growth trajectory parameters. Analyses are consistent with tests of gender differences in regression, as recommended by Holmbeck (1997).

Preliminary Analyses

Study variable means and standard deviations are presented in Table 1. A correlation matrix of the study variables is presented in Table 2. Data were screened in SPSS (Green, Salkind, & Akey, 2000) to determine whether they met the SEM requirement for normality. A square root transformation was applied to the composite marijuana use measure due to a high degree of positive skewness.

Growth Curve Model: Marijuana Use

The single-group model with a single linear slope fit the data poorly ($\chi^2(10) = 19.415$, $p = .0353$; CFI = .81; RMSEA = .091). To improve model fit, error covariances between adjacent time points for marijuana use were added, resulting in a model that fit the data well ($\chi^2(6) = 9.204$, $p = .162$; CFI = .935; RMSEA = .069). The mean of the intercept was positive and significant ($M = 2.30$), indicating participants reported using marijuana a significant number of times in the previous month. The mean of the slope was not significant ($M = -.25$), indicating that, on average, participants did not report a significant amount of change in the frequency of marijuana use over the course of the study. Of note, values of growth trajectory parameters are based on data that have been square root transformed.

In order to control for the effect of treatment on the marijuana use trajectory, slope was regressed on two dummy variables representing the three treatment conditions (i.e., SET, family therapy, TAU). The inclusion of the treatment controls resulted in a model that fit the data well ($\chi^2(13) = 15.038$, $p = .305$; CFI = .96; RMSEA = .037).

There was a significant association between one dummy variable and slope ($\beta = -.38$, $p <$

.05), indicating participants in the SET condition demonstrated significantly less marijuana use over time than participants in the TAU condition.

Next, gender was added as a predictor of intercept and slope to examine gender differences in the growth trajectory. Girls were coded as 0 and boys were coded as 1 to ease interpretation. The model fit the data well ($\chi^2(17) = 20.22, p = .263$; CFI = .95; RMSEA = .041) and there was a significant association between gender and slope ($\beta = .38, p < .05$). Specifically, results indicate boys reported significantly greater increases in marijuana use over time than girls.

LGCM with Exogenous Predictors of Intercept and Slope

To evaluate whether the proposed predictor variables were associated with initial level and/or change over time in marijuana use, and to determine whether participant gender moderated the associations, the individual and family variables (i.e., disruptive behavior problems, depression, family conflict, and parental monitoring) were individually included in the model as exogenous predictors of the growth trajectory parameters. Factor scores were centered and predictor-by-gender interactions were computed. Separate models were tested for each exogenous predictor variable in which intercept and slope were regressed on the predictor variable, gender, and the predictor-by-gender interaction.

For disruptive behavior problems, the model fit the data well ($\chi^2(23) = 25.031, p = .349$; CFI = .96; RMSEA = .028). There were no significant associations between disruptive behavior problems, gender, or their interaction and the growth trajectory parameters. Thus, findings do not provide support for hypothesis two, which stated

disruptive behavior problems would be positively associated with initial level of marijuana use.

For depression, the model fit the data well ($\chi^2(23) = 25.488, p = .326; CFI = .96; RMSEA = .031$). There was a trend for depression to be positively associated with intercept ($\beta = .57, p = .08$), suggesting increased depression at baseline may be associated with increased concurrent marijuana use. There was also a trend for depression to be negatively associated with slope ($\beta = -.58, p = .11$). When depression was included in the model, the slope was negative and significant ($M = -1.01, p < .05$). Thus, the negative association with depression suggests participants with higher levels of comorbid depression at baseline tended to demonstrate greater decreases in marijuana use over time. Hypothesis four, which stated depression would be positively related to intercept, negatively related to slope during treatment, and positively related to slope post-treatment, was partially supported. Specifically, depression was positively associated with intercept and negatively associated with marijuana use during and post-treatment. However, contrary to hypothesis four, no gender differences were found in associations between depression and marijuana use.

For the family predictor variables, the model provided excellent fit to the data (family conflict: $\chi^2(23) = 22.493, p = .491; CFI = 1.00; RMSEA = .000$; parental monitoring: $\chi^2(23) = 26.935, p = .259; CFI = .93; RMSEA = .039$); however, there were no significant associations between the family variables and the growth trajectory parameters. Thus, hypotheses six and eight were not supported.

Summary of SEM Findings

Results of a single-group, linear latent growth curve model including both girls and boys indicate clinic-referred, Hispanic American adolescents engage in significant levels of marijuana use at baseline, on average. In general, adolescents who are receiving treatment for substance use disorders do not appear to exhibit increases in marijuana use over time; however, significant differences in change in marijuana use were found based on gender and treatment condition. Specifically, boys demonstrated significantly greater levels of marijuana use over time than girls. Additionally, adolescents in the SET treatment condition demonstrated significantly greater decreases in marijuana use over time as compared with youth in the treatment as usual (i.e., control) condition. Thus, family-based treatment that includes an ecological component appears to be effective at reducing marijuana use in Hispanic American adolescents with substance use disorders. Furthermore, findings suggest drug clinic-referred youth may meet criteria for a dual diagnosis. Emotional distress, i.e., depression, appears to be a particularly salient factor to consider in this population. Specifically, in participants of both genders, depression appears to be positively associated with concurrent marijuana use and negatively associated with change in marijuana use over time. Contrary to prediction, family functioning did not appear to be related to initial levels or change over time in marijuana use. Thus, results suggest individual functioning may be particularly important in predicting marijuana use in Hispanic American youth.

Post Hoc Regression Analyses

The current sample of 113 participants is considered small for evaluating a complex LGCM (Kline, 2005). Therefore, regression analyses were conducted in SPSS

(Green, Salkind, & Akey, 2000) in order to follow-up on findings generated in SEM. Regression analyses allowed for evaluation of study hypotheses from an alternative approach; specifically, it was possible to evaluate gender as a moderator of associations between exogenous predictor variables and initial level and change over time in marijuana use. Given the exploratory nature of these analyses, Bonferroni corrections were not applied to the alpha level to adjust for multiple tests.

Means and standard deviations for variables included in regression analyses are reported in Table 3. Due to positive skewness, a square root transformation was conducted on marijuana use variables. Associations between the predictor variables and initial level of marijuana use (i.e., time 1 marijuana use) and change in marijuana use over time were examined. Change in marijuana use was computed by subtracting time 1 marijuana use from time 5 marijuana use. Centered factor scores generated from SEM analyses were used as measures of the predictor variables. Predictor-by-gender interactions were computed, as gender was evaluated as a potential moderator of proposed associations. As recommended by Holmbeck (1997), moderation was tested with a series of hierarchical multiple regressions. Specifically, first the predictor variable and gender were entered in a regression equation, followed by the predictor-by-gender interaction. Main effects and interaction effects were evaluated. Separate analyses were conducted for each predictor variable (i.e., disruptive behavior problems, depression, family conflict, and parental monitoring) and for each outcome (i.e., initial level of marijuana use and change in marijuana use). A regression effect of .32 would be required to detect an effect with 80% Power.

Gender was not associated with baseline marijuana use, suggesting girls and boys reported similar levels of marijuana use at the beginning of the study (see Tables 4 through 7). Gender was significantly associated with change in marijuana use when disruptive behavior problems, depression, and parental monitoring were included in the model (see Tables 8, 10, and 11), consistent with results of SEM. There was a trend for gender to be associated with change in marijuana use when family conflict was included in the model (see Table 9). Results indicate that, compared to girls, boys reported greater increases in marijuana use over the course of the study.

Depression was positively associated with time 1 marijuana use (see Table 4), indicating increased depression at baseline was associated with increased concurrent marijuana use, consistent with results of SEM analyses. In addition, there was a trend for the gender-by-depression interaction to be associated with time 1 marijuana use (see Table 4), suggesting the positive association between depression and marijuana use may only apply to girls, in support of hypothesis 4. Specifically, since girls were coded as 0 and boys were coded as 1, the interaction term drops out of the equation for girls, since gender = 0:

$$\begin{aligned} \text{Intercept}_{\text{girls}} &= -.14 (\text{Gender}) + .47 (\text{Depression}) - .38 (\text{Depression X Gender}) \\ &= .47 (\text{Depression}) \end{aligned}$$

In contrast, since gender = 1 in boys, the coefficients for depression and the interaction term virtually cancel each other out:

$$\begin{aligned} \text{Intercept}_{\text{boys}} &= -.14 (\text{Gender}) + .47 (\text{Depression}) - .38 (\text{Depression X Gender}) \\ &= -.14 + .09 (\text{Depression}) \end{aligned}$$

Depression was also associated with change in marijuana use (see Table 8). Since change in marijuana use was not significant ($t(68) = -1.76, ns$), results suggest increased depression at baseline is associated with greater decreases in marijuana use over time, consistent with results of SEM.

There was a trend for parental monitoring to be positively associated with baseline marijuana use (see Table 5), suggesting increased parental monitoring may be associated with increased concurrent marijuana use, contrary to prediction based on hypothesis six. There was also a trend for the gender-by-monitoring interaction to be associated with baseline marijuana use (see Table 5). Results suggest the positive association between parental monitoring and concurrent marijuana use may only apply to girls. Specifically, since girls were coded as 0 and boys were coded as 1, the interaction term drops out of the equation for girls, since $gender = 0$:

$$\begin{aligned} \text{Intercept}_{\text{girls}} &= -.13 (\text{Gender}) + .38 (\text{Monitoring}) - .37 (\text{Monitoring X Gender}) \\ &= .38 (\text{Monitoring}) \end{aligned}$$

In contrast, since $gender = 1$ in boys, the coefficients for parental monitoring and the interaction term virtually cancel each other out:

$$\begin{aligned} \text{Intercept}_{\text{boys}} &= -.13 (\text{Gender}) + .38 (\text{Monitoring}) - .37 (\text{Monitoring X Gender}) \\ &= -.13 + .01 (\text{Monitoring}) \end{aligned}$$

The trend for parental monitoring to be positively associated with concurrent marijuana use in girls remained even when psychiatric comorbidity (i.e., depression and disruptive behavior problems) was included in the model (parental monitoring $\beta = .33, p = .08$; monitoring-by-gender interaction $\beta = -.38, p = .051$). The association between parental monitoring and change in marijuana use was not significant (see Table 9).

Disruptive behavior problems were not significantly associated with baseline marijuana use (see Table 6) or change in marijuana use (see Table 10), contrary to prediction based on hypothesis two. In addition, family conflict was not significantly associated with baseline marijuana use (see Table 7) or change in marijuana use (see Table 11), contrary to prediction based on hypothesis eight. Thus, greater levels of externalizing symptomatology, both within individuals and among family members, do not appear to contribute to marijuana use in Hispanic American youth.

Post Hoc Evaluation of Gender Differences in Predictors

Lastly, since it was not possible to adequately assess gender differences in predictor variables in SEM due to sample limitations, a series of t-tests was conducted in SPSS. Specifically, analyses were conducted to determine whether reported levels of disruptive behavior problems, depression, family conflict, and parental monitoring at baseline differed in girls and boys. It was hypothesized that disruptive behavior problems would be greater in boys than girls, depression and family conflict would be greater in girls than boys, and parental monitoring would not differ by gender. Again, Bonferroni corrections were not applied to the alpha level given the exploratory nature of analyses.

There were no significant gender differences when factor scores were analyzed (see Table 12). However, when individual measures of the predictor variables were evaluated, the following gender differences emerged. There was a significant difference in parent reported conduct problems on the RBPC ($t = 2.516, p = .013$), with girls ($M = 26.40, SD = 9.69$) reportedly exhibiting higher levels of conduct problems than boys ($M = 19.83, SD = 10.77$), contrary to expectation based on hypothesis one. In addition, girls ($M = 6.25, SD = 4.96$) reported more symptoms of anxiety and depression on the YSR

than boys ($M = 3.39$, $SD = 4.36$; $t = 2.60$, $p = .011$), and girls (55%) were more likely than boys (32%) to meet criteria for major depression on the DISC-PS ($t = 2.00$, $p = .048$), providing support for hypothesis three. However, boys ($M = 2.48$, $SD = .47$) reported slightly higher levels of parental monitoring than girls ($M = 2.18$, $SD = .75$; $t = -2.10$, $p = .038$), contrary to expectation based on hypothesis five. There were no gender differences in levels of family conflict, indicating hypothesis seven was not supported.

Evaluation of Study Hypotheses

Hypothesis one stated that mean levels of disruptive behavior problems would be significantly greater in boys than in girls. Hypothesis one was not supported in the current study. Rather, girls appear to display higher levels of disruptive behavior problems than boys, at least according to parents.

Hypothesis two stated that disruptive behavior problems would be positively associated with initial level of marijuana use (intercept), and that the association would be stronger in boys than in girls. Hypothesis two was not supported, as disruptive behavior problems were not associated with the intercept in girls or boys. Hypothesis two also stated that disruptive behavior problems would not be associated with change in marijuana use over time (slope). Hypothesis two was partially supported, as the association between disruptive behavior problems and change in marijuana use over time was not significant.

Hypothesis three stated that mean levels of depression would be significantly greater in girls than in boys. Support was provided for hypothesis three, as girls reported significantly more symptoms of anxiety and depression than boys and were more likely to meet criteria for a diagnosis of major depressive disorder than boys.

Hypothesis four stated that depression would be positively related to initial level of marijuana use, negatively related to change in marijuana use during treatment, and positively related to change in marijuana use post-treatment. Associations were expected to be stronger for girls than boys. Hypothesis four was partially supported, as depression appears to be positively associated with baseline marijuana use, and the association appears to be stronger in girls than boys. In addition, depression appears to be negatively associated with change in marijuana use over time (i.e., both during treatment and post-treatment).

Hypothesis five stated that mean levels of parental monitoring would not be significantly different in girls and boys. Partial support was provided for hypothesis five, as parenting behaviors reported by parents did not differ in girls and boys. However, contrary to expectation, boys reported slightly higher levels of parental monitoring than girls.

Hypothesis six stated that parental monitoring would be negatively associated with both initial level of marijuana use (intercept) and change in marijuana use over time (slope) in both girls and boys. Hypothesis six was not supported, as parental monitoring was positively associated with intercept in girls, but not boys. There was no association between parental monitoring and slope.

Hypothesis seven stated that mean levels of family conflict would be significantly greater in girls than in boys. Hypothesis seven was not supported, as similar levels of family conflict were reported for both girls and boys.

Hypothesis eight stated that family conflict would be positively associated with both initial level of marijuana use (intercept) and change in marijuana use over time

(slope), and that associations would be stronger in girls than in boys. Hypothesis eight was not supported, as family conflict was not associated with baseline marijuana use or change in marijuana use over time.

Discussion

Substance abuse is a serious problem that is prevalent among American youth (SAMHSA, 2005). As adolescent substance abuse is associated with significant immediate and long-term consequences (Hawkins, Catalano, & Miller, 1992), and interventions for substance abuse often fail (Latimer, Newcomb, Winters, & Stinchfield, 2000), it is important to better understand factors associated with substance use initiation and maintenance to improve prevention and intervention efforts. Consistent with theoretical models (Bronfenbrenner, 1979; Szapocznik & Coatsworth, 1999), numerous risk factors for adolescent substance use have been identified across multiple domains of development, including individual, family, and neighborhood risk factors (Hawkins, Catalano, & Miller, 1992). Prior research has been conducted with primarily community-based samples in which rates of serious substance abuse are generally low (Disney, Elkins, McGue, Iacono, 1999; Latimer, Newcomb, Winters, & Stinchfield, 2000; Locke & Newcomb, 2003; Opland, Winters, & Stinchfield 1995), however, and it is necessary to examine factors associated with change in substance use in clinic-referred youth with substance use disorders to determine appropriate targets for treatment. Furthermore, limited research has been conducted with ethnic minority youth (Rowe, Liddle, Caruso & Dakof, 2004), despite evidence substance use is increasing among some minority youth, particularly Hispanic Americans (SAMHSA, 2005). The current longitudinal study was designed to address these limitations by evaluating factors associated with change in marijuana use over time in clinic-referred, Hispanic American adolescents with substance use disorders. Specifically, psychiatric comorbidity (i.e., disruptive behavior disorders and depression) and family functioning (i.e., family conflict and parent monitoring) were

examined as predictors of the initial level (intercept) and change over time (slope) in marijuana use, and participant gender was examined as a moderator of the proposed associations.

It was hypothesized that boys would exhibit higher levels of disruptive behavior disorders than girls, and that disruptive behavior disorders would be positively associated with the intercept more strongly in boys than girls. It was further hypothesized that girls would exhibit higher levels of depression than boys, and that depression would be positively associated with the intercept, negatively associated with the slope during treatment, and positively associated with the slope post-treatment. Associations with depression were expected to be stronger in girls than boys. It was expected levels of parental monitoring would be equivalent in girls and boys, and that parental monitoring would be negatively associated with both intercept and slope in participants of both gender. Lastly, it was hypothesized girls would experience higher levels of family conflict than boys, and that family conflict would be positively associated with intercept and slope more strongly in girls than boys.

Marijuana Use in Clinic-Referred, Hispanic American Youth

Results of the current longitudinal study indicate marijuana use is elevated among clinic-referred, Hispanic American adolescents who are receiving treatment for substance use disorders. As participants were required to meet criteria for a substance use disorder to be eligible for the current study, and the vast majority reported marijuana as their primary drug of use, it is no surprise that the average level of marijuana use was significantly elevated at baseline. Specifically, adolescents reported using marijuana an average of 5.5 days in the month prior to study entry, with some adolescents indicating

they used marijuana every day. Although marijuana use was elevated, however, it was relatively low compared to other samples of youth with substance use disorders (Crowley et al., 1998). It may be that marijuana use at baseline in this sample was artificially reduced. Specifically, since the majority of study participants were referred to the study by the juvenile justice system, indicating they had recently been arrested for substance use related charges, participants may have engaged in less marijuana use in the month prior to study entry due to fears of legal consequences related to their substance use.

Considerable research with both epidemiological (SAMHSA, 2005) and community samples (Windle & Wiesner, 2004) indicates adolescents tend to increase their substance use over time. In the current sample of Hispanic American adolescents with substance use disorders, however, average marijuana use did not generally appear to increase over time. Participants did demonstrate greater variability in frequency of marijuana use over time, indicating some adolescents increased their marijuana use considerably. Furthermore, considering the high degree of missing data at the last measurement point (39% of cases), it may be that adolescents who used marijuana more frequently were more likely to drop out of the study, resulting in an artificially decreased mean. Greater marijuana use may indicate poor engagement in treatment and substance use severity has been found to predict dropout from drug clinic treatment programs (Alterman, McKay, Mulvaney, & McLellan, 1996; Leigh, Ogborne, & Cleland, 1984). To more fully understand changes in marijuana use over time, it will be important to follow-up with study dropouts to determine reasons for attrition. In general, however, drug clinic-referred Hispanic American adolescents do not appear to increase their marijuana use over time.

Several factors are important to consider in understanding the lack of change in marijuana use in the current sample. First, research suggests that, among drug clinic-referred youth, juvenile justice involved youth exhibit lower rates of substance use over time than youth who are not involved in the juvenile justice system (Rowe, Liddle, Caruso, & Dakof, 2004). Since the majority of study participants were juvenile justice involved, it may be that legal consequences for substance use, such as probation or mandatory drug tests, resulted in decreased substance use over time in these youth. It may also be that juvenile justice involved Hispanic American youth engage in a range of delinquent activities, including substance use, and that there is a lower threshold for substance use in these youth compared with non-juvenile justice involved youth. That is, the juvenile justice system may be more likely to come in contact with certain Hispanic American adolescents due to high levels of delinquent activity, apart from substance abuse. Once delinquent youth are involved in the juvenile justice system, they may be more likely to be referred for mandatory substance abuse treatment, even if their level of substance abuse is relatively low compared to non-juvenile justice involved substance abusing youth (Rowe, Liddle, Caruso, & Dakof, 2004). In contrast, youth who are not involved in the juvenile justice system may exhibit lower levels of delinquent activity in general, but higher levels of substance use and increasing substance use over time (Windle & Wiesner, 2004).

It is also possible that adolescents who display relatively stable marijuana use over time are engaging in other forms of illicit substance use, consistent with the “gateway hypothesis” (Kandel, 2002). In other words, substance use severity may increase over time in high-risk youth in general, with some youth increasing their

frequency of marijuana use and others progressing to more dangerous patterns of polysubstance use. Rates of all forms of illicit drug use tend to increase during adolescence (Young et al., 2002), and it is possible that although average marijuana use does not increase over time, use of other illicit substances may increase over time in Hispanic American youth. Future research will be necessary to determine whether drug clinic-referred Hispanic American adolescents progress from marijuana to more dangerous illicit drugs.

The most important factor to consider in understanding the lack of change in marijuana use in this sample is treatment. Despite research indicating marijuana use in adolescence tends to increase over time (SAMHSA, 2005), family-based treatment has been shown to significantly impact adolescent marijuana use (Sexton, Robbins, Holliman, Mease, & Mayorga, 2003; Stanton & Shadish, 1997). Furthermore, treatment that involves multiple domains of the adolescent's social ecology has been found to be particularly effective in addressing substance use (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 1998). Although the current study did not focus on treatment outcome, the majority of study participants took part in family-based substance abuse treatment (i.e., either SET or FAM), and results suggest involvement in treatment may be associated with decreased levels of marijuana use over time. Specifically, compared with the control condition, SET was associated with significantly less marijuana use over time. In fact, evaluation of mean levels of marijuana use over time by treatment condition (see Table 13) suggests family-based treatment, particularly SET, appears to be associated with decreased levels of marijuana use over time, whereas adolescents in the control condition tended to increase their marijuana use over time. Adolescents in the FAM

condition demonstrated relatively stable levels of marijuana use over time. Thus, while clinic-referred Hispanic American adolescents, as a group, demonstrate stable levels of marijuana use over time, salient differences in the marijuana use trajectory emerge based on treatment condition. Results indicate brief family-based treatment is effective at reducing marijuana use in inner city, Hispanic American youth with substance use disorders (Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation).

Gender and Marijuana Use

No gender differences were found in reported frequency of marijuana use at baseline, consistent with findings that girls and boys engage in comparable levels of substance use (CDC, 2000; SAMHSA, 2005; Young et al., 2002). However, girls demonstrated a significantly greater decrease in marijuana use over the course of the study than boys. Although it was not possible to evaluate gender by treatment condition interactions, due to sample limitations, it may be that family-based substance abuse treatment is more effective at reducing marijuana use in Hispanic American girls than boys. Since Hispanic American girls tend to be more involved in family functioning than boys (Carrillo, 1982), interventions that target maladaptive family processes may be more effective at reducing delinquent behavior, including substance use, in girls than boys. Indeed, prior research suggests family processes are the most important correlate of both internalizing and externalizing symptomatology in girls (Coatsworth, Pantin, McBride, Briones, Kurtines, & Szapocznik, 2000), suggesting treatment that involves improvement in family functioning may be effective at reducing substance use in girls.

Effects of Individual and Family Functioning

Results of the current study indicate problematic individual and family functioning in clinic-referred, Hispanic American youth with substance use disorders. Interesting gender differences emerged, with girls generally exhibiting more maladaptive psychosocial functioning than boys. Although results must be interpreted with caution due to the small sample of girls (N = 20), findings are consistent with other research indicating girls with substance use disorders display more impaired psychological functioning and family processes than boys (Dakof, 2000; Flannery, Vazsonyi, Torquati, & Fridrich, 1994; McCabe, Lansing, Garland, & Hough, 2002; Wu, Lu, Sterling, & Weisner, 2004). Specifically, girls appear to exhibit greater psychiatric comorbidity and less optimal family functioning than boys, including worse depression and disruptive behavior disorders and lower levels of parental monitoring. Furthermore, disruptions in functioning, particularly depression and parental monitoring, appear to be more closely linked with concurrent marijuana use in girls than boys. Notably, initial levels of depression appear to be associated with change in marijuana use in both girls and boys, suggesting Hispanic American youth with substance use disorders and comorbid depression may represent a subset of substance abusing youth who are more responsive to family-based treatment efforts (Rowe, Liddle, Caruso, & Dakof, 2004).

Depression, Marijuana Use, and Gender

As expected, girls reported significantly more symptoms of depression, and were more likely to meet criteria for major depressive disorder, than boys. Findings are consistent with previous studies indicating female adolescents with substance use problems are more likely to display comorbid depression than male adolescents (Dakof,

2000; Latimer, Stone, Voigt, Winters, & August, 2002; Robbins, Kumar, Walker-Barnes, Feaster, Briones, & Szapocznik, 2002). Furthermore, results indicate depression is positively associated with concurrent marijuana use, and that the association is stronger in girls than boys. As substance use appears to covary with depression in girls but not boys (Kovacs, Obrosky, & Sherrill, 2003), it is likely female adolescents engage in substance use in order to cope with emotional distress (Wills, Vaccaro, & Benson, 1995). Female adolescents with substance use disorders are more likely to experience trauma, such as sexual abuse, than males (Hsieh & Hollister, 2004), and there is some indication that females may use substances in order to self-medicate due to anxiety and distress related to trauma (Clark, Lesnick, & Hegedus, 1997). Thus, it appears Hispanic American girls with substance use problems are more vulnerable to depression than males, and may engage in marijuana use in an effort to cope with their emotional distress (Thompson & Wilsnack, 1984).

Alternatively, frequent marijuana use in Hispanic American girls may also result in symptoms of depression. Specifically, marijuana use is associated with lack of motivation, disrupted cognitive processes, and alienation from prosocial activities such as school (Hawkins, Catalano, & Miller, 1992; Rey, Martin, & Krabman, 2004), all of which may be associated with feelings of depression in girls. In addition, girls who use marijuana frequently are more likely than boys to experience traumatic life events (Hsieh & Hollister, 2004; Kandel & Chen, 2000), which have been found to predict depression (Clark, Lesnick, & Hegedus, 1997). Thus, likely due to a bi-directional effect, depression appears to be more strongly linked with marijuana use in Hispanic American girls with substance use disorders than boys.

While depression is more strongly associated with concurrent marijuana use in girls than boys, depression appears to be negatively associated with change in marijuana use in Hispanic American adolescents of both genders. That is, participants with greater depressive symptoms at baseline exhibited greater decreases in marijuana use over time, as compared with participants with less depressive symptoms. It may be that certain symptoms of depression are associated with relatively less marijuana use in Hispanic American adolescents longitudinally. For example, social withdrawal has been found to be a primary manifestation of depression in adolescents (Denda, Sasaki, Asakura, Kitagawa, & Koyama, 2001). Since peer substance use is one of the strongest predictors of adolescent substance use (Hawkins, Catalano, & Miller, 1992), and adolescents report peer pressure to be a major risk factor for relapse (Brown, Stetson, & Beatty, 1989), it is possible that depression is associated with decreased substance use due to reduced peer interaction. That is, depression may result in less frequent marijuana use because depressed adolescents may spend less time with substance-using peers as a result of social withdrawal. However, considerable research supports a positive association between depression and substance use (Armstrong & Costello, 2002), indicating it is unlikely Hispanic American adolescents with comorbid depression and substance use disorders engage in decreased marijuana use.

Alternatively, it is possible that the treatment employed in the current study was more effective at reducing marijuana use in Hispanic American youth with comorbid depression than in non-depressed youth. Outpatient treatment has been found to be effective in reducing substance use in clinic-referred ethnic minority youth with comorbid depression and substance use disorders (Rowe, Liddle, Caruso, & Dakof,

2004). It may be that depressed youth are more receptive to family-based intervention efforts than non-depressed youth with substance use disorders. It may also be that treatment targets dysfunctional family interactions that are associated with both substance use and depression in youth (Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation). Since depression and substance use have been found to covary (Kovacs, Obrosky, & Sherrill, 2003), it may be that family-based treatment results in decreased marijuana use due to decreases in youth depression. Thus, by reducing depression, treatment may have indirectly resulted in a decrease in depression-related marijuana use. Future research will be necessary to determine whether treatment was associated with a reduction in depression longitudinally, and a subsequent reduction in marijuana use.

Disruptive Behavior Problems and Gender

In addition to depression, female adolescents with substance use problems reportedly exhibit more severe disruptive behavior problems than male adolescents, according to parents. Findings are contrary to prediction but consistent with previous research demonstrating the association between conduct problems and substance abuse may be stronger in girls than boys when problems are severe (Lewis & Bucholz, 1991; McCabe, Lansing, Garland, & Hough, 2002; Pederson, Mastekaasa, & Wichstrøm, 2001; White, Johnson, & Garrison, 1985). Specifically, at serious levels of both substance use and conduct problems, girls are twice as likely as boys to meet criteria for a dual diagnosis (White, Johnson, & Garrison, 1985). In addition, among abstinent adolescents, the association between early conduct problems and later marijuana use is stronger in girls than boys (Pederson, Mastekaasa, & Wichstrøm, 2001). Furthermore, among urban Hispanic adolescents with marijuana use problems, girls have been found to report more

externalizing problems than boys (Flannery, Vazsonyi, Torquati, & Fridrich, 1994). Thus, it appears girls with severe substance use problems may exhibit more serious conduct problems than boys.

In general, it appears that when deviant behaviors are present, including substance abuse, they are more pervasive in girls than boys, as associations among different types of delinquent behavior have been found to be stronger in girls than boys (Storvoll, Wichstrom, & Pape, 2002; Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001). In fact, whereas delinquent behaviors are fairly evenly distributed among boys, there appears to be a discrepancy among girls, with most girls exhibiting few or no delinquent behaviors and a small group of girls exhibiting pervasive delinquency (Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001). Such pervasive delinquency was found to be more frequent in girls than boys, and was strongly related to clinically significant substance use problems (Tiet, Wasserman, Loeber, McReynolds, & Miller, 2001).

Findings are consistent with a “gender paradox” (Ciocco, 1940), which suggests the gender with the lower prevalence of a certain disorder is more likely to exhibit severe outcomes when the disorder is present. Thus, although fewer girls exhibit disruptive behavior disorders than boys overall, when disruptive behavior disorders are present, the risk of developing comorbid conditions is greater among girls than boys (Eme, 1992; Loeber & Keenan, 1994).

Several hypotheses have been posited to explain the gender paradox. The Polygenetic Multiple-Threshold Model (DeFries, 1989) suggests the underlying genetic predisposition is similar in males and females, but the threshold for clinically significant disturbance differs. Consistent with this theory, girls appear to have a higher threshold

for developing delinquent behaviors than boys (Loeber & Keenan, 1994; Webster-Stratton, 1996), although when they reach the threshold, delinquency is more severe in girls than boys (McCabe, Lansing, Garland, & Hough, 2002). The Constitutional Variability Model (James & Taylor, 1990) indicates there is greater genetic variability in boys than girls, resulting in more variability in severity of impairment. Thus, when girls are at genetic risk for developing conduct problems, the presentation is likely to be more severe than boys. An alternative explanation presented by Tiet and colleagues (2001) indicates gender may moderate the association between risk factors and negative outcomes. Specifically, female gender may be protective at low to moderate levels of risk (Earls, 1987; Eme, 1979; Rutter, 1990), but girls may be more vulnerable than boys at high levels of risk. Consistent with this theory, female delinquents have been found to experience greater environmental risk, such as abuse and trauma, than males (McCabe, Lansing, Garland, & Hough, 2002).

It is possible that the gender paradox is due to differential referral patterns, with boys generally more likely to be referred for conduct problems than girls and only the most impaired girls being referred for treatment (Eme, 1992, James & Taylor, 1990). Indeed, when girls are referred for treatment for disruptive behavior problems, their behavior is generally more severe than boys (Zoccolillo, 1993). A similar pattern has been suggested for the juvenile justice system, with girls generally treated more leniently than boys for similar offenses (Poe-Yamagata & Butts, 1996), but exhibiting more serious offenses than boys when they are adjudicated (McCabe, Lansing, Garland, & Hough, 2002). However, the gender paradox is not entirely due to differential referral, as it has also been supported in non-clinic samples (Tiet, Wasserman, Loeber, McReynolds,

& Miller, 2001). Thus, for a variety of reasons, girls with substance use problems appear to exhibit more severe conduct problems and delinquency than boys.

Although Hispanic American girls with substance use disorders reportedly exhibit higher levels of disruptive behavior problems than boys, disruptive behavior problems were not found to be directly associated with marijuana use in girls or boys, contrary to prediction. It may be that there is a delay in the relation between disruptive behavior problems and marijuana use, with the effect of comorbid disruptive behavior disorders influencing later, not concurrent, marijuana use. Indeed, psychiatric comorbidity, particularly disruptive behavior problems, has been found to precede substance use problems (Biederman, Faraone, & Kiely, 1996; Disney, Elkins, McGue, & Iacono, 1999; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Riggs, Baker, Mikulich, Young, & Crowley, 1995). Thus, even though participants exhibited high levels of marijuana use at baseline, it is likely comorbid disruptive behavior problems developed before the onset of substance use problems.

It may also be that clinic-referred Hispanic American youth engage in multiple forms of delinquent behavior, but that greater levels of behavior problems do not necessarily result in greater levels of substance use. That is, levels of disruptive behavior and marijuana use may vary independently, with some youth exhibiting higher levels of disruptive behavior and high levels of marijuana use, and some youth exhibiting lower levels of disruptive behavior and high levels of marijuana use. As expected, disruptive behavior problems at baseline were not associated with change in marijuana use over time, suggesting adolescents with significant disruptive behavior problems may engage in chronic marijuana use (Lillehoj, Trudeau, Spoth, & Madon, 2005; Windle & Wiesner,

2004). Prior analyses with the current dataset suggest that treatment effects may have been moderated by level of disruptive behavior problems, with Hispanic American adolescents with lower levels of comorbid disruptive behavior problems at baseline displaying the greatest improvement in marijuana use post-treatment (Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation). However, prior analyses were not conducted to specifically test for moderation, as Hispanic American adolescents with high and low levels of disruptive behavior problems were analyzed separately. Results of the current study indicate the association between disruptive behavior problems and treatment effects may not be statistically significant.

Parental Monitoring, Gender, and Concurrent Marijuana Use

Contrary to expectations, boys reported significantly more parental monitoring than girls. It may be that parents expect boys to engage in more deviant behavior than girls, and thus monitor their behavior more closely. However, this is inconsistent with prior research indicating girls are more closely monitored than boys (Carlo, Rarraelli, Laible, & Meyer, 1999; Svensson, 2003). It may also be that inner city, ethnic minority girls with substance use disorders and high rates of psychiatric comorbidity exhibit more problematic family functioning than boys, including lower levels of parental monitoring. Of note, the gender difference in parental monitoring was very small and likely lacked clinical significance. In addition, the small sample of girls limits the generalizability of findings. Thus, it seems both male and female Hispanic American adolescents with substance use disorders experience low levels of parental monitoring, perhaps as a result of parental psychopathology and family conflict (McCabe, Lansing, Garland, & Hough, 2002). However, given higher rates of psychiatric comorbidity in drug clinic-referred

girls as compared with boys, it appears poor parental monitoring may be a more salient risk factor for substance abuse and other adverse outcomes in girls than boys.

Specifically, it is possible that poor parental monitoring is a major family risk factor that partially explains extremely deviant functioning in clinic-referred Hispanic American girls, including high rates of comorbid depression, disruptive behavior problems, and substance use disorders. That is, when parents do not adequately monitor their daughters, particularly in high-risk, inner city environments, it is likely that family functioning is considerably impaired, possibly resulting in negative adolescent outcomes. For example, family psychopathology has been found to be related to conduct disorder and substance abuse in girls (McCabe, Lansing, Garland, & Hough, 2002). In addition, in the current study, there was a trend for family conflict and parental monitoring to be negatively correlated ($r = -.18$, $p = .058$), indicating girls who are poorly monitored may experience more conflictual family processes. Thus, poor parental monitoring, perhaps related to parental psychopathology and family conflict, may be a more salient risk factor for substance abuse and emotional and behavior problems in Hispanic American girls than boys.

Contrary to prediction, parental monitoring was positively associated with initial level of marijuana use in girls but not boys. Thus, higher levels of parental monitoring were associated with higher levels of concurrent marijuana use in Hispanic American girls with substance use problems. Since overall levels of parental monitoring were slightly higher in boys than girls, it is surprising that parental monitoring was found to be associated with marijuana use in girls but not boys. Yet, relatively lower levels of parental monitoring in girls as compared with boys appear to be associated with increased

concurrent marijuana use. As findings are based on a very limited sample of girls, and results are generally inconsistent with prior research (Dakof, 2000; Dishion, Capaldi, Spracklen, & Li, 1995; Foxcroft & Lowe, 1991; Patterson & Stouthamer-Loeber, 1984; Rowe, Liddle, Caruso, & Dakof, 2004; Steinberg, Fletcher, & Darling, 1994; Vazsoni & Flannery, 1997;), results are interpreted with caution.

The girls in the current study appear to exhibit more pervasive comorbid psychopathology than the boys, and it may be that they perceive parental monitoring attempts as intrusive and overly controlling, resulting in increased marijuana use in an attempt to escape from parenting behaviors they interpret as negative. The effect of parenting behaviors on youth outcome has been found to be moderated by adolescent appraisals of the meaning of the parenting behaviors (Mason, Walker-Barnes, Tu, Simons, & Martinez-Arree, 2004), indicating parental monitoring may be associated with negative outcomes if it is perceived by adolescents to be intrusive.

The positive association between parental monitoring and marijuana use remained even when psychiatric comorbidity (i.e., depression and disruptive behavior disorders) was included in the model. Findings are contrary to prior research indicating parental monitoring is not a significant predictor of adolescent marijuana use when other variables, such as conduct problems, are taken into account (Flannery, Vazsonyi, Torquati, & Fridrich, 1994; Pederson, Mastekaasa, & Wichstrøm, 2001). It is possible other variables not included in the model, such as association with deviant peers, account for the positive association between parental monitoring and marijuana use in girls. Specifically, it may be that membership in a deviant peer group is associated with both increased parental monitoring and increased marijuana use. More research is needed

with larger samples of clinic-referred, Hispanic American girls to further explicate the relation between parental monitoring and marijuana use in this high-risk sample.

Family Conflict

Contrary to expectations, male and female Hispanic American adolescents with substance use problems appear to experience similar levels of family conflict, according to both adolescents and parents. Since results of previous research are inconsistent regarding gender differences in levels of family conflict among adolescents with substance abuse problems (Hsieh & Hollister, 2004; Wu, Lu, Sterling, & Weisner, 2004), it is not surprising that gender differences were not found in the current study, particularly given the limited sample of girls. It may be that there are few gender differences in family functioning among adolescents with marijuana use problems (Webster-Stratton, 1996). Thus, it is possible drug clinic-referred Hispanic American girls and boys experience equivalent levels of family conflict, possibly resulting from differential acculturation between parents and adolescents (Szapocznik, Santisteban, Rio, Perez-Vidal, Kurtines, & Hervis, 1986; Szapocznik, Santisteban, Rio, Perez-Vidal, & Kurtines, 1989). It may also be that Hispanic American girls are exposed to more family conflict than boys, as predicted (Dakof, 2000), but there was not sufficient power to detect a difference. In fact, even with a large effect size ($\omega^2 = .40$), there was not sufficient power to detect a significant difference due to limited sample size (Cohen, 1965, 1977). It will be necessary to conduct future research, with particular attention to recruiting high-risk, Hispanic American girls with substance use disorders, in order to determine whether levels of family conflict differ in families of drug clinic-referred, Hispanic American girls and boys.

Contrary to prediction, family conflict was not found to be associated with concurrent marijuana use, or with changes in marijuana use over time. Results are in opposition to prior research with both community and clinic-based samples documenting a strong association between family conflict and substance use (Dakof, 2000; Forgatch & Stoolmiller, 1994; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998; Loeber, Green, Lahey, Frick, & McBurnett, 2000; Rowe, Liddle, Caruso, & Dakof, 2004). It may be that in multiple-risk Hispanic American families, family conflict is elevated due to differential acculturation (Szapocznik, Santisteban, Rio, Perez-Vidal, Kurtines, & Hervis, 1986; Szapocznik, Santisteban, Rio, Perez-Vidal, & Kurtines, 1989), independent of adolescent substance use. It may also be that an association between family conflict and adolescent substance use is artificially reduced. Specifically, some youth may spend the majority of their time with substance-abusing peers. Family conflict may be artificially reduced since these adolescents may spend less overall time with their families. It is also possible levels of family conflict and marijuana use covary over time, requiring more targeted longitudinal analyses to discern an association. Future research will be required to more carefully explicate the potential relation between family conflict and marijuana use in Hispanic American adolescents.

Conclusions

Overall, individual and family functioning appears to influence marijuana use in drug clinic-referred Hispanic American adolescents in complex ways. Girls with substance use disorders appear to display more problematic psychosocial functioning than boys, including higher levels of comorbid depression and disruptive behavior disorders and lower levels of parental monitoring. Although contrary to prediction,

results are consistent with some prior research indicating girls with substance use disorders display more impaired psychosocial functioning than boys (Flannery, Vazsonyi, Torquati, & Fridrich, 1994; McCabe, Lansing, Garland, & Hough, 2002). Compared with boys, girls with substance use disorders appear to be more susceptible to emotional and behavior problems, and may be more vulnerable to the immediate influence of family functioning.

Individual functioning appears to be important in understanding change in marijuana use over time in adolescents of both genders. Specifically, comorbid depression appears to be associated with decreased marijuana use over time, perhaps due to treatment effects. It will be important to conduct future research that includes longitudinal measures of depression to determine whether depression covaries with marijuana use over time, as has been shown in one recent study (Kovacs, Obrosky, & Sherrill, 2003). Should fluctuations in depression be accompanied by similar fluctuations in drug use, it may be possible to improve treatment for drug abuse by targeting comorbid depression.

Family-based treatment appears to be effective at addressing marijuana use in clinic-referred, Hispanic American adolescents with substance use disorders. Whereas previous research indicates adolescents tend to increase marijuana use following initial onset (Botvin, Scheier, & Griffin, 2002), adolescents in this treatment study exhibited relatively stable levels of marijuana use over the course of the study in general, with the degree of change in marijuana use varying based on treatment condition. Specifically, adolescents in the SET condition exhibited reductions in marijuana use over time, adolescents in the control condition exhibited increasing marijuana use over time, and

adolescents in the FAM condition exhibited intermediate levels of marijuana use over time. Furthermore, despite greater psychosocial difficulties at study onset, girls appear to exhibit the greatest treatment response, as illustrated by a greater decrease in marijuana use over time compared with boys.

In sum, results of the current study are consistent with Bronfenbrenner's (1979; 1989) ecological developmental model and the ecodevelopmental theory developed by Szapocznik and colleagues (e.g., Szapocznik & Coatsworth, 1999), in that risk factors for adolescent substance abuse are present in multiple domains of development (Hawkins, Catalano, & Miller, 1992). Given the high prevalence of substance use among American youth (SAMHSA, 2005), it appears that any disruption in individual or family functioning increases the likelihood of problematic substance use, particularly among inner city Hispanic American youth who are already at high risk for substance use problems (Berman, Kurtines, Silverman, & Serafini, 1996; García Coll & Garrido, 2000). These adolescents, particularly girls, appear to experience multiple individual and family risk factors that are likely interrelated and that transact with the adolescent over the course of development (Lynch & Cicchetti, 1998; Szapocznik & Coatsworth, 1999), maintaining and potentially exacerbating substance abuse. Furthermore, adolescent substance abuse likely has a deleterious effect on individual (Hawkins, Catalano, & Miller, 1992) and family functioning (Kurtines & Szapocznik, 1996), resulting in greater emotional and behavioral problems and increased family conflict, and subsequently increasing substance use. Thus, it seems individual and family risk factors and adolescent substance abuse are intricately interrelated in clinic-referred, Hispanic

American youth, and that associations are especially strong in girls. More research is needed with larger samples in order to replicate the current findings.

Study Strengths

The current study improved on previous research in several ways. First, it involved an evaluation of an understudied, inner city, ethnic minority sample. While results may not generalize to the general population of youth in the US, urban ethnic minority youth represent a subgroup of the population that experiences a disproportionate level of risk for substance use problems (García Coll & Garrido, 2000). Therefore, it is important that research focus on explicating the individual and contextual factors associated with initiation of and change in substance use in this sample. Second, participants were clinic-referred youth with substance use disorders. Much prior research has been conducted with community samples (Dishion & Skaggs, 2000; Latimer, Newcomb, Winters, & Stinchfield, 2000; Locke & Newcomb, 2003; Opland, Winters, & Stinchfield 1995), and it is important to improve understanding of the correlates of change in substance use in adolescents with significant substance use problems in order to inform treatment efforts. Third, the study involved a prospective, longitudinal evaluation of marijuana use, allowing for evaluation of factors associated with change in marijuana use over time. Fourth, multi-method, multi-informant assessment of study variables was employed, including adolescent self-report, parent report, and a structured clinical interview, to improve the validity and reliability of measurement. Lastly, the current study involved structural equation modeling, the most advanced, state-of-the-art data analytic technique, to evaluate a complex latent growth curve model.

Limitations

Despite these strengths, the study involved several limitations that require discussion. First, the small sample of girls limited the possible analyses, the results, and the conclusions that can be drawn. Specifically, it was not possible to conduct multi-group latent growth curve modeling as proposed due to lack of model convergence resulting from the small sample of girls (Kline, 2005). While single-group SEM analyses and post-hoc regression analyses generated interesting findings, multi-group analyses would have provided the strongest test of gender differences in associations between the predictor variables and change in marijuana use over time. Furthermore, idiosyncratic characteristics of the small group of female participants may have resulted in some unexpected findings that are inconsistent with previous research. That is, since results are based on only 20 girls, they may not generalize to other samples of Hispanic American youth. Thus, it will be important to conduct future research with larger samples of clinic-referred, Hispanic American girls in order to replicate the current findings.

Second, results are limited due to a high degree of missing data at later time points. It is not clear whether data are missing at random or whether missingness is related to one or more of the variables of interest in the current study. For example, it may be that adolescents who exhibited the highest level of marijuana use at a certain time point were more likely to drop out of the study at that time point. Of course, it is impossible to evaluate this hypothesis, as data are not available. Examination of available data suggests marijuana use at a prior time point is not associated with attrition at the next time point, suggesting data may be missing at random. It would be necessary

to follow-up with adolescents for whom data are missing in order to fully understand the reasons for attrition. However, at present data are considered to be missing at random, as that is a requirement of the SEM analyses (Muthén & Muthén, 2004).

Third, the adolescents in the current study participated in three different treatment conditions. Although the current study was not designed to evaluate treatment effects, treatment condition did influence the marijuana use trajectory, and it is possible treatment affected associations between the exogenous predictors and change over time in marijuana use. Thus, it is possible the results of the current study are biased due to treatment effects.

Fourth, results are limited because the measures of comorbid psychopathology and family functioning were each evaluated as predictors of marijuana use in separate models, without controlling for the other predictor variables. This was necessary because the limited sample size would not allow for the estimation of more complex models. In addition, while multiple factors have been found to be associated with substance use when considered individually (Greene, Biederman, Faraone, Wilens, Mick, & Blier, 1999), significant associations may not be found in multi-variate models due to the high degree of multi-collinearity among various risk factors for substance use (Loeber, Stouthamer-Loeber, & White, 1999). Nonetheless, it will be necessary to evaluate models in which multiple predictors are included simultaneously in order to determine the most salient correlates of substance use in clinic-referred, Hispanic American youth.

Fifth, although marijuana is the most commonly used illicit substance among adolescents (Young, Corley, Stallings, Rhee, Crowley, & Hewitt, 2002) and was reported

by the vast majority of study participants to be their primary substance of abuse, results may not generalize to other substances. Specifically, findings may differ if alcohol, tobacco, or another illicit substance were included as the outcome variable. Thus, the current findings are generalizable to adolescent marijuana use only.

Sixth, factors that may explain both initiation of substance use and change in substance use over time, such as peer substance use, were not included in the model. Peer substance use will be a particularly important factor to evaluate in future research, as it has been found to be one of the strongest predictors of adolescent substance use (Brook, Brook, Gordon, Whiteman, & Cohen, 1990). However, as the current study focused on factors that are most amenable to treatment, peer substance use was not included in analyses.

Lastly, predictor variables were measured at only one time point; thus, it was not possible to evaluate the ways in which change in the predictor variables may be associated with change in substance use. Future research should include time-varying predictor variables in order to determine whether substance use and the predictor variables covary over time. It will be particularly interesting to evaluate whether psychiatric comorbidity is coupled with substance use in Hispanic American adolescents, as has been reported in European American and African American youth (Kovacs, Obrosky, & Sherrill, 2003).

Clinical Implications

Although family-based treatments appear to be effective at reducing marijuana use in Hispanic American adolescents with substance use disorders, these youth continue to engage in marijuana use, albeit less frequently, and are at high risk for relapse (Brown,

Vik, & Creamer, 1989; Latimer, Newcomb, Winters, & Stinchfield, 2000). Therefore, it appears particularly important that research and intervention efforts focus on prevention with high-risk youth. Preventing inner city, ethnic minority youth from experimenting with marijuana initially may be the best option for decreasing substance use among these adolescents. As parental monitoring generally appears to protect adolescents from getting involved with substance-using peers (Brown, Mounts, Lamborn, & Steinberg, 1993), prevention efforts that focus on improving parents' abilities to adequately monitor their youth may be most effective. In addition, as considerable research indicates conduct problems precede substance use (Biederman, Faraone, & Kiely, 1996; Bukstein, Glancy, & Kaminer, 1992; DeMilio, 1989; Disney, Elkins, McGue, & Iacono, 1999; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Reebye, Moretti, & Lessard, 1995; Riggs, Baker, Mikulich, Young, & Crowley, 1995), it will be especially important to intervene with youth who exhibit early conduct problems, as they may be at particularly high risk for developing later substance use difficulties. However, given the high prevalence of adolescent marijuana use (SAMHSA, 2005, Young et al., 2002), prevention will likely have to occur on a community rather than individual level in order to be most beneficial.

Of course, prevention efforts will not be successful with all adolescents, and among those youth who develop substance use problems, it will be necessary to develop more intense treatment techniques that address both substance use and associated psychosocial difficulties. Family-based treatment that includes an ecological component appears most promising (e.g., Robbins, Szapocznik, Dillon, Turner, & Mitrani, manuscript in preparation), and efforts to improve such intervention techniques must

continue. In addition to targeting factors directly related to substance abuse, treatment must address psychiatric comorbidity, particularly depression, which appears to be related to marijuana use both concurrently and longitudinally in complex ways. It may be that substance use in adolescence is secondary to psychological impairment, and improving psychological functioning may result in greater treatment success. In any case, it will be important to address the underlying causes of substance use, in addition to directly targeting substance use, to improve treatment among Hispanic American adolescents with substance use problems.

Lastly, findings from the current study indicate girls with substance use problems display more impaired psychosocial functioning than boys. As girls may only be referred for treatment when substance use problems become extremely severe (Eme, 1992, James & Taylor, 1990), it is imperative that clinicians improve awareness of less severe female cases so that interventions may begin before substance abuse becomes too entrenched (Zoccolillo, 1993). Impaired family functioning, including disengaged, ineffective parenting behaviors, may represent a significant risk factor for substance use in girls, and as such family functioning must be evaluated in the context of substance abuse prevention and intervention. In addition, it appears particularly important that female adolescents with conduct problems be referred for treatment, including substance use prevention, as early conduct problems are highly predictive of later substance use in girls (Pederson, Mastekaasa, & Wichstrøm, 2001). In order to be more sensitive to conduct problems in girls, it may be necessary to revise clinical criteria for conduct disorder. Specifically, current criteria for CD may be more appropriate for boys than girls, since criteria include primarily overt behaviors, such as physical aggression, which are

generally more common in boys (Zoccolillo, 1993). As girls tend to display more covert than overt conduct problems (Kazdin, 1992), clinicians must be more aware of these difficulties in girls. When girls do present with substance use problems, treatment must address the considerable psychological and family impairment these girls experience.

Endnotes

¹ For disruptive behavior problems, a model including all indicators could not be identified. Since parents have been found to be reliable reporters of their child's conduct problems (Chamberlain & Reid, 1987), only parent reports of disruptive behavior (i.e., RBPC CD and SA, DISC-PS parent report CD and ODD) were included in the model. For depression, factor scores could not be generated due to a negative error variance. Since adolescent and parent reports of youth internalizing symptomatology are often inconsistent (Achenbach, McConaughy, & Howell, 1987), and youth are considered more reliable informants than parents regarding their own depressive symptoms (Sourander, Helstela, & Helenius, 1999), only adolescent reports of depression (i.e., YSR Anxiety/Depression and DISC-PS MDD) were included in the model. For family conflict, it was necessary to include an error covariance between FES parent report and CBQ youth report in order to improve fit. For parental monitoring, a model with all indicators fit the data well.

FIGURE 1

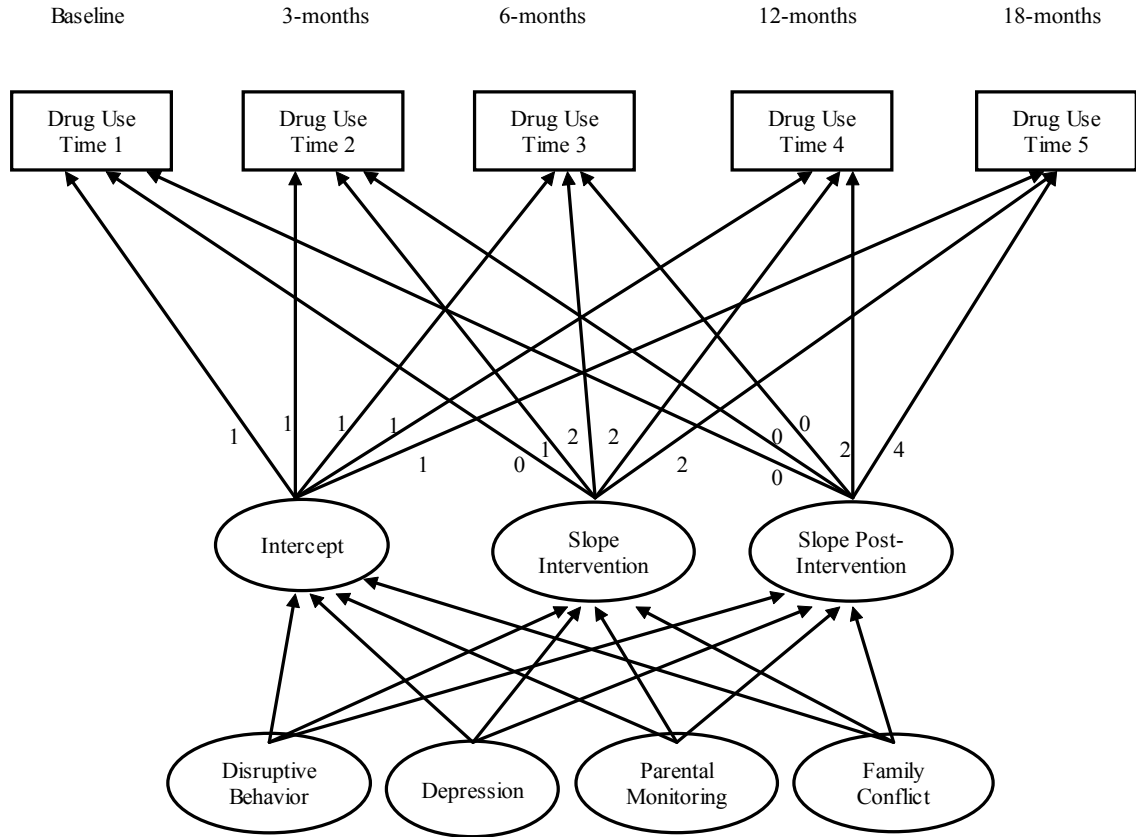


Table 1

*Descriptive Statistics for Study Variables**

Latent construct/Indicator	<u>N</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>
Disruptive Behavior				
RBPC Conduct Disorder	113	20.99	10.84	0 to 43
RBPC Aggression	113	16.01	8.93	0 to 33
DISC-PS CD**	108	.69	.46	0 to 1
DISC-PS ODD**	108	.73	.45	0 to 1
Depression				
RBPC Anxiety/Withdrawal	113	9.85	5.85	0 to 22
YSR Anxiety/Depression	112	3.90	4.58	0 to 23
DISC-PS MDD**	112	.36	.48	0 to 1
Family Conflict				
FES conflict (adolescent)	113	3.45	2.52	0 to 8
FES conflict (parent)	113	3.50	2.50	0 to 9

Note. RBPC = Revised Problem Behavior Checklist; DISC-PS = Diagnostic Interview Schedule for Children-Predictive Scales; CD = Conduct Disorder; ODD = Oppositional Defiant Disorder; YSR = Youth Self Report; MDD = Major Depression Disorder; FES = Family Environment Scale; CBQ = Conflict Behavior Questionnaire

*All variables collected at Time 1, with exception of Marijuana Use.

**Means reported represent proportion of participants who meet criteria for diagnosis.

Table 1 (continued)

*Descriptive Statistics for Study Variables**

Latent construct/Indicator	<u>N</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>
CBQ conflict (adolescent)	108	2.67	2.25	0 to 7
CBQ conflict (mother)	112	3.29	1.81	0 to 7
Parent Monitoring				
Monitoring (adolescent)	99	2.43	.53	1 to 3
Extent Involvement (parent)	111	3.50	.77	1.67 to 5
Positive Parenting (parent)	113	3.62	.87	1 to 5
Marijuana Use				
Time 1	113	5.49	6.16	0 to 30.5
Time 2	102	5.31	9.06	0 to 45.5
Time 3	87	5.17	9.26	0 to 60.5
Time 4	74	5.62	10.57	0 to 45.5
Time 5	69	5.74	10.21	0 to 45.0

Note. RBPC = Revised Problem Behavior Checklist; DISC-PS = Diagnostic Interview Schedule for Children-Predictive Scales; CD = Conduct Disorder; ODD = Oppositional Defiant Disorder; YSR = Youth Self Report; MDD = Major Depression Disorder; FES = Family Environment Scale; CBQ = Conflict Behavior Questionnaire

*All variables collected at Time 1, with exception of Marijuana Use.

**Means reported represent proportion of participants who meet criteria for diagnosis.

Table 2

Pearson Correlations of Study Variables

<u>Variable</u>	1	2	3	4	5	6	7	8	9	10	11	12
1. RBPC CD	1.00											
2. RBPC SA	.78*	1.00										
3. DISC-PS CD	.37*	.48*	1.00									
4. DISC-PS ODD	.58*	.45*	.46*	1.00								
5. RBPC Anxiety	.66*	.65*	.23	.41*	1.00							
6. YSR Depress	.07	.08	.08	.15	.11	1.00						
7. DISC-PS MDD	.18	.21*	.11	.10	.24*	.48*	1.00					
8. FES (adol.)	.29*	.32*	.14	.12	.23*	.31*	.23*	1.00				
9. FES (parent)	.49*	.38*	.22*	.28*	.39*	.10	.16	.27*	1.00			
10. CBQ (adol.)	.37*	.32*	.17	.18	.21*	.29*	.09	.66*	.26*	1.00		
11. CBQ (mother)	.55*	.42*	.16	.29*	.30*	.18	.16	.43*	.47*	.48*	1.00	

Note. * $p < .05$. RBPC = Revised Problem Behavior Checklist; CD = Conduct Disorder; SA = Socialized Aggression; DISC-PS = Diagnostic Interview Schedule for Children-Predictive Scales; ODD = Oppositional Defiant Disorder; YSR = Youth Self Report; MDD = Major Depression Disorder; FES = Family Environment Scale, Conflict; CBQ = Conflict Behavior Questionnaire, Conflict; PPS = Parenting Practices Scale; Marij. = Marijuana Use Composite; Treat D1 = Treatment Dummy 1; Treat D2 = Treatment Dummy 2.

Table 2 (continued)

Pearson Correlations of Study Variables

<u>Variable</u>	1	2	3	4	5	6	7	8	9	10	11	12
12. PPS Monitor	-.17	-.14	-.13	-.03	-.12	-.12	-.19	-.27*	-.09	-.27*	-.45*	1.00
13. PPS Involve	-.15	-.12	-.20*	-.15	-.04	-.13	-.10	-.21*	-.32*	-.38*	-.23*	.16
14. PPS Positive	-.18	-.18	-.16	-.20*	-.14	-.09	.04	-.24*	-.29*	-.27*	-.29*	.28*
15. Marij. time 1	.32*	.34*	.19	.19	.34*	-.07	-.01	.07	.08	.16	.20*	-.13
16. Marij. time 2	.01	.04	.18	.08	-.03	.17	.08	-.01	.11	.09	.01	-.09
17. Marij. time 3	.19	.17	.20	.08	.17	.12	.07	.05	.14	.05	.00	.01
18. Marij. time 4	-.06	-.05	.10	-.08	.05	-.10	-.08	.14	.19	.02	.14	-.10
19. Marij. time 5	-.07	-.13	-.04	-.01	-.04	.10	-.20	-.09	-.06	.06	-.07	.15
20. Gender	-.23*	-.15	-.15	-.06	-.05	-.24*	-.19*	-.06	-.15	-.13	-.12	.21*
21. Treat D1	-.08	.05	.04	-.15	.02	.12	.21*	.05	-.08	-.06	-.05	.02
22. Treat D2	.11	.12	-.08	.04	.09	-.10	-.09	-.13	-.03	.05	-.07	.06

Note. * $p < .05$. RBPC = Revised Problem Behavior Checklist; CD = Conduct Disorder; SA = Socialized Aggression; DISC-PS = Diagnostic Interview Schedule for Children-Predictive Scales; ODD = Oppositional Defiant Disorder; YSR = Youth Self Report; MDD = Major Depression Disorder; FES = Family Environment Scale, Conflict; CBQ = Conflict Behavior Questionnaire, Conflict; PPS = Parenting Practices Scale; Marij. = Marijuana Use Composite, Treat D1 = Treatment Dummy 1; Treat D2 = Treatment Dummy 2.

Table 2 (continued)

Pearson Correlations of Study Variables

<u>Variable</u>	13	14	15	16	17	18	19	20	21	22
13. PPS Involve	1.00									
14. PPS Positive	.49*	1.00								
15. Marij. time 1	-.15	-.16	1.00							
16. Marij. time 2	.17	.10	.21*	1.00						
17. Marij. time 3	.01	.04	.23*	.42*	1.00					
18. Marij. time 4	.05	-.02	.13	.35*	.21	1.00				
19. Marij. time 5	-.06	.01	.15	.29*	.29*	.56*	1.00			
20. Gender	.15	.15	-.14	.11	.12	.30*	.20	1.00		
21. Treat D1	.06	.21*	-.06	.05	.02	.22	.02	.02	1.00	
22. Treat D2	.04	-.07	.04	-.09	-.18	-.21	-.16	.06	-.46*	1.00

Note. * $p < .05$. RBPC = Revised Problem Behavior Checklist; CD = Conduct Disorder; SA = Socialized Aggression; DISC-PS = Diagnostic Interview Schedule for Children-Predictive Scales; ODD = Oppositional Defiant Disorder; YSR = Youth Self Report; MDD = Major Depression Disorder; FES = Family Environment Scale, Conflict; CBQ = Conflict Behavior Questionnaire, Conflict; PPS = Parenting Practices Scale; Marij. = Marijuana Use Composite, Treat D1 = Treatment Dummy 1; Treat D2 = Treatment Dummy 2.

Table 3

Descriptive Statistics for Predictor Variable Factor Scores, Initial Level of Marijuana Use, and Change in Marijuana Use Over Time

Variable	<u>N</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>
Disruptive Behavior ¹	113	.14	.89	-1.73 to 2.00
Depression ²	113	.58	2.92	-2.39 to 11.21
Family Conflict ³	113	.03	1.54	-2.64 to 3.64
Parental Monitoring ⁴	111	.23	.56	-.44 to 2.00
Initial Level Marij. Use ⁵	113	5.49	6.16	0 to 30.5
Change in Marij. Use ⁶	69	.67	11.06	-25 to 43

¹ Factor score for Disruptive Behavior Problems is a weighted average of RBPC Aggression, RBPC CD, DISC-PS ODD parent report, and DISC-PS CD parent report.

² Factor score for Depression is a weighted average of YSR Anxiety/Depression and DISC-PS MDD youth report.

³ Factor score for Family Conflict is a weighted average of FES Conflict youth report, FES Conflict parent report, CBQ youth report, and CBQ mother report.

⁴ Factor score for Parental Monitoring is a weighted average of PPS adolescent report of parental monitoring, PPS parent report of extent of involvement, and PPS parent report of knowledge of whereabouts.

⁵ Initial Level of Marijuana Use refers to baseline marijuana use.

⁶ Change in Marijuana Use refers to marijuana use at time 5 – marijuana use time 1.

Table 4

Hierarchical Multiple Regression: Depression, Gender, and Depression-by-Gender Interaction predict Initial Level of Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Depression	.472	.035
Gender	-.135	.150
Depression-by-gender	-.380	.089

Table 5

Hierarchical Multiple Regression: Parental Monitoring, Gender, and Monitoring-by-Gender Interaction predict Initial Level of Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Parental monitoring	.384	.067
Gender	-.130	.171
Monitoring-by-gender	-.370	.052

Table 6

Hierarchical Multiple Regression: Disruptive Behavior Problems, Gender, and Behavior-by-Gender Interaction predict Initial Level of Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Disruptive Behavior	.144	.550
Gender	-.145	.129
Behavior-by-gender	-.153	.526

Table 7

Hierarchical Multiple Regression: Family Conflict, Gender, and Conflict-by-Gender Interaction predict Initial Level of Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Family conflict	-.099	.661
Gender	-.153	.122
Conflict-by-gender	.118	.598

Table 8

Hierarchical Multiple Regression: Depression, Gender, and Depression-by-Gender Interaction predict Change in Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Depression	-.604	.010
Gender	.232	.041
Depression-by-gender	.302	.189

Table 9

Hierarchical Multiple Regression: Parental Monitoring, Gender, and Monitoring-by-Gender Interaction predict Change in Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Parental monitoring	-.022	.935
Gender	.263	.034
Monitoring-by-gender	-.023	.930

Table 10

Hierarchical Multiple Regression: Disruptive Behavior Problems, Gender, and Behavior-by-Gender Interaction predict Change in Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Disruptive Behavior	-.066	.823
Gender	.265	.032
Behavior-by-gender	-.068	.818

Table 11

Hierarchical Multiple Regression: Family Conflict, Gender, and Conflict-by-Gender Interaction predict Change in Marijuana Use

<u>Predictor</u>	<u>β</u>	<u>p-value</u>
Family conflict	-.172	.553
Gender	.228	.101
Conflict-by-gender	.196	.486

Table 12

T-Tests: Gender Differences in Predictor Variables: Factor Scores

Variable	<u>t-value</u>	<u>p-value</u>	<u>Girls' Mean</u>	<u>Boys' Mean</u>
Disruptive Behavior ¹	-.260	.795	-.044	.014
Depression ²	.204	.838	.122	-.026
Family Conflict ³	1.455	.148	.457	-.09
Parent Monitoring ⁴	.498	.620	.056	-.014

¹ Factor score for Disruptive Behavior Problems is a weighted average of RBPC Aggression, RBPC CD, DISC-PS ODD parent report, and DISC-PS CD parent report.

² Factor score for Depression is a weighted average of YSR Anxiety/Depression and DISC-PS MDD youth report.

³ Factor score for Family Conflict is a weighted average of FES Conflict youth report, FES Conflict parent report, CBQ youth report, and CBQ mother report.

⁴ Factor score for Parental Monitoring is a weighted average of PPS adolescent report of parental monitoring, PPS parent report of extent of involvement, and PPS parent report of knowledge of whereabouts.

Table 13

Mean Levels of Marijuana Use Over Time By Treatment Condition

<u>Marijuana Use</u>	<u>SET¹</u> (N = 35)		<u>FAM²</u> (N = 36)		<u>Control³</u> (N = 42)	
	<u>N</u>	<u>SD</u>	<u>N</u>	<u>SD</u>	<u>N</u>	<u>SD</u>
Time 1	6.0	5.9	5.0	5.9	5.5	5.6
Time 2	4.8	10.1	5.0	6.8	5.9	9.9
Time 3	2.8	5.6	5.1	6.9	7.2	12.6
Time 4	1.8	3.3	8.7	13.6	5.8	10.6
Time 5	3.2	7.4	6.5	12.2	7.2	10.4

¹ Structural Ecosystems Therapy

² Family Therapy (limited focus on social ecology)

³ Treatment as usual, i.e., referral to community service

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