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Troubled Parents, Motivated Adolescents: Predicting Motivation to Change Substance Use among Runaways

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Abstract

Runaway adolescents engage in high rates of substance use and report significant family and individual problems. However, in general, adolescents report low motivation to change their substance use. Because a higher level of motivation for changing substance use is associated with greater substance abuse treatment success, identifying variables associated with motivation for change can be useful for enhancing treatment success. In this study, predictors of motivation for changing substance use were examined among 140 shelter-recruited adolescents and their parents/primary caretakers. Several findings were noteworthy. A perceived negative family environment increased parents' and adolescents' depressive symptoms, which increased adolescent's motivation to change. Also, greater severity of adolescent substance use predicted higher motivation to change. Consideration of the family environment and parent problems when addressing motivation for changing substance use among these adolescents might be important foci for motivational interventions and future research.

Keywords

Motivation; substance use; adolescents; family; runaways

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Motivation for changing alcohol and/or drug use has been deemed responsible for change in substance use behavior (Burke, Arkowitz, & Menchola, 2003; DiClemente, Nidecker, & Bellack, 2008; Freyer, Tonigan, Keller, Rumpf, John, & Hapke, 2005). As a concept, motivation for change “broadly includes an individuals' concerns about or interest in the need for change, his or her goals and intentions, the need to take responsibility and make a commitment to change, and sustaining the behavior change and having adequate incentives to change” (DiClemente et al., 2008, p. 26). However, while researchers suggest that motivation for change leads to better treatment outcomes, factors that contribute to motivation for change have been less frequently studied (DiClemente, 1999). Research on this topic has focused largely on adult substance users, with research identifying factors associated with motivation for changing substance use among adolescents in its infancy (Battjes, Gordon, O'Grady,

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Kinlock, & Carswell, 2003; Breda & Heflinger, 2007; Kohler, Schoenberger, Tseng, & Ross, 2008).

Runaway Adolescents

Runaway adolescents are often defined as youth who have left home for 24 hours without their parent's or guardian's permission (U.S. Department of Health and Human Services, 1999). Many studies refer to runaway adolescents as those recruited from a runaway shelter (Robertson & Toro, 1999; Thompson, Maguin, & Pollio, 2003). However, many adolescents reside at runaway shelters at their parent's initiation and did not leave home by choice (Yoder, Whitbeck, & Hoyt, 2001). It is well established that runaway adolescents experience higher levels of alcohol and drug abuse than non-runaway adolescents (Peterson, Baer, Wells, Ginzler, & Garret, 2006). In a sample of shelter-recruited adolescents, Rotheram-Borus, Song, Gwadz, Lee, Van Rossem, and Koopman (2003) reported that lifetime prevalence of drug use ranged from 36% to 52% while reports of recent (prior 3 months) drug use varied from 17-31% for marijuana use and 6-11% for other drug use. Alcohol use is common among runaway youth with an estimated 69-81% reporting alcohol use (Kipke Montgomery, Simon, & Iverson 1997; Van Leeuwen, Hopfer, Hooks, White, Petersen, & Pirkopf, 2004). Kipke et al. (1997) classified more than 70% of runaway and homeless youth in their Los Angeles study as having alcohol or substance abuse disorders. High rates of depressive symptoms are also reported among these youth with rates of clinical depression ranging from 29% to 83.6% (Unger, Kipke, Simon, Montgomery, & Johnson, 1997; Van Leewen et al., 2004). Although substance use and major depressive episodes are prevalent among the runaways, reports suggest that runaway adolescents in need of substance abuse or mental health treatment are either reluctant to seek services (Son, 2002) or lack resources to access available programs (Ensign & Panke, 2002).

Further, adolescents in general are considered difficult to engage in therapy and often fail to complete treatment (DiClemente, 1999) with many studies demonstrating that adolescents experience low levels of motivation for change (Battjes et al., 2003; Pelkonen, Marttunen, Laippala, & Loennqvist, 2000). Identifying predictors of motivation for change among adolescents can provide opportunities for early intervention and specific treatment targets that improve intervention effectiveness. This research focus is important since early onset substance use problems can predict continuing substance abuse problems in adulthood (Chen & Kandel, 1995); identifying efficacious interventions has the potential to interrupt this trajectory.

Theoretical Framework

Transtheoretical Model of Change—Historically, a person's degree of motivation was classified in one of two ways: motivated or unmotivated (Beckman, 1980). Current theories of motivation suggest that motivation occurs on a continuum along which levels of motivation gradually progress from one extreme to the other. The motivational tasks and behavior change have been described as the Stages of Change (e.g. precontemplation, contemplation, preparation, action and maintenance) in the Transtheoretical Model of Change (Prochaska & DiClemente, 1984). Characteristics of each stage have been well researched; however, few studies offer information as to why some people fall into different stages and what factors contribute to their motivation for change (Font-Mayolas, Planes, Gras & Sullman, 2007). For example, some researchers have understood movement through the stages of change as a change in the weighting of the pros and cons of continuing to engage in the drug use behavior (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez & Rossi, 1991; Font-Mayolas et al., 2007). Font-Mayolas et al. (2007) determined that Spanish tobacco smokers in the contemplation-preparation stage rated the cons of smoking more highly than those in the precontemplation stage. In the current study, the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996) was used to measure the motivational process.

Family Systems Framework—Although there has been a tendency for many to view substance use and related issues as intrapersonal problems, many are now looking at the interactional context of substance use in order to better understand the problem (Carr, 2000; Mezzich, Tarter, Kirisci, Feske, Day, & Gao, 2007). Examining motivation to change from an interpersonal context is a relatively unexplored area and has the potential to uncover important correlates of motivation. A family systems theoretical framework suggests that adolescent problem behaviors, including substance abuse, running away and other internalizing and externalizing problems, are symptoms of maladaptive family interaction patterns (Dakof, Tejada, & Liddle, 2001). Research support for this proposition is substantial. Families with a depressed member show deficits in communication and interpersonal relations (Heene, Buysse, & Van Oost, 2007; Slesnick & Waldron, 1997). High levels of family conflict, low family organization/high chaos and low levels of cohesion are consistently associated with poorer individual and family functioning and are frequently cited family environment characteristics of families with a runaway adolescent (Thompson et al., 2003).

Although family pressure to engage in treatment has been associated with lower motivation for change (Breda & Heflinger, 2007), the relationship between family environment characteristics and motivation for change has not been directly examined. Existing research suggests that because adolescents are strongly influenced by their families, family environment characteristics impact adolescents' change process, with those families showing higher connectedness also showing higher treatment engagement (Dakof et al., 2001) and better substance use outcomes (Slesnick, Bartle-Haring, & Gangamma, 2006).

In sum, family systems researchers note that the family environment impacts treatment engagement and treatment outcomes, and is central to understanding symptoms among individuals, such as substance use and depression (Dakof et al., 2001). Some research also suggests that individuals' problem behaviors, such as substance use and depression, influence motivation for change. Thus, the relationship between family environment and motivation for change is likely mediated by substance use and depressive symptoms, as described below.

Substance Use, Motivation and Depression

The relationship between depressive symptoms, substance use and motivation has received some attention, although the direction of the relationship is unclear. In general, among adolescents, dual diagnosis rates of depression and substance use disorder have ranged from 20-30% (Kandel, Johnson, Bird, Weissman, Goodman, Lahey, et al., 1999) which is similar to the dual diagnosis rate of depression and substance use (18%) reported in a sample of shelter-recruited adolescent substance users (Slesnick & Prestopnik, 2005a; 2005b). Some research concludes that depressive symptoms are associated with lower motivation to change among adolescent samples (Tevyaw & Monti, 2004). Given that adolescents with severe depressive symptoms report high levels of negative affect and less energy for daily activities (Larson, Raffaelli, Richards, Ham, & Jewell, 1990), their apathy might be associated with lack of motivation and eagerness to change (Nesse, 2000).

Substance use severity also appears to impact motivation for change though the findings are similarly mixed. Several studies indicate that as severity of substance use increases, so does motivation for change (Breda & Heflinger, 2007; Freyer et al., 2005). Other studies indicate a negative relationship, lower motivation was associated with more severe substance use (Maglione, Chao, & Anglin, 2000), or no relationship (Battjes et al., 2003). Because of the lack of consistent findings, more research clarifying the relationship between depressive symptoms, substance use severity and motivation among adolescents is needed. Given the role of the family environment in the development and maintenance of problem behaviors, it was expected that family environment would influence both depressive symptoms and substance use which would then influence motivation for change.

Gender and Ethnicity

Very few studies have examined gender or ethnic/racial differences in motivation for change among adolescent substance abusers. However, in general, it appears that gender and ethnicity should be controlled when examining motivation for change. In an adolescent sample of substance abusers, Breda and Heflinger (2004) concluded that ethnicity is an important predictor in motivation to change. In particular, fear of negative external consequences (extrinsic motivation) was more relevant in predicting motivation for change among White and other racial/ethnic groups than for African-American youth.

Research findings on the relationship between gender, motivation to change and treatment retention are inconsistent (Greenfield, Brooks, Gordon, Green, Kropp, McHugh, et al., 2007). Studies using adult samples show that women are more likely than men to complete treatment for both alcohol and drug use (Maglione et al., 2000; Hser, Huang, Teruya, & Anglin, 2004), and have more motivation to change their substance use behavior (Barnett, 2006; Freyer et al., 2005). However, the limited research on adolescent substance abuse treatment reported no gender differences in motivation to change (Breda & Heflinger, 2004; 2007).

Current Study

Overall, research has focused on increasing the level of motivation for change among those seeking substance abuse treatment (Breda & Heflinger, 2007; DiClemente, 1999) but it is evident that predictors of motivation are not yet clearly understood, especially among adolescents. The present study examined runaway youth, a lesser researched subpopulation of adolescents with more severe substance use, mental health and family problems than non-runaway youth. Using both parent and adolescent reports and controlling for gender and ethnicity, it was expected that the perceived family environment would influence adolescent's motivation to change, but that the influence would be mediated by the level of the adolescent's and parent's depressive symptoms and substance use. Specifically, we expected that a more negatively perceived family environment would predict lower adolescent motivation to change and that the relationship would be mediated by higher depressive symptoms and substance use. Furthermore, given a family systems-oriented perspective in which parents' behaviors are expected to impact children's behaviors and children's behaviors impact parents' behaviors, we expected that the relationships noted above would be predicted across, as well as within, family members. As an example, a negatively perceived family environment by the PC would predict greater depressive symptoms among adolescents (as well as among PCs), and a more negatively perceived family environment by the adolescent would predict greater PC depressive symptoms (as well as adolescent depressive symptoms).

Methods

Participants

All participants were recruited from the only runaway shelter in Columbus, Ohio. The sample included 140 parent-child pairs (total sample, N =280) who were involved in an ongoing clinical trial examining substance abuse treatment outcomes. All participants agreed to receive either 1) 14 sessions of Ecologically-Based Family Therapy (Slesnick & Prestopnik, 2005b), 2) 4 sessions of Motivational Enhancement Therapy (Miller & Rollnick, 2002), or 3) 14 sessions of the Community Reinforcement Approach (Meyers & Smith, 1995), an operant-based substance abuse treatment. The current study focused on baseline data (prior to the commencement of treatment) from this trial. In order to be eligible for the larger study, youth were between the ages of 12 to 17 years, were staying at the runaway shelter, had the legal option of returning to a home situation, met The Diagnostic and Statistical Manual of Mental Disorders-IV-TR (DSM IV-TR; American Psychiatric Association, 2000) criteria for substance abuse or dependence, and had a parent/legal guardian willing to participate in

treatment and complete the assessment instruments. Of the 467 youth who were approached at the shelter, 62.7% (N = 293) were eligible and 61.4% (N = 180) of eligible adolescents and their parents were successfully engaged into the study. Since data entry and cleaning are still in progress for the 180 youth, the first 140 youth had complete data at the time of the analysis and comprised the sample for the current study.

The adolescent participants were on average 15.5 years old (SD=1.2 years) and 51% were female. Most adolescents were African American (63.2%) or White/non-Hispanic (31%). Of the parents/primary caretakers (PCs), mothers comprised 75% of the sample, fathers comprised 13%, and “other” comprised 12%. The ‘other’ category included grandparents and aunts/uncles. Average age of PCs was 41.5 years (SD = 8.5) and reported average annual income was \$23,000. Single parents (76%) comprised the majority of the parents/PCs. Adolescents reported repeated runaway episodes, averaging 3.1 times in their lifetime (Range: 0-50, SD = 6.3). Adolescents were 14.1 years old on average when they first ran away from home (Range: 8 – 17). The most common reason for being away from home was family conflict and arguments (50.5%, n = 48). In addition, 26.3% (n = 25) reported that they left on their own decision because they were angry at their parents after a fight. Runaway adolescents also reported victimization experiences in families; 43.8% were physically abused, and 28.0% were sexually abused. It is important to note that the current sample of shelter-recruited youth are not street-living youth or literally homeless. Only 28.6% (n = 40) of the sample had ever slept on the streets in their lifetime. Of these, the majority reported that in their lifetime, they had slept on the streets one night (12.9%, n = 18) or two nights (8.6%, n = 12). Only 7.1% (n = 10) had ever slept on the streets more than three nights.

Measures

A research assistant (RA) administered the Computerized Diagnostic Interview Schedule for Children (CDISC; Shaffer, 1992) to adolescents, a computerized comprehensive diagnostic interview based on DSM-IV-TR. CDISC diagnoses alcohol, tobacco, and other substance abuse and dependence and was used to determine formal eligibility. A demographic questionnaire was administered to both the adolescent and the parent/PC and assessed items such as age, gender, and ethnicity.

Adolescent and parent/PC depressive symptoms were measured using the Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report instrument for measuring depressive symptoms in adults and adolescents age 13 and above. Items correlate with the DSM-IV-TR (American Psychiatric Association, 2000) criteria for depression. The BDI-II includes 21 items rated on a 4-point likert scale. Norms for the scale suggest that scores of 0-13 indicate minimal depression, 14-19 mild depression, 20-28 moderate depression and 29-63 severe depression. In this sample, Cronbach alpha for the overall depression score was .94.

The Form 90 Substance Use Interview (Miller, 1996) was administered to assess frequency of substance use among the adolescents. The Form 90 is a semi-structured questionnaire that yields total number of days, in the last 90, of each major class of drugs, including alcohol. This tool has shown excellent test-retest reliability for indices of drug use in major categories among runaway substance abusing adolescents with kappas for different drug classes ranging from .74 to .95 (Slesnick & Tonigan, 2004). Parent/PC substance use was assessed by self-report in which the parent/PC reported how many days of the prior 30 that they used alcohol and illicit drugs. For both parents and adolescents, illicit drug use included cocaine/crack, marijuana, heroin/opiates, non-prescription methadone, hallucinogens/psychedelics, methamphetamines or other amphetamines, barbiturates, prescription drugs, and inhalants.

The Family Environment Scale (FES; Moos & Moos, 1994) was administered to both the parent/PC and adolescent. The FES is a 90-item true-false questionnaire that measures the social-environmental characteristics of families. In the current sample, subscales' internal consistencies ranged from .55 to .73 which compares to .61 to .78 reported by Moos and Moos (1994).

The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller & Tonigan, 1996) was originally created to parallel the stages in Prochaska and DiClemente's Transtheoretical Model of Change (1984). As part of a multi-site clinical trial on alcohol treatment (Project MATCH Research Group, 1993), Miller and Tonigan (1996) conducted a study assessing reliability and validity of the SOCRATES on a clinical sample of 1726 adult drinkers. The final version of the questionnaire included a 19-item likert-type scale with responses ranging from strongly disagree (1) to strongly agree (5). Exploratory factor analysis of the scale yielded three separate dimensions; person's recognition of drinking problems (readiness), uncertainty about drinking (ambivalence), and making efforts to change drinking (taking steps). As Miller and Tonigan (1996) stated, SOCRATES measures continuous motivational processes underlying the stages of behavioral change. That is, the Recognition subscale refers to the precontemplation and determination stages. The Ambivalence subscale refers to the contemplation stage, and the Taking Steps subscale parallels the action and maintenance stages. In addition, the SOCRATES total score provides an estimate of overall motivation for change (Sutton, 2001). A separate version of SOCRATES to measure motivation to change drug use behavior was also developed by modifying the original scale. SOCRATES showed good reliability with Cronbach alphas ranging from .60 to .96 in adult samples (Miller & Tonigan, 1996), and .88 to .93 in adolescent samples (Maisto, Chung, Cornelius, & Martin, 2003). Similarly, the SOCRATES subscales showed adequate internal consistency, ranging from .85 to .95 in the current sample.

Procedure

A research assistant (RA) screened every adolescent residing at the runaway shelter for participation in the current study. If the adolescent met preliminary eligibility criteria and was interested in participating in the study, permission to contact his/her parent/PC was obtained. Upon obtaining the parent or legal guardian's consent, assent was obtained from the adolescent and an assessment was scheduled with the adolescent and parent/PC within 24 hours (when possible). During the assessment interview with the adolescent, the RA administered the CDISC sections on alcohol, marijuana and other substances to the youth to determine formal eligibility. If the youth did not meet criteria for a drug or alcohol use disorder, he or she continued with treatment as usual through the shelter. Otherwise, the youth continued with the assessment interview. Adolescents were told that the assessment would take up to three hours and that they would receive a \$40 gift card at the end of participation. Parents'/PCs' assessments were conducted at their home and required one hour to complete. Parents/PCs received \$25 cash for their participation. All procedures were approved by The Ohio State University's Institutional Review Board.

Overview of Analyses

The main objective of this study was to demonstrate a relationship among family level and intra-individual variables and motivation to change alcohol or drug use. Adolescent and parent/PCs' perspectives were provided on the family level variables (family environment), and intra-individual variables (Beck Depression Inventory Scores for adolescent and parent/PC, percent days use of alcohol and percent days use of drugs for adolescent, and substance use for the parent/PC). Adolescents' scores on the SOCRATES drug and SOCRATES alcohol scales were utilized. These variables were used in a model that can be seen in Figures 1 and 2. This is a path model with mediating relationships. In other words, it was hypothesized that the

relationship between motivation to change and the family environment would be mediated by the level of depressive symptoms being experienced by both the adolescent and the caregiver as well as the level of substance use. Since these mediating relationships were hypothesized, structural equation modeling was used to estimate the models and test the relationships. Two models were estimated, one for motivation to change alcohol use and one for motivation to change other drug use. We did this because some of the adolescents in the sample reported no alcohol use, while others reported no drug use. By removing those adolescents who reported no alcohol use ($N = 50$) we had a more accurate assessment for motivation to change alcohol use for only those who used alcohol ($N = 84$). The same was true for drug use in which $N = 15$ were removed for lack of drug use, for a final sample of $N = 119$. No differences between the excluded and included sample of PCs and adolescents were reported for BDI depressive scores or FES cohesion, conflict or organization.

Structural equation modeling simultaneously estimates the paths in the model as well as the errors in measurement for latent variable indicators and the correlations among the “independent variables.” This is a more efficient and more effective way to estimate a path model than with traditional path analysis with multiple regression (Bollen, 1989; Kline, 2005).

Results

The means and standard deviations for the assessments used in the study are presented in Table 1 including information about the total sample and the two subsamples that were included in the analyses. As noted in the table, adolescents reported using drugs on 25% of the prior 90 days, and reported using alcohol on 5% of the days (averaging 10 standard drinks per drinking occasion). Parents reported using alcohol on 2.7 days in the prior 30, and reported minimal drug use (0.3 days).

On average, adolescents' depressive symptoms were in the mild depression range and PCs' scores were in the minimal depression range, similar to prior studies with runaways (Slesnick & Prestopnick, 2005a; 2005b; Whitbeck & Hoyt, 1999). In regard to the Family Environment Scale scores, data collected from distressed families show a mean of 5.25 for Cohesion, 4.02 for Conflict, and 5.07 for Organization (Moos & Moos, 1994). As shown in Table 1, for the most part, the means reported in this sample indicate even more distress than the clinical sample. Results of one sample t-test analyses revealed runaways reported significantly greater conflict [$t(126) = 7.75, p < .001$], lower cohesion [$t(124) = -5.81, p < .001$], and lower organization [$t(125) = -5.00, p < .001$] than the clinic-referred sample, reported by Moos and Moos (1994). Similarly, parents/primary caretakers reported significantly higher conflict [$t(124) = 3.32, p < .01$], and less cohesion [$t(122) = 2.32, p < .05$] compared to outpatient samples. However, perceived family organization did not differ among clinic-referred adults and parents with runaway youth [$t(121) = -.92, p > .05$].

As noted, the SOCRATES was designed to assess motivational processes of substance users, which was intended to parallel the stages in Transtheoretical Model of Change (Prochaska & DiClemente, 1984). Norms for three subscales (Recognition, Ambivalence, Taking Steps) were created, based on a sample of 1726 adult men and women who were under alcohol treatment in Project MATCH (1993). Those whose total Recognition score fell within 7-26, total Ambivalence score fell within 4-8, and total Taking Steps score fell within 8-25 were categorized as ‘low in motivation’ (Project MATCH Research Group, 1993). As shown in Table 1, runaway adolescents' Recognition, Ambivalence, and Taking Steps scores for both alcohol and drug use indicated low motivation to change their substance use behavior. Since the majority of this sample showed low motivation, it was not possible to use their scores to create three categories of motivation: there was no variance across the sample. Alternatively,

three subscale scores of the SOCRATES were used as indicators of a latent variable for motivation to change. This latent variable provides an estimate of motivational processes, and parallels Miller and Tonigan's (1996) original approach. Other authors have also found that SOCRATES measures motivation as a single construct (i.e. Maisto et al., 2003; Sutton, 2001).

Similarly, based upon the literature, the three FES subscales - conflict, cohesion and organization – were chosen to create a latent variable for family environment. Higher scores on this latent variable indicated a more positive perceived family environment. Thus, we estimated two structural equation models to test the relationships among family variables, intra-individual variables and motivation to change while controlling for gender and ethnicity (see Figures 1 and 2). In both figures, gender and ethnicity are set to influence all the intra-individual variables, the family variables influence the depression scores, which in turn influence the substance use and motivation to change scores. The only difference between the two models estimated was whether we were using motivation to change alcohol use, or motivation to change drug use. In other words, the intra-individual variables were hypothesized to mediate the relationship between the family variables and the adolescent's self-reported motivation to change.

In examining the distribution of scores on the variables used in the model, the percent days of adolescent alcohol use and the parent/PC substance use scores showed severe skewness and kurtosis. This severe nonnormality breaks the assumption of normality in structural equation modeling and could impact the maximum likelihood estimates for the model. In order to “normalize” the scores we used the natural log of adolescent percent days alcohol or drug use and parent/PC substance use. The natural logs of these scores eliminated the severe kurtosis and reduced the skewness in the data.

The models were then estimated using full information maximum likelihood estimation with the Expectation Maximization (EM) algorithm in LISREL 8.8 (Linear Structural Relationship; Joreskog & Sorbom, 2006). This maximized the sample size for both models (n's= 84 for alcohol and 119 for drug). The EM Algorithm estimates the model with the available data, then iterates using all cases with the probable estimates from the available data model. The solution then allows for missing data and in a sense weights cases with complete data differently than those without complete data. In this instance, missing data is not replaced per se, but is used in the calculation of the final estimates. The model explained about 24% of the variance in motivation to change drug use, and 14% of the variance in motivation to change alcohol use. The two models fit the data quite well as well: For the motivation to change drug use: $\chi^2(79) = 80.25$; $p = .44$; RMSEA = .012; CI (.00; .053); for the motivation to change alcohol use: $\chi^2(79) = 85.80$; $p = .28$; RMSEA = .032; CI (.00; .071). The RMSEA or Root Mean Square Error of Approximation is an index of close fit. MacCallum, Brown, and Sugwara (1996) suggest that a range from 0 to .05 indicates a close fit. When using the full information maximum likelihood estimation in LISREL this is the only fit index provided other than the chi-square. Since the chi-squares for both models are non-significant this indicates a good fit. We used Preacher and Coffman (2006) software to calculate the statistical power of these tests. We calculated the power to detect a difference between the RMSEA achieved and an RMSEA of .10 which would be considered a poor fit. With the sample size of 84 for the motivation to change alcohol use, with an alpha of .05 and 79 degrees of freedom, the power to detect the difference between an RMSEA of .03 and .10 was .97. For the motivation to change drug use with a sample size of 119 with 79 degrees of freedom and the alpha set at .05, the power detect the difference between an RMSEA of .012 and .10 was .99. Again using the Preacher and Coffman (2006) software we also calculated the minimum sample size necessary to test these models with power set at .80, the minimum sample size was calculated to be 72, thus we have the sample size needed to test the models and can be reasonably confident in the results.

The loadings of the motivation to change subscales onto the latent variable were all positive and significant suggesting common variance. The results of the measurement model are reported in Table 2. The loadings of PCs' alcohol use and drug use in the last 30 days were also positive and significant creating a latent variable for PC substance use. We tested the full model with direct relationships between the family variables and the motivation to change and substance use variables. None of the direct paths from the family variables to motivation to change alcohol or substance use were significant. Since this was the case, our hypothesis about the mediating impact of intraindividual variables was supported.

For motivation to change alcohol use, there were significant relationships between adolescent depressive symptoms and percent days use of alcohol, PC's depressive symptoms and motivation to change alcohol use and PCs' substance use. Depressive symptoms predicted increased substance use for both the adolescent and the PC. It was also the case that when the PC had more depressive symptoms, the adolescent was more motivated to change. The PCs' perception of the family environment was negatively related to his/her depressive symptoms, such that the more positive the PC viewed the family, the fewer depressive symptoms reported. Race was also related to the adolescent's depressive symptoms. White adolescents had higher depressive symptom scores than African American adolescents. Given the relationship between the PCs' perception of the family and his/her depressive symptoms, and their depressive symptoms and the adolescent's motivation to change, there is evidence of an indirect or mediated relationship between the family environment and the adolescent's motivation to change alcohol use, at least from the PC's perspective. That is, the more negative the family environment, the more depressive symptoms experienced by the PC, the more motivated the adolescent is to change alcohol use. The results for the structural model are reported in Table 3 and the significant path estimates (standardized) are labeled in Figure 1. These results also provide support for our original expectations that the PC's perspective on the family would impact the adolescent. The direction of these relationships was contrary to expectation in that it was expected that the poorer the family environment the less motivated the adolescent would be to change substance use. In this instance, the opposite was true.

Several relationships between substance use, depression and motivation to change were found. Of particular interest, among adolescents, percent days of drug use was positively related to motivation to change drug use behavior. Thus, as drug use increased, so did motivation to change. This was also the case for the adolescents' depressive symptoms - higher percent days of drug use was positively related to adolescents' depressive symptoms.

PCs' substance use was related to their depressive symptoms as well. The PCs' perception of the family environment was significantly related to their depressive symptoms, and the same was true for the adolescents' perception of the family environment and their depressive symptoms. Given the relationships between the adolescent's perception of the family environment and their depressive symptoms, and their depressive symptoms and their motivation to change substance use, there is again evidence for an indirect or mediated relationship between the family environment and motivation to change substance use. That is, the more negative the adolescent views the family environment, the more symptoms of depression reported; the more symptoms of depression reported, the higher the adolescents' motivation to change substance use. Figure 2 shows significant path estimates.

Discussion

Research identifying predictors of motivation to change among adolescent substance abusers has lagged behind research on adults. Given that studies converge on the finding that adolescents show low levels of motivation to change substance use and high levels of treatment drop-out, identifying factors that predict motivation to change has the potential to enhance

interventions focused on increasing motivation and treatment outcome. This study uniquely contributes to prior research by examining the contribution of family environment characteristics, from both the adolescent and parent/PC report, to understanding adolescent motivation to change.

The hypothesis that substance use and depressive symptoms would mediate the relationship between family environment and motivation to change was partially supported. For both adolescents and parents, his or her perspective of the family environment predicted his or her depressive symptoms which, in turn, predicted adolescent's self-reported motivation to change drug and alcohol use, respectively. Specifically, those parents who reported more depressive symptoms, in part due to the family environment, positively influenced their child's motivation to change alcohol use. Just as research suggests that parents with depressive symptoms influence adolescent problem behaviors (Heene et al, 2007; Slesnick & Waldron, 1997), this study extends those findings to motivation for changing alcohol use. Possibly, as parents' own distress increase, so do adolescents' distress which increases motivation to change. Similarly, parents with more depressive symptoms might be less involved in their adolescent's life and might pressure their adolescent children less to change – possibly (and paradoxically) leaving those adolescents more motivated to change. Also, adolescents who reported more depressive symptoms, in part due to the family environment, reported greater motivation to change their drug use, supporting prior research showing a relationship between psychological stress and motivation to change (Battjes et al., 2003; Hiller, Knight, & Simpson, 1999). However, this finding is contrary to findings suggesting that adolescents with co-occurring disorders are less motivated to change (Breda & Heflinger, 2004).

Of interest is that depressive symptoms, and not substance use, mediated the relationship between family environment and motivation to change. Although a family systems theoretical framework suggests that patterns of family interaction are primary for understanding individual problem behaviors, in this sample, the family environment did not appear to impact severity of substance use. Future research might determine that other factors not assessed in this study, in particular peer relationships, influence the severity of substance use which impacts motivation for change. This study did not include any peer relationship measures and so the impact of peer relationships on the variables of interest could not be examined.

In the current study, higher severity of adolescent substance use predicted higher motivation to change drug use. The majority of the adult literature reports that as substance use severity increases, so does motivation for change (Freyer et al., 2005). Among the adolescent literature, findings in this regard are mixed (Battjes et al., 2003; Breda & Heflinger, 2007; Slavet, Stein, Colby, Barnett, Monti, Colembeske, et al., 2006). The samples might partially account for the observed differences since adolescents in these studies experienced a different level of external pressure for treatment. Compared to adults, adolescents are more likely to enter treatment due to external influences, such as family and legal pressure (Breda & Heflinger, 2007) and such pressure is associated with lower motivation to change (DeLeon et al., 2000). Anecdotally, in this study, more staff effort was directed towards encouraging parent involvement than adolescent involvement. Therefore, the adolescents in the current study may have been more motivated to participate in the treatment than were their parents. This might account for the observed positive association between adolescent substance use and motivation to change since these adolescents might have felt less pressured to participate in treatment by their parents. One implication of this finding is that motivation enhancement targeted towards less-severe drug using adolescents, found in this study to have lower motivation to change, might have important preventative utility. Increasing motivation levels when adolescents are beginning experimentation with drugs might prevent individual and family problems associated with the possible progression to higher levels of use.

This study showed that different factors predict adolescent motivation to change alcohol versus drug use. Adolescent motivation to change alcohol use was predicted by parent/PC perceptions of the family environment as mediated by PCs' depressive symptoms while adolescent's motivation to change drug use was predicted by adolescents' perceptions of the family environment as mediated by their own depressive symptoms. As Weisner (1992) notes, alcohol and drugs carry different meanings and values which affect treatment strategies and outcomes. Future research might confirm that these different values and meanings also influence motivation for changing alcohol versus drug use and are differentially influenced by parents' behaviors. Moreover, adolescent substance use predicted motivation to change drug use but not alcohol use. Similarly, De Leon (1993) found varying motivation levels among individuals reporting different drugs of abuse; cocaine and opiate abusers were more motivated to change than alcohol and marijuana users. Few studies have examined alcohol use outcomes separately from drug use outcomes among adolescents, but those that have provide some indication that alcohol may be more difficult to treat than drug use (Santisteban, Perez-Vidal, Coatsworth, & Kurtines, 2003; Slesnick, Bartle-Haring, Glebova, & Glade, 2006). Future research should determine if addressing motivational differences for alcohol and drug use can lead to better alcohol and drug use reductions.

Among the demographic variables, gender did not impact the relationship of the predictor variables to motivation to change, and no differences in motivation to change by gender were found. This finding is similar to that of Battjes et al. (2003), but research with adults suggests that females show greater motivation to change substance use than males (Barnett, 2006; DiClemente, 1999). The finding might represent a difference between adult and adolescent samples. The consequences of and factors associated with substance use for male and female adolescents might be more similar than for adult males and females. For example, many more adult women substance abusers have children in their custody than do men, and some studies indicate that this increases treatment seeking behavior (Lundgren, Schilling, Fitzgerald, Davis, & Amodeo, 2003).

Also, no difference by racial/ethnic category was found for motivation to change. Neither Battjes et al. (2003) nor Breda and Heflinger (2007) found differences among racial/ethnic groups in relationship to motivation for change. Clarifying the relationship between racial/ethnic group and motivation to change in future studies is important given that different cultural pressures can impact the process of change (Gordon, 1993). However, being White was associated with more depressive symptoms than being African-American, and, in turn, more depressive symptoms was associated with higher alcohol use. This finding is similar to research indicating that White adolescents tend to report more depressive symptoms than African-American adolescents (Substance Abuse and Mental Health Services Administration (SAMHSA), 2005). Prevalence estimates of a major depressive episode in the past year was 9.2% for White adolescents and 7.7% for African-American adolescents (SAMHSA, 2005). Moreover, a significant body of research indicates an association between higher depressive symptoms and alcohol use (Galaif, Sussman, Newcomb, & Locke, 2007). In a study among adolescent drinkers, 31% showed severe levels of depressive symptoms (Center for Substance Abuse Prevention, 2002). While Salomonsen-Sautel, Van Leeuwen, Gilroy, Boyle, Malberg and Hopfer (2008) found that African-American runaway and homeless youth were significantly less likely than White youth to use alcohol or illicit drugs, very few studies have focused on ethnic or racial differences among runaway adolescents.

Limitations

Some limitations should be considered when interpreting the findings. Because the current study used a sample of convenience and focused solely on runaway adolescents and families willing to participate in substance abuse treatment, generalizability of the findings to other

adolescent populations is limited. For example, families that agree to participate in substance abuse treatment might differ from those who refuse to participate; in particular, families that agree might be more open or motivated to change. Since parent willingness to participate in the treatment research was a requirement for the study, the families in this study may have less (or more) severe problems than families who declined to participate. Some research suggests that higher income is associated with higher motivation to change (Milin, 2007). Given the low income levels reported among this sample of runaway adolescents, the current findings might not generalize to those adolescent samples reporting higher income levels. Similarly, this sample of adolescents reported low motivation for change, even though they agreed to participate in the treatment. And, the average score for 'taking steps' even though relatively low, was still higher than that for recognition and ambivalence. Although the adolescents agreed to participate in the treatment, their goals might have been more closely related to receiving assistance with family problems, possibly associated with substance use, or to receiving support from the therapist. Even so, the findings of the study are apparent even though adolescents reporting higher motivation levels might show a different pattern of findings. Another limitation is that while comorbid mental health problems among runaway adolescents have been documented (Slesnick & Prestopnik, 2005a) this study did not undertake a comprehensive assessment of mental illness among runaway youth. Recently, DiClemente, Nidecker, and Bellack (2008) noted that dually diagnosed individuals likely require additional support throughout the change process, and more research in this area is needed.

Parent under-reporting of substance use is also suspected. In some cases, following the baseline assessment and during the treatment phase of the project, parents admitted to using marijuana frequently, or that they drank alcohol more regularly than reported on the baseline assessment. Biological validation of self-report would likely have ameliorated this limitation. However, we expected that engagement of parents into the project would likely have suffered if urine screens were a requirement for their participation. Adolescents might have also under-reported their alcohol and drug use. Most studies with runaways report prevalence and not frequency of substance use, therefore, comparison across studies is difficult. Report of frequency of adolescent substance use in this sample was lower than that in a New Mexico recruited sample (Slesnick & Prestopnik, 2005a; 2005b). The difference in use rates might be associated with the characteristics of the samples. For example, this sample included a majority of African American adolescents (63%) while the New Mexico sample included primarily Latino/a (39%) and White (39%) adolescents. In particular, one study reported that Latino runaways used drugs more frequently than did Anglo runaways (Koopman, Rosario, & Rotheram-Borus, 1994) while Thompson (2004) found that White adolescents were significantly more likely than African-American adolescents to report illicit drug use problems. In addition, this sample included only runaway adolescents recruited from a crises shelter - a population that reports lower substance use rates than street living youth (Van Leeuan et al., 2004), whereas most of the studies reporting frequency of substance use include mixed samples of street-living homeless youth and shelter-recruited runaways (e.g., Kipke et al., 1997).

Finally, given the limited sample size, and our interest in parent and family contribution to adolescent motivation, other variables that might contribute to motivation to change were not included in the model. For example, Broome, Joe, and Simpson (2001) identified social support and peer deviance as positively associated with adolescent motivation to change, and Battjes et al. (2003) identified negative consequences as a predictor of motivation. Clearly, research understanding the factors associated with motivation for change among adolescents is still in its early stages, and more research unraveling the complex relationship between individual, family, peer, other systems and cultural influences on this phenomenon is needed.

Implications for Practice and Conclusions

Adolescents, by nature of their developmental stage, are more dependent upon their parents than are most adults for whom motivational interventions were developed. The current study's findings suggest that the family environment and parent behaviors influence adolescent's motivation to change and parent involvement in motivational interventions might be a fruitful addition to the intervention. It should be noted that this sample of shelter-recruited adolescents returned to a guardian's home after leaving the shelter. In contrast, homeless youths are disconnected from their parents, avoid shelters, and live on the streets (Slesnick, Dashora, Letcher, Erdem, & Serovich, In press). Motivational Enhancement Therapy with homeless, street-recruited youth has shown limited utility (Baer, Garrett, Beadnell, Wells, & Peterson, 2007; Peterson et al., 2006) but the impact of motivational interventions for shelter-recruited adolescents has not yet been reported.

In a recent study, Miller-Day (2008) found that other than a no tolerance rule, most strategies used by parents to prevent alcohol and drug use by their children were ineffective. In contrast, motivational interventions (Miller & Rollnick, 2002) assume that the responsibility and capability for change lie within the client and needs to be evoked (rather than created or installed). The therapist's task is to create a set of conditions that will enhance the client's motivation for and commitment to change. Practically, parent involvement in motivational sessions might facilitate the conditions that lead to motivation for change. In particular, a specific strategy used by therapists employing motivational interventions is to elicit and reinforce client "change talk." Including the parent in motivational interventions (perhaps after being instructed on how to elicit change talk) with their adolescent might be especially effective at facilitating adolescent motivation to change, and might be a fruitful focus of future study. Finally, the findings from this study suggest that increasing motivation among those using drugs at lower levels might have significant preventative utility.

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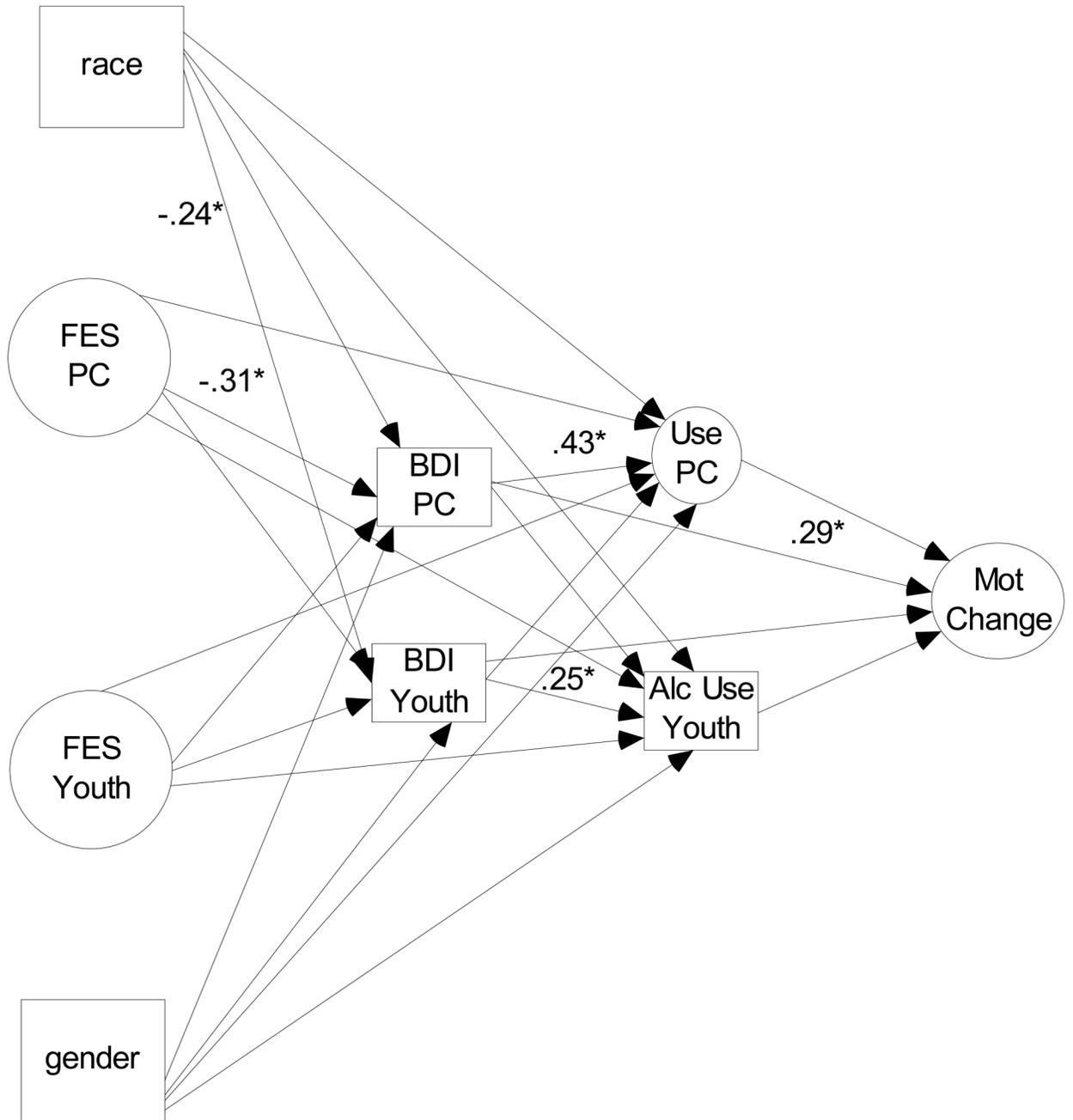


Figure 1. Model to predict motivation to change alcohol use with significant standardized path estimates labeled.

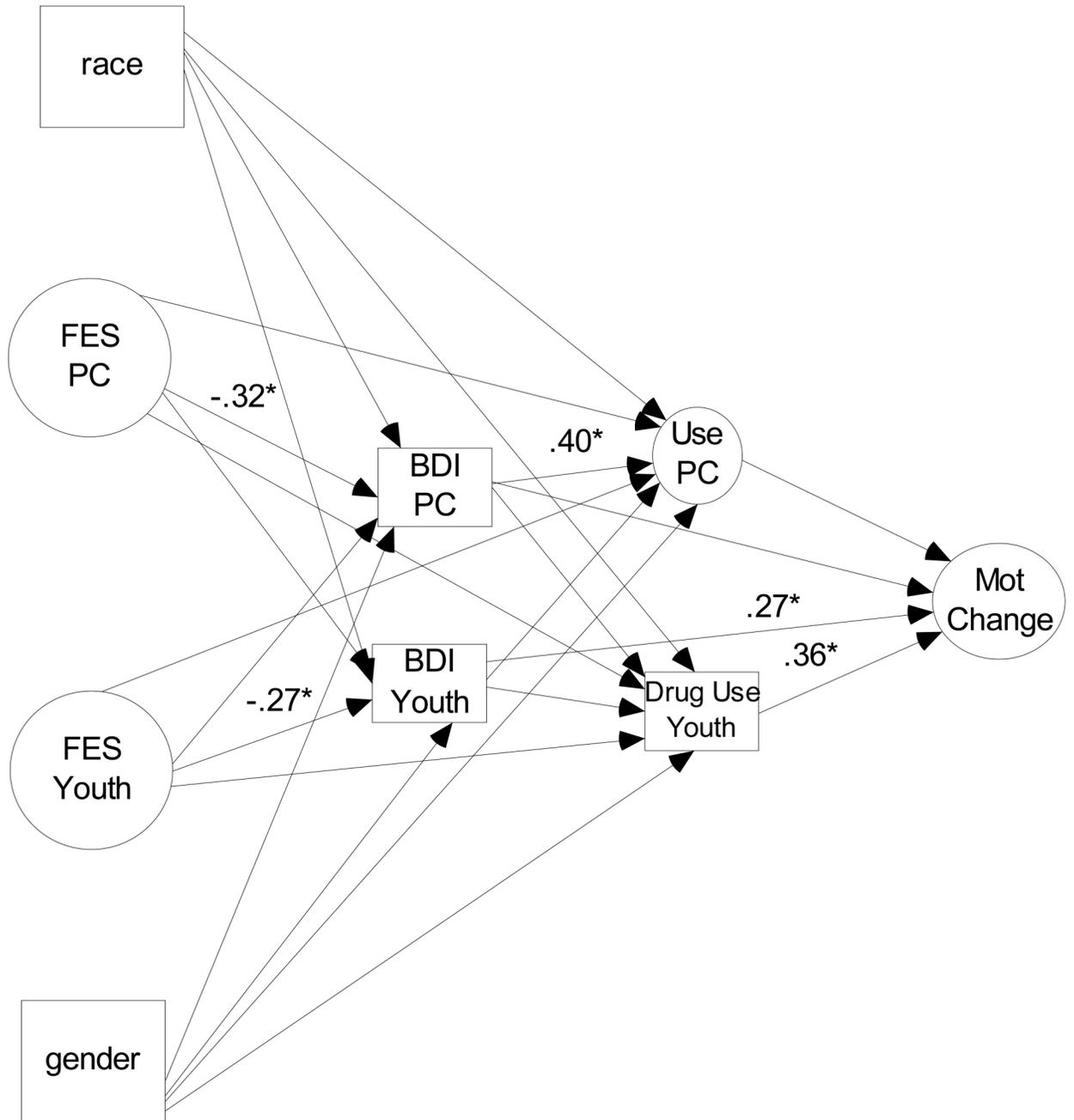


Figure 2. Model for motivation to change drug use with significant standardized path estimates labeled.

Table 1
Descriptive statistics for the whole sample and the subsamples who reported no drug use or no alcohol use.

Scale	PC		PC		PC		Youth		Youth	
	Total M(SD)	Alcohol Model M(SD)	Drug Model M(SD)	Total M(SD)	Alcohol Model M(SD)	Drug Model M(SD)	Total M(SD)	Alcohol Model M(SD)	Drug Model M(SD)	
N	140	84	119	140	84	119	140	84	119	
Substance Use										
#days in last 30 alcohol	2.78 (5.76)	3.00 (6.22)	2.72 (5.60)							
#days in last 30 drugs	.28(2.71)	.47 (3.47)	.33 (2.93)	5.07(11.85)	8.09 (14.16)	3.66 (9.84)	25 (27.5)	23.45(28.41)	28.14 (27.64)	
%days last 90 alcohol										
%days last 30 drugs	9.72 (9.85)	10.39 (9.89)	9.62 (9.41)	14.98 (12.54)	15.70 (11.94)	15.11(12.69)				
BDI										
FES										
Cohesion	5.74(2.37)	5.27(2.51)	5.70 (2.40)	4.03 (2.34)	3.82 (2.40)	4.06 (1.97)				
Conflict	4.61 (2.0)	4.74(2.04)	4.60(1.97)	5.41 (2.03)	5.47(1.94)	5.38(2.03)				
Organization	4.19 (1.97)	4.86(1.98)	4.91(2.01)	4.90 (2.01)	4.0 (2.01)	4.21(1.95)				
SOCRATES Alcohol										
Recognition				9.67 (5.2)	10.56 (5.81)	9.23(4.77)				
Ambivalence				5.78 (3.31)	6.38(3.60)	5.43(2.93)				
Taking Steps				13.42 (8.69)	14.84(9.0)	12.50(8.18)				
SOCRATES Drugs										
Recognition				11.11 (6.19)	11.32(6.85)	11.33(6.29)				
Ambivalence				7.14 (4.45)	7.24(4.78)	7.36(4.55)				
Taking Steps				15.31 (8.97)	15.52(9.60)	15.43(8.81)				

Table 2

LISREL Estimates (standardized estimates) for the measurement model.

Path	Motivation to Change Drug Use	Motivation to Change Alcohol Use
	N=119	N=84
From Indicator		
To Motivation Drug		
Recognition	1.00	1.00
Ambivalence	.75* (.94)	.61* (.94)
Taking Steps	1.07* (.70)	1.01* (.62)
From Indicator to		
PC Use		
Use of Alcohol	1.00	1.00
Use of Drugs	.63* (.78)	.42* (.63)
From Indicator		
To Family Environment PC		
Cohesion	1.00	1.00
Conflict	-.64* (-.58)	-.52* (-.57)
Organization	.67* (.59)	.51* (.56)
From Indicator to		
Family Environment Youth		
Cohesion	1.00	1.00
Conflict	-.75* (-.64)	-.84* (-.71)
Organization	.68* (.61)	.78* (.64)

*
p < .05

Table 3
LISREL Estimates (standardized estimates) for the structural model.

Path	Motivation to Change Drug Use N=119	Motivation to Change Alcohol Use N=84
Motivation to Change		
From youth Use	1.94* (.36)	.88 (.17)
From PC Use	2.26 (.18)	.30 (.04)
From BDI Youth	.12* (.27)	.03 (.07)
From BDI PC	.05 (.09)	.16* (.29)
Youth Use		
From BDI Youth	-.01 (-.07)	.02* (.25)
From BDI PC	.00 (.04)	.01 (.12)
PC Use		
From BDI Youth	.00 (-.11)	-.01 (-.24)
From BDI PC	.02* (.40)	.03* (.43)
Family Environment PC to:		
To Youth Use	.00 (.01)	.09 (.19)
PC Use	.02 (.08)	.03 (.08)
BDI Youth	-.68 (-.10)	-.93 (-.17)
BDI PC	-1.70* (-.32)	-1.37* (-.31)
Family Environment Youth to:		
Youth Use	-.03 (-.05)	-.05 (-.07)
PC Use	-.41 (-.21)	-.10 (-.23)
BDI Youth	-1.93* (-.27)	-1.41 (-.19)
BDI PC	.18 (.03)	-.08 (-.01)
Youth Gender to:		
Youth Use	.17 (.08)	-.05 (-.02)
PC Use	.19 (.21)	.35 (.26)
BDI Youth	-1.85 (-.07)	-4.64 (-.20)
BDI PC	.29 (.02)	1.15 (.06)
Youth Race/Ethnicity to:		
Youth Use	.13 (.06)	.44 (.22)
PC Use	.12 (.13)	.22 (.17)
BDI Youth	-2.69 (-.10)	-5.77* (-.24)
BDI PC	-2.70 (-.14)	-2.67 (-.13)

* p < .05