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Abstract

Based on problem-behavior theory (Jessor & Jessor, 1977), a second-order problem behavior model of delinquency, marijuana use, and risky sexual behavior over five waves was estimated among truant adolescents. The study also investigated the influence of the problem factor on future arrest charges and the effect of socio-demographics on problem behavior and future crime. Results confirm the existence of a second-order latent factor of problem behaviors. Problem behaviors predicted more future arrest charges. Age was related to problem behaviors and future arrest charges, and family income was related to problem behavior. Implications for future research and practice are discussed.

Keywords

problem-behavior theory; truancy

Introduction

Problem behaviors during adolescence remain a concern for society and the individual. A number of theories postulate common causes for multiple problem behaviors among youth. These theories include, but are not limited to, general strain theory (Agnew, 1992), problem-behavior theory (PBT: Jessor & Jessor, 1977), social control theory (Hirschi, 1969), and social learning theory (Akers, 1977). Unlike traditional general theories of deviance for youth used in criminology and criminal justice, problem-behavior theory specifically postulates a global construct, or syndrome, of general deviance. The present study contributes to the literature on problem-behavior theory by testing its syndrome hypothesis among a sample of truant adolescents.

Problem-Behavior Theory

Problem-behavior theory (Jessor & Jessor, 1977) is a psychosocial explanation for co-occurring problem behaviors among adolescents. It hypothesizes problem behaviors reflect a general deviance construct that shares common etiology based on proneness, or risk, toward delinquency and antisocial problem behaviors (Jessor, 1987). The theory focuses on three key areas: personality, environment, and behavior (Jessor & Jessor, 1977). Personality encompasses three domains: motivational-instigation, personal belief, and personal control. Behavior is perceived as directly dependent on values placed on academics, peers, and independence, personal values and self-constraints (e.g., self-esteem), and self-control mechanisms (e.g., tolerance for behavior, religiosity). Environment is divided into two domains: a distal domain that includes perceived environment variables which affect behavior indirectly, such as support and control from parents and peers, and a proximal domain that includes measures which directly affect behavior, such as imitation and approval for behavior by parents and peers. Finally, the behavior component includes problem behaviors, as well as conventional behaviors. Problem behaviors are directly impacted by the personality and environment systems, both of which may also interact to affect problem behavior.

Problem-behavior theory has received much empirical support (Ary et al., 1999; Barrera, Biglan, Ary, & Li, 2001; Chun & Mobley, 2010; Cooper, Wood, Orcutt, & Albino, 2003; Donovan & Jessor, 1985; Donovan, Jessor, & Costa, 1988, 1991; Duncan, Duncan, & Strycker, 2001; Farrell, Kung, White, & Valois, 2000; Fortenberry, Costa, Jessor, & Donovan, 1997; Gillmore, Spencer, Larson, Tran, & Gilchrist, 1998; Grube & Morgan, 1990; Jessor & Jessor, 1977; Jessor et a., 2003; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Mitchell & O'Nell, 1998; Mobley & Chun, 2013; Newcomb & McGee, 1991; Resnicow, Ross-Gaddy & Vaughan, 1995; Vazsonyi et al., 2008; Vingilis & Adlaf, 1990; Zhang, Welte, & Wieczorek, 2002). Generally, tests of the theory focus on its hypothesis of a general deviance construct (i.e., the existence of a syndrome of general deviance), with relatively few studies testing the full theory (i.e., personality, environment, and behavior components). In most studies of PBT, the general deviance construct is comprised of substance use (e.g., tobacco, alcohol, marijuana, and other illicit substances), delinquency (e.g., assault, theft, and status offenses such as truancy and curfew violations), and sexual risk behaviors (e.g., number of sexual partners, condom usage, pregnancy, contracting sexually transmitted diseases [STDs]); but a few studies include measures of academic performance, religiosity, risky driving, and conventional behaviors (expected to be inversely correlated with problem behaviors). Results of tests of this syndrome hypothesis indicate problem behaviors appear to reflect a global construct in adolescence (but see, Farrell, Sullivan, Esposito, Meyer, & Valois, 2005; Tidlesley, Hops, Ary, & Andrews, 1995; Williams, Ayers, Abbott, Hawkins, & Catalano, 1996; Willoughby, Chalmers, & Busseri, 2004).

While the theory suggests the general problems behavior construct is similar across socio-demographic characteristics, research on this is mixed. A few studies find the general deviance construct for PBT is similar across gender (Barrera et al., 2001; Donovan et al., 1988; Farrell et al., 2000; Grube & Morgan, 1990; Jessor et al., 2003), race/ethnicity

(Barrera et al., 2001), age (Grube & Morgan, 1990), and urbanity (Farrell et al., 2000); but others report variation in the construct across gender (Chun & Mobley, 2010), race/ethnicity (Mobley & Chun, 2013), and age (Chun & Mobley, 2010). More research is needed to help clarify the issue of variance across socio-demographic groups.

Studies of the general problem behavior construct tend to rely on confirmatory factor analysis to either model problem behavior as a first-order latent factor comprised of observed indicators for the various problem behaviors (Ary et al., 1999; Donovan & Jessor, 1985; Donovan et al., 1988; Farrell, Danish, & Howard, 1992; Newcomb & McGee, 1991; Willoughby et al., 2004) or a second-order latent factor comprised of separate latent factors for each problem behavior which, in turn, are each comprised of multiple observed problem behaviors (Barrera et al., 2001; Chun & Mobley, 2010; Cooper et al., 2003; Fortenberry et al., 1997; Lightfoot, Stein, Tevendale, & Preston, 2011; Mobley & Chun, 2013; Vazsonyi et al., 2008; Zhang et al., 2002). Some studies test competing models of the first-order factor versus the second-order factor structure (Farrell et al., 2000; Gillmore et al., 1998; Grube & Morgan, 1990; Mitchell & O'Nell, 1998; Resnicow et al., 1995; Tildesley et al., 1995; Vingilis & Adlaf, 1990), with the majority of these studies finding stronger support for a second-order factor model of problem behaviors (but see, Tildesley et al., 1995). More recently, research has also examined the stability of the problem behavior syndrome over time, generally by utilizing latent growth modeling to estimate both the general problems latent construct and growth (i.e., slope) in this latent construct over time (Duncan et al., 2001; Farrell et al., 2005; see also, Cooper et al., 2003). Research suggests the syndrome of problem behaviors continues over time for adolescents. For example, Cooper and associates (2003) found the problem behaviors factor at time one accounted for approximately 75% of the variance in the factor at time two. Moreover, Duncan et al. (2001) found a significant positive slope for the problems behavior factor in their growth model, indicating problem behaviors increased over time, between 11 and 18 years of age.

The overwhelming majority of the research on PBT has relied upon samples of youth in the U.S. taken from general populations and cross-sectional data. Few studies have tested PBT utilizing samples of at-risk youth (Gillmore et al., 1998; Lightfoot et al., 2001) and longitudinal data (Ary et al., 1999; Cooper et al., 2003; Donovan & Jessor, 1985; Duncan et al., 2001; Farrell et al., 2005; Fortenberry et al., 1997; Jessor et al., 1995; Newcomb & McGee, 1991; Zhang et al., 2002). Gillmore and associates (1998) examined the general deviance factor among a sample of pregnant and parenting teenagers, and found a second-order, single factor consisting of latent constructs for school problems, substance use, general delinquency, and sexual involvement best described their data for pregnant and parenting adolescents. Lightfoot et al. (2001) studied homeless and runaway adolescents in Los Angeles County, California and also found support for a second-order factor of problem behaviors for substance use, general delinquency, and sexual risk. Furthermore, Zhang et al. (2002) utilized a sample of adolescent males in Buffalo, New York that was specifically oversampled for young men at-risk of delinquency. Their study revealed the adolescents could be characterized as possessing a syndrome of problem behaviors comprised of alcohol use, drug use (marijuana and other illicit substances), and general delinquency. To the authors' best knowledge, however, none of the research has tested PBT on a sample of truant youth exclusively. Yet, truant youth are an important group for focused attention within the

problem behavior theory framework. While some of the aforementioned tests of PBT in at-risk populations, such as studies of homeless youth, likely contained truant youths, none of these prior studies utilized an entire sample of youth labeled as truant, as is the case with the present study. As such, the present study extends the research on problem-behavior theory to the understanding of general deviance in truant adolescents.

Truant Adolescents as an At-Risk Population

Truancy is an ongoing problem in the U.S. with potentially serious consequences. Generally, truancy refers to unauthorized, unexcused absence from school, though, this definition is not universally accepted. Since the definition of truancy varies across jurisdictions, accurate national statistics on the prevalence of truancy among adolescents are not available. Estimates from self-report data and school districts, however, suggest the prevalence of truancy in the U.S. is approximately 10% (e.g., Colorado Department of Education, 2011; Dropout Nation, 2010; Henry, 2007; Vaughn, Maynard, Salas-Wright, Perron, & Abdon, 2013).

Truant youth may be particularly prone to experiencing problem behaviors addressed in PBT. Truancy is associated with a variety of negative behaviors. Truancy has been associated with difficulties in school and academic achievement (e.g., Bridgeland, Dilulio, & Morison, 2006; Caldas, 1993; Lamdin, 1996), difficulties with family and personal relationships (Baker, Sigmon, & Nugent, 2001; Kearney & Silverman, 1995), emotional and psychological issues (e.g., Dembo et al., 2012; Diebolt & Herlache, 1991; Egger, Costello & Angold, 2003), alcohol and illicit substance use (e.g., Barry, Chaney, & Chaney, 2011; Flaherty, Sutphen, & Ely, 2012; Henry, 2010; Henry, Knight, & Thornberry, 2012; Maynard, Salas-Wright, Vaughn, & Peters, 2012), and juvenile delinquency and crime (e.g., Baker et al., 2001; Catalano, Arthur, Hawkins, Berglund, & Olson, 1998; Gonzales, Richards, & Seeley, 2002; Henry et al., 2012; Li et al., 2011; Onifade, Nyandoro, Davidson, & Campbell, 2010; Schroeder, Chaisson, & Pogue, 2004). The nature of the associations between truancy and the aforementioned negative behaviors, however, is unclear.

Truant youth may also be prone to experience multiple problem behaviors because the behavior itself increases the risk of contact with the criminal justice system. Truancy is often classified as a status offense that, depending on how it is enforced in a jurisdiction, results in arrest and contact with the juvenile justice system. Juvenile court statistics indicate increasing trends in the rates of cases processed for a status offense of truancy (e.g., Puzzanchera et al., 2011), which suggests the juvenile justice system is being more heavily relied upon to manage truant behavior. Consequently, the criminalization of truancy has a net-widening effect that may increase truant youths' risk of delinquency and other problem behaviors.

Furthermore, truants may be prone to experience multiple problem behaviors because it places such youth on a potentially criminal life-course trajectory. In particular, Loeber and Farrington (2000) describe three developmental pathways to delinquent behavior for youth. One of these pathways is the authority conflict pathway, which includes truancy as a characteristic. According to the authority conflict pathway to violence, truancy, along with curfew violations and running away, represents the final step in a pattern of defiant behavior

that increases youths' risk of early involvement in delinquency and future violent behavior (Loeber & Farrington, 2000). While the research supporting this hypothesis is limited, Loeber et al. (1993) demonstrated boys in the Pittsburgh Youth Study who were categorized as being on the authority conflict pathway were at increased risk of engaging in future violence and property offending. Additional research on the association between truancy and delinquency is needed, and may be better informed by a test of the syndrome hypothesis of problem-behavior theory on truant youth.

Although research testing PBT has revealed much support for the theory using a broad range of psychosocial influences and problem behaviors, to the authors' knowledge none of this work tests PBT using a sample of truant youth alone. Since truant youth represent a population that may experience a variety of behavioral problems, they reflect an interesting group on which to test the syndrome hypothesis of PBT. Demonstration of support of PBT among truant youth would expand the understanding of the dynamics of problem behaviors.

Purpose of the Study

The purpose of this study was to test PBT on a sample of truant youth involved in a longitudinal, NIDA funded Brief Intervention (BI) project. This exploratory study had three major goals. The first goal was to test the syndrome hypothesis of PBT (Jessor & Jessor, 1977) for problem behaviors among truant youth across five time points spanning 18 months. It was hypothesized a second-order factor of general problem behaviors would fit the data for the truant adolescents, with the factor comprised of latent factors for marijuana use, sexual risk, and general delinquency, each of which were comprised of observed indicators of the behavior at multiple time points. If a single latent construct of problem behaviors was found, the second goal was to examine how this latent problem behavior factor affected future involvement in official criminal behavior. Based on the literature reviewed above, it was anticipated that any such relationship would reflect a positive relationship between the problem behavior factor and future criminal behavior. The direction of the relationship between the problem behavior factor and future official crime, however, was not specified. The third goal was to examine the influence of certain socio-demographic characteristics on any problem behavior factor identified and future official crime. Since the research is mixed on the effects of socio-demographic characteristics on the general problem behavior factor, no specific hypotheses were made regarding the direction of the effects of socio-demographic variables on the problem factor among truant youth. Figure 1 displays the model tested in the present study.

Method

Procedures

Procedures for this study were approved and monitored for ethics by the university's Institutional Review Board (IRB). Participants were involved in a Brief Intervention (BI) project for truant youth involved in substance use. Youths and their families were recruited for the project primarily from the local truancy center, but also school guidance counselors in the local school district and a community diversion program. The truancy center is located in a large urban area in the southwest U.S. The truancy center is a school-based center with a

classroom-like setting where youths who have been apprehended by local law enforcement for truancy are held during school hours. The truant youths are retrieved by their parents at the end of school hours. Homeless youth who are picked up by law enforcement for truancy are not taken to the truancy center because they may lack a specific school assignment and are thus not in school records and/or they cannot be released to parents at the end of the school day. None of the participants in this study were homeless. Runaway youth may be picked up for truancy and taken to the truancy center. It is possible that runaways were included in our sample, but less likely given the requirement for youth assent as well as parental consent.

Project staff informed recruited youths and their parents/guardians of the purpose of the study, specified participation was free and voluntary, and indicated services would be delivered in-home. Following consent and assent procedures and completion of youth and parent baseline interviews, participants were randomly assigned to one of three project service conditions: BI-youth only (BI-Y), BI-youth plus an additional parent individual session (BI-YP), or standard truancy services (STS). Random assignment was balanced to ensure equal distribution across the three conditions. The follow-up period began the day after the date of the youth's last participation in project services (i.e., the last intervention or STS session). Follow-up interviews were conducted at 3-months, 6-months, 12-months, and 18-months. Each youth and his/her parent/guardian was paid $15 for completing each in-home, baseline and follow-up interview. Generally, the youth interview took sixty minutes to complete, while the parent interview took thirty minutes to complete. In addition, official arrest and charge information was collected for a 24-month follow-up period.

Participants

To be eligible for the project, truant youths had to meet the following criteria. First, they had to be 11 to 17 years of age at the time of enrollment. Second, their criminal records had to indicate two or fewer misdemeanor arrests. Third, they had to demonstrate involvement in alcohol or drug use, as determined by a screening instrument or reported by a school or truancy center social worker. Finally, they had to live within 25-mile radius of the truancy center. The final sample consisted of 300 youths, who were enrolled and completed baseline interviews between March 2, 2007 and June 22, 2012. Depending on when the youths entered the project, follow-up interviews were also administered to the youths and their parents at 3-month ($n = 282$), 6-month ($n = 281$), 12-month ($n = 245$), and 18-month ($n = 215$) follow-up. Youths who began participation early in the project completed all four follow-up interviews, whereas youths who enrolled most recently were not yet due for any follow-up interview at the time the data collection terminated. High overall completion rates of 94.0%, 93.7%, 92.1%, and 88.5% were achieved for the 3-month, 6-month, 12-month, and 18-month follow-up interviews, respectively. Of the completed follow-up interviews, 95.4% of the 3-month, 95.0% of the 6-month, 96.3% of the 12-month, and 99.1% of the 18-month interviews were completed within 60 days of the scheduled interview date.

Intervention Conditions

The focus of the present study was on the problem behavior factor, not the intervention. Therefore, this study did not test the efficacy of the BI on truant youth. Since the youths

were undergoing an intervention, however, it was important to control for the effects of treatment. As mentioned, the youths were randomly assigned, with assignment balanced to ensure equal numbers, to one of three groups for intervention. Two groups received the BI (BI-Y or BI-YP), while a third group received the standard truancy center services (STS).

The goal of the BI was to promote abstinence and prevent relapse among drug-using adolescents. Adapted from previous work, the BI incorporated elements of Motivational Interviewing, Rational-Emotive Therapy and Problem-Solving Therapy to develop adaptive beliefs and problem-solving skills to improve positive coping mechanisms (Winters & Leitten, 2007). The goal of the BI therapy was to diminish factors contributing to drug use (e.g., maladaptive beliefs) and promote factors that protect against relapse via problem-solving skills and support from the environment (Winters, Fahnhorst, Botzet, Lee, & Lalone, 2012; Winters, Lee, Botzet, Fahnhorst, & Nicholson, 2014). Youths randomly assigned to the BI-Y condition were administered two BI sessions, but no session was held with their parents. Youths randomly assigned to the BI-YP condition were administered two BI sessions and their parents were administered a separate parent BI session. Briefly, in the first BI session with the youths, the potential causes and consequences of the youth's substance use are examined and the youth develops a goal for changing their behavior and striving for drug abstinence. In the second session with the youth, the youth's progress with regard to drug abstinence goal is reviewed and modified and risk factors for use are identified. In the parent session, the parent's attitudes, behavior, supervision, discipline and communication with respect to the youth's substance use are explored and addressed. On average, each BI session was 75 minutes in duration, and the sessions occurred one week apart.

Youths randomly assigned to the STS condition received the normal truancy services provided by the local school district, as well as a referral service overlay of three weekly, 60-minute visits by project staff. Referral assistance provided truant youths and their families in the control condition with an additional resource that is not easily available to them, and also controlled for service exposure. On each contact occasion, the project staff member carried a copy of a county government-developed agency and service resource guide, which contained hundreds of publicly-available agency listings, contact persons, telephone, and e-mail information. Staff members provided participating families, when requested, with the referral information contained in the resource guide. No form of counseling or therapy was offered in the STS condition.

Measures

Marijuana use—Marijuana use for baseline and four follow-up periods (3-, 6-, 12-, 18-month) was measured by combining responses to self-report questions about use with results from urine tests (UA). The self-report questions about marijuana use were items from the Adolescent Diagnostic Interview (ADI: Winters & Henly, 1993). The ADI was designed to be administered in a highly structured and standardized format to capture *DSM-IV* criteria for substance use disorders and related areas of functioning. It has demonstrated strong reliability and validity (Winters & Henly, 1993). The ADI questions probed the use of marijuana as never, less than five times, or five or more times for lifetime at baseline and between interviews for the follow-up periods. Urine specimens were collected with the

Onsite CupKit® urine screen procedure to assess recent drug use. For marijuana (THC), the urine test positive threshold level was 50 ng/ml of urine. The surveillance windows were 5 days for moderate users of marijuana, 10 days for heavy users of marijuana, and 30 days for chronic users. Other substances were not included in this study due to low endorsement rates.

For each time point, we combined the self-reported marijuana use and marijuana urine test data into an overall measure of marijuana use consisting of four categories: (1) marijuana use denied and UA test for marijuana negative or missing due to reasons beyond the youth's control (e.g., incarceration or long-distance interview) or the youth's refusal to provide a urine specimen; (2) UA test missing or negative for marijuana, but the youth reported marijuana use one to four times; (3) UA test missing or negative, but the youth reported marijuana use five or more times; (4) UA test positive for marijuana. This categorical variable was used in subsequent analyses.

Time in a secure setting reduces time at risk, and the likelihood of engaging in risk behavior. Official and interview records provided information on placement in a secure facility, either treatment or incarceration, for the youths. Relatively few youths spent a sizable number of days in a secure facility during each of the follow-up periods. Specifically, in each follow-up period, less than 4% of the youths spent 30 or more days in a secure facility. Since it is possible that youths had access to marijuana during their time in a secure facility, these cases were included in the analyses.

Sexual risk behavior—Youths were asked to self-report involvement in sexual risk behavior for lifetime at baseline and between interviews for the follow-up periods using the POSIT HIV/STD Risk Behavior instrument, developed by the NOVA Research Company (Young & Rahdert, 2000). It has demonstrated very good psychometric properties (e.g., internal consistency = 0.80, one-week test-retest reliability = 0.90; concurrent validity with the Sexual Risk Questionnaire scores: $r = 0.80$). Lack of condom use and number of sexual partners, in particular, are widely used sexual risk behavior measures in related research (Brook, Balka, Abernathy, & Hamburg, 1994; Bryan, Ray, & Cooper, 2007; Cooper, 2002; Elkington, Bauermeister, Brackis-Cott, Dolezal, & Mellins, 2009; Goldstein, Barnett, Pedlow, & Murphy, 2007; Komro, Tobler, Maldonado-Molina, & Perry, 2010; Morris, Baker, Valentine, & Pennisi, 1998; Morris, Harrison, Knox, Tromanhauser, & Marquis, 1995; Murphy, Brecht, Herbeck, & Huang, 2009; Wetherill & Fromme, 2007; also see: Warren et al., 1998; de Guzman & Bosch, 2007). This study developed a summary measure of youths' involvement in four of the sexual risk behaviors at each time point: (1) had sexual intercourse, (2) had sexual intercourse without using a condom, (3) had sex with two or more people, and (4) had a sexually transmitted disease. Low endorsement rates for the STD item at each time point led to the recoding of the sexual risk summary measure to include youths reporting all four sexual risk behaviors in the fourth category of the final ordinal measure used in analyses, together with youths reporting three risk behaviors.

Self-reported delinquent behavior—Based on the work of Elliott, Ageton, Huizinga, Knowles, and Canter (1983) on the National Youth Survey, questionnaire items were created and administered to participating youths to capture 23 self-reported delinquent behaviors. At

baseline, youths were asked to report how many times they engaged in each of 23 delinquent behaviors during the previous 12 months. For each follow-up period, youths were asked to report their engagement in these same acts during the time between interviews. Youths who reported committing an act 10 or more times were also asked to indicate how often they participated in this behavior (i.e., once a month, once every two or three weeks, once a week, two to three times a week, once a day, or two to three times a day). Moreover, youths were asked to indicate the age during which a committed act first occurred for each delinquent behavior. A measure of total self-reported delinquency (i.e., sum of number of times of the 23 delinquent acts) was created for subsequent analyses. The distributions of the total delinquency measures were non-normal, with some youths reporting no delinquent behavior and others reporting hundreds of delinquent acts. Therefore, the measures of total delinquency for baseline and follow-up interviews were transformed using logarithm to the base 10 (with 1 added to the raw total score before log transformation). This transformation evaluates the differences between 1 and 10, 10 and 100, and 100 and 1,000 offenses as being comparable (Dembo & Schmeidler, 2002). Importantly, the skewness and kurtosis of the log transformed measure of total delinquency were dramatically lower than those of the untransformed measure at each data collection point.

Preliminary analyses indicated no need to control for time at risk for the self-reported delinquency measures. The correlation between the number of the days spent in a secure facility during each follow-up period and the youths' self-reported delinquency during that period was low and non-significant (3-month follow-up: $r = .059$; 6-month follow-up: $r = .043$; 12-month follow-up: $r = .105$; 18-month follow-up: $r = .094$). Similarly low correlations were found using log transformed days to reduce skewness and kurtosis: $r = .065$, $r = .145$, $r = .138$, and $r = .106$, respectively. All these correlations were positive, suggesting that much time in a secure facility was not associated with spuriously low reported delinquency.

Validity of the self-reported delinquency data: In order to evaluate the accuracy of the self-reported delinquency data, we compared youths who were and were not arrested in each follow-up period. Among youths who were not arrested, the percentages of those who reported any delinquency were 55%, 54%, 50%, and 48% in the four follow-up periods, respectively. Among youths who were arrested, the percentages that reported any delinquency were 83%, 76%, 72%, and 52%, respectively. The higher rates of reporting delinquency among arrested youths suggest that most youths reported their delinquency fairly accurately for the 3-month, 6-month, and 12-month follow-up periods, but somewhat less accurately for the 18-month follow-up period.

Socio-demographic and other covariate measures—While the primary focus of this study was on the stability of a problem behavior factor among truant youth, several socio-demographic and other covariates were examined in relation to the problem factor and future official crime to address the second goal of the study. *Age* was measured in the number of years at the time of baseline interview. *Gender* was a dichotomous measure, where 0 = male and 1 = female. *Race* was also a dichotomy, where 1 = African American

and 0 = other race, as was *Ethnicity*, where 1 = Hispanic (any race) and 0 = non-Hispanic (any race).

This study also examined covariates for the family structure, income, and stressful events. Relatively few youths lived with both biological parents at the time of the baseline interview. Hence, *youth lives with mother* was a dichotomous variable reflecting whether or not the youth lived with their biological mother, where 1 = lived with mother and 0 = other living situation. During the baseline interview, parents were asked to provide information about their annual family income. *Family income* was an ordinal variable where 1 = less than $5,000, 2 = $5,001 to $10,000, 3 = $10,001 to $25,000, 4 = $25,001 to $40,000, 5 = $40,001 to $75,000, and 6 = more than $75,000. In addition to income, parents were asked at baseline to indicate whether or not the youth or their family ever experienced certain serious stressful or traumatic events. Specifically, parents were questioned about the following events: accidental injury requiring hospitalization, serious illness, death, divorce, eviction, unemployment of a parent, legal problems resulting in jail or detention, victimization of violence, and any other (unspecified) traumatic event. A summary index was created for affirmative responses (1 = yes, 0 = no) to the nine items, such that higher scores indicate experience of repeated traumatic events.

Official record recidivism at 24-month follow-up—Considerable discussion has been devoted to reviewing the strengths and weaknesses of measuring recidivism (see, for example: Spohn & Holleran, 2002). A major issue in this discussion centers around the lack of complete information on "every crime and who committed it" (Maltz, 1984, p. 22). Although informed judgments differ on an appropriate operational definition of recidivism, Maltz (1984) and Blumstein and Cohen (1979) argue persuasively that data on arrests are a better measure of recidivism than convictions. As Blumstein and Cohen (1979, p. 565) assert, "errors of commission associated with truly false arrests are far less serious than errors of omission that would occur if the more stringent standard of conviction were" [used]. Hence, the operational definition of recidivism in this study was based on the youth's follow-up period arrest data, and involved the arrest information during the 19th to 24th months (referred to as the 24-month follow-up period) following the youth's date of last project service (i.e., BI session or STS meeting).

Since youths can be arrested on multiple charges, and number of charges is a practical indicator of serious offense behavior, the key distal outcome measure of recidivism was created using the number of arrest charges during the 24-month follow-up period. These data were obtained from official criminal histories obtained from the state juvenile justice system and the county sheriff's office. In addition, adult arrest information was obtained from the local and state criminal records for youths who turned 18 years old or older during the 24-month follow-up period. For the analyses reported in this paper, a summary score for total arrest charges was created.

One-sample Kolmogorov-Smirnov tests indicated the distribution of the number of arrest charges during the 24-month follow-up period was not consistent with a normal, uniform, Poisson or Exponential distribution. Further, the distribution had very high skewness and kurtosis values. Hence, the number of arrest charges distribution was log transformed to the

base 10, with −1 assigned to no charges. The log transformation reduced the skewness and kurtosis values below levels indicating severe non-normality (skew > 2; kurtosis >7) (Fabrigar, Wegener, MacCallum, & Strahan, 1999) of each distribution.

Time in secure facility at 24-month follow-up—Since time in a secure setting reduces the likelihood of engaging in risk behavior, it was important to control for time at risk when examining the impact of the multi-problem factor on the outcome variable of recidivism. Consequently, for each youth, the number of days he/she spent in a secure facility (e.g., detention center, jail) during the 24-month follow-up period was determined. Examination of the distribution of this variable indicated it was highly skewed with large skewness and kurtosis values. Accordingly, the time in a secure facility during the recidivism period measure was log transformed to the base 10, with a −1 assigned to no days in a secure facility. The log transformations greatly reduced skewness and kurtosis values of the variable's distribution.

Treatment condition—An indicator of BI treatment was also included in analyses involving the distal outcome of recidivism. This was a dichotomy that contrasted youths and families receiving BI services (BI-Y or BI-YP) with those receiving standard truancy services (STS).

Analysis Strategy

First-order and second-order, confirmatory factor analyses (CFA) were estimated on the problem behavior measures for marijuana use, sexual risk behavior, and self-reported delinquency to test the syndrome hypothesis of PBT. The analyses were completed using Mplus Version 7.2 (Muthèn & Muthèn, 1998–2012), a versatile, multivariate statistical modeling program that estimates a variety of models for continuous and categorical observed and latent variables. Since marijuana use and sexual risk behavior at each time point were measured by an ordinal (polytomous) variable, a robust weighted least square estimator, using a diagonal weight matrix, with mean-adjusted and variance-adjusted chi-square test statistics (WLSMV) (Muthèn & Muthèn, 1998–2012) was used in these analyses.

The analyses proceeded in five steps. First, separate first-order CFAs were completed for each set of problem variables (i.e., marijuana use, sexual risk behavior, and self-reported delinquency). Second, a combined measure, first-order CFA was performed on the three problem variable sets. Third, a second-order CFA was conducted involving the latent variables of the three problem variable sets. For comparison purposes, a one-factor first-order CFA was also conducted on all the variables of the three sets. Fourth, to address goal two, a structural equation model (SEM) was estimated assessing the influence of the second-order problem variable on number of arrest charges during the 24-month follow-up period. Figure 1 illustrates the SEM estimated for this fourth, sequential step. Finally, to address goal three, assessments were made of the influence of various covariates on the SEM variables.

A non-significant chi-square value for WLSMV indicates an acceptable model fit. Mplus also provides a number of measures that aid in assessing the closeness of fit of the model to

the data. Three fit indices were used to evaluate the model fit: (1) the comparative fit index (CFI) (Bentler, 1990); (2) the Tucker-Lewis coefficient (TLI) (Tucker & Lewis, 1973); and (3) root mean square error of approximation (RMSEA) (Byrne, 2001). The typical range for both TLI and CFI is between 0 and 1 (although TLI can exceed 1.0), with values greater than .95 indicating a good fit (Browne & Cudeck, 1993; Hu & Bentler, 1999). For RMSEA, values at .05 or less indicate a close model fit, and values between .05 and .08 suggest an adequate model fit (Browne & Cudeck, 1993).

Because the time of entry into the study determined the number of follow-up interviews each youth and parent/guardian received, missing data were a consequence of the study design. Accordingly, the Mplus feature allowing for maximum likelihood estimation of missing values was used to treat the missing data (Muthèn & Muthèn, 1998–2012).

Results

Descriptive Statistics

Table 1 provides descriptive information for the covariates and outcome measure. Participants averaged 14.8 (SD = 1.30) years in age at the time of the baseline interview. Approximately two-thirds of the sample were male. The youths were racially and ethnically diverse, with large portions of the youths describing themselves as African American or white/Anglo in race, and Hispanic (regardless of race) in ethnicity. Relatively few youths were living with both of their biological parents (17%), and a third of the youths were living with their birth mother alone. Overall, the families in the project reported modest annual incomes. Many of the families reported experiencing one or more stressful events at baseline, with an average of 2.99 (SD = 1.76) stressful/traumatic events reported per family. By design, one third of the sample were selected for the BI-Y, BI-YP, and STS treatment condition, respectively. On average, youths spent 20 days during the entire 24-month follow-up period in a secure facility. Descriptive information on arrest charges during the 24-month follow-up period indicated 84.9% of 212 youths who were involved in the project for a sufficient period to be eligible for 24-month follow-up arrest record assessment had no arrest charges, 8.0% had one charge, 3.8% had two charges, 0.5% had three charges, 0.5% had four charges, 0.9% had five charges, 0.5% had six charges, 0.5% had seven charges, and 0.5% had nine charges.

As reported in Table 2, the youths engaged in the three problem behaviors of marijuana use, sexual risk behaviors, and self-reported delinquency fairly consistently between baseline interview and the 18-month follow-up period. Most youths self-reported or were UA positive for marijuana use at each time point, with 36% to 49% being UA positive for the drug. For marijuana, a greater portion of youths reported or tested positive for use at baseline than during the follow-up periods.

For lifetime until baseline, and in each interval between interviews, approximately two-thirds of the sample reported having engaged in sexual intercourse, with one-third of the sample participating in sexual intercourse without using a condom. Approximately one-third of the sample reported engaging in sex with multiple people. Very few adolescents reported contracting an STD.

The truant youths reported relatively high rates of delinquency during the year prior to their initial interviews. High prevalence rates were reported for index offenses (50%), crimes against persons (75%), general theft (75%), drug sales (29%), and total delinquency (94%). Further, several youths reported engaging in the offenses 100 times or more. Reported delinquency at baseline referred to the past year, so it is not directly comparable to follow-up delinquency, which was shorter for follow-ups at 3-months and 6-months than at 12-months and 18-months. Over the course of the data waves, the youths tended to report lower prevalence rates of engaging total delinquency (94%, 57%, 57%, 54%, and 48% from baseline interview to 18-month follow-up, respectively), taking the length of the reporting period into account.

Separate First-Order CFAs of Problem Variables

Marijuana use—Initial CFA of the marijuana variables, involving WLSMV estimation, indicated a poor fit, which could be improved by correlating the residuals between marijuana use at 6-months and 12-months, and marijuana use at 12-months and 18-months. These specifications resulted in an acceptable fit of a one factor model to the data (chi-square = 7.91, df = 3, p = 0.05; RMSEA = 0.07; CFI = 0.995; TLI = 0.982). Each marijuana use variable loaded significantly on the latent factor. (A detailed table reporting these results is available from the senior author upon request.)

Sexual risk behavior—Preliminary CFA of the sexual risk behavior variables, involving WLSMV estimation, indicated a marginal fit of the one factor model to the data. Examination of the modification indices indicated model fit could be improved by specifying a correlated error term between sexual risk behaviors at 12- and 18-months. Analysis of this respecified model found a good model fit, with each sexual risk variable being loaded significantly on the latent factor (chi-square = 9.14, df = 4, p = 0.06; RMSEA = 0.06; CFI = 0.997; TLI = 0.993). Each sexual risk behavior measure loaded significantly on the latent factor. (A detailed table reporting these results is available from the senior author upon request.)

Self-reported delinquency—Preliminary CFA of the self-reported delinquency measures, involving MLR estimation, confirmed a one factor model fit the data well (chi-square = 5.91, df = 5, p = 0.32; RMSEA = 0.02; CFI = 0.996; TLI = 0.992). Each delinquency measure was loaded significantly on the latent factor. (A detailed table reporting these results is available from the senior author upon request.)

Combined First-Order CFA of Problem Variables

Next, a CFA of the three sets of problem behavior measures with the above noted model specifications was estimated. Results of this analysis indicated a good fit of the model to the data, with moderate but significant correlations among the marijuana use, sexual risk behavior, and self-reported delinquency latent variables. Table 3 presents the results of the combined first-order CFA multiple problems model. Each indicator of marijuana use, sexual risk behavior and self-reported delinquency for the five time points loaded significantly onto separate, respective factors. In addition, the marijuana use, sexual risk, and delinquency factors were significantly and positively correlated with one another.

Second-Order CFA of General Problem Latent Construct

In step three of the analyses, a second-order CFA in which the latent variables for the three problem behaviors were specified as indicators of a generic problem behavior latent variable was estimated, with factor correlations among the three problem behaviors (i.e., marijuana use, sexual risk behavior, self-reported delinquency set to zero). This step reflects the illustration in Figure 1 except for the regression on arrest charges for the 19–24-month follow-up period (far right observed variable depicted as a rectangle). The second-order model fit the data well. As Table 4 shows, each of the behaviors for the five time points maintained their significant loading on their first-order factors. Importantly, each of the three problem behavior latent variables (first-order factors) loaded significantly on the generic problem behavior latent variable (second-order factor).

For comparison with the second-order CFA based on the three first-order factors, a first-order CFA was performed to test a one-factor model including all three sets of measures (without modeling separate factors for the three sets). This one-factor model did not fit the data well (chi-square = 621.99, df = 90, p = 0.0000; RMSEA = 0.14; CFI = 0.759; TLI = 0.719). This demonstrated the benefit of fitting a second-order CFA model.

SEM for Second-Order Problem Behavior Effect on Recidivism

Building on the results of the second-order CFA, an SEM was conducted in which the effect of the generic problem behavior factor on youth's total arrest charges during the 24-month follow-up period was estimated. As can be seen in Table 5, a significant positive effect of problem behavior on 24-month follow-up arrests charges was found. Youths with higher levels of problem behaviors were significantly more likely to recidivate during the 24-month follow-up period, than youths with lower levels of problem behaviors (critical ratio = 1.656, one-sided p = .049). All of the first-order and second-order factor loadings remained significant when recidivism was included in the model.

Second-Order Problem Factor Effect on Recidivism with Time at Risk and BI Covariates

It is likely that youths arrest charges would be related to their time at risk (i.e., time placed in a secure facility) and, possibly, their involvement in Brief Intervention services. Accordingly, an SEM was conducted with the specifications noted in the above section and the following additional effects: (a) BI services, specified as a predictor of the marijuana use, sexual risk behavior, self-reported delinquency latent variables, and number of arrest charges during the 24-month follow-up period; and (b) time at risk during the 24-month follow-up period, specified as a predictor of the number of arrest charges during the 24-month follow-up period. Analysis found BI services and time at risk were both significantly related to 24-month follow-up arrest charges. Youths receiving BI services possessed fewer official arrest charges, than youths in the STS condition. Further, youths with more days in secure placement received more official arrest charges, than youths with fewer days of placement in secure facilities. In addition, when the BI and time at risk covariates were added to the model, the effect of the generic problem behavior factor on number of 24-month follow-up arrest charges increased in magnitude and statistical significance (critical ratio = 2.210, one-sided p = .014). (Due to space concerns, a table reporting these results has been omitted. A copy of the table is available from the senior author upon request.)

Covariate Associations with Problem Behavior and Recidivism

Lastly, parameters for associations of truants' socio-demographic covariates at baseline with the generic problem behavior latent variable and the number of arrest charges during the 24-month follow-up period were estimated. Table 6 presents these results. The youth's age at baseline was significantly positively associated with problem behavior, and significantly negatively associated with recidivism; family income was significantly positively associated with problem behavior. None of the other covariates were significantly associated with problem behavior or recidivism.

Discussion

The primary purpose of this study was to determine if truant youths' involvement in marijuana use, sexual risk behavior, and delinquency across five time points reflected Jessor and Jessor's (1977) problem behavior syndrome, using confirmatory, second-order factor analysis. Additional aims were to determine the relationship, if any, between a latent variable reflecting the problem behavior syndrome and future involvement in delinquent/criminal behavior during a 24-month, post-project service follow-up period, and to examine the covariates of truant youths' involvement in problem behavior.

The truant youths in this study demonstrated relatively high rates of problem behaviors. Comparison of self-reports of sexual risk behaviors with findings reported in the Centers of Disease Control's Youth Risk Behavior Surveillance Study (YRBSS: CDC, 2013) indicated youths in the present study had a much higher rate of sexual intercourse before baseline and in each period between interviews (all 62% to 67%), than that reported for lifetime by youths in the YRBSS nationally (47%) or in the state (48%; 9th grade: 31%; 10th grade: 45%; 11th grade: 57%). Participants in this study also reported higher rates of marijuana use than the general population, with the YRBSS reporting approximately 40% ever using marijuana and 23% currently using marijuana. These result are consistent with an expectation that truant youth engage in risky behavior at a higher rate than the general youth population.

The results of this study provided convincing evidence in support of the Jessor and Jessor (1977) syndrome hypothesis of problem-behavior theory. A second-order CFA described three domains of problem behaviors among truant youth, which reflected a global construct of problem behaviors over time; however, a first-order CFA did not succeed at describing these problem behaviors among truant youth as a single overall problem. The results are consistent with the majority of the research on PBT, including tests on at-risk populations (Gillmore et al., 1998; Lightfoot et al., 2011; Zhang et al., 2002). Similar to tests of the syndrome hypothesis of PBT which have examined longitudinal trends in the problem behaviors, this study suggested problem behaviors among truant adolescents are consistent. The CFA results for the observed problem behaviors across the five waves of data collection (spanning 18 months) fit the data well for their specific behaviors. For example, self-reported delinquency for waves 1 through 5 fit a first-order CFA of a latent construct of delinquency. This indicated cohesion in the indicators of delinquency across time.

The second hypothesis that the general problem behavior factor would significantly affect future official crime was supported. There was a marginally significant positive effect between the problem behavior factor and future arrest charges. Truant youth with higher levels of the problem behavior factor were more likely to experience official arrest charges in the future, than truants with lower problem behaviors. Hence, problem behaviors, including delinquency/crime, persist in truant adolescents. Interestingly, youths receiving the BI had lower arrest charges at the 24-month follow-up. This suggests that intervention strategies are beneficial to truant youth in reducing some problem behaviors. Replication is needed to validate the findings of this study, and more research is needed on the longitudinal stability of the syndrome component of PBT in both general and at-risk populations.

The results of this study also address research on the effects of socio-demographic characteristics for PBT. Gender, race, ethnicity, family structure, and stressful family events had no significant effect on the problem behavior factor. Consistent with Chun and Mobley (2010) there were age differences in the problem behavior factor. Older truant youths were more likely to experience higher levels of problem behaviors (marijuana, delinquency, and sexual risk). Nonetheless, older truant youths were significantly less likely to experience future official arrest charges. This finding is consistent with the expectation that people age out of offending, especially for behaviors that can result in criminal prosecution. It is important to note, however, that the self-reported delinquency measure includes some behaviors not likely to result in arrest (e.g., been paid for having sexual relations with someone, begged for money or things from strangers). The inverse effect of age on 24-month follow-up arrest charges could reflect a maturing out trend for this distal outcome; or, the effect could be an indication that the younger aged youths in our study were more vulnerable to future trouble with law enforcement. Future research should explore the connection between age and problem behaviors more closely. It will be beneficial to practitioners and theorists to know which years during childhood and adolescence demonstrate the highest and lowest levels of multi-problem behaviors.

In addition, truant youths who belonged to families who reported higher income were more likely to experience higher problem behaviors. This finding is consistent with the concept of relative deviance (see Dembo & Shern, 1982). According to this view, youth who are "deviant" from the norms of their social and cultural setting in their truancy are more likely to be involved in problem behavior, than youth who follow these norms. Since higher income families tend to be more supportive of conventional norms relating to school attendance and performance, truant youth from these families may be more likely to be involved in problem behavior. Future research on the interaction between family income factors and the problem behavior syndrome should be explored, particularly when comparing at-risk to less at-risk populations. Such information may better inform intervention strategies and theory.

There are several limitation for this study. First, the test of the syndrome hypothesis for problem-behavior theory was limited to three domains of problem behaviors, marijuana use, risky sexual behaviors, and self-reported delinquency. Data were not available on other key problem behaviors, such as academic failure, and conventional behaviors, nor were data available from a variety of informant sources (i.e., parent and teacher reports), all of which

could have enriched the study. Second, the study did not address the etiology of problem behaviors. Less is understood about how the personality and environment domains of PBT influence the development of problem behaviors among truant youth, in particular. Problem behaviors may also be influenced by protective factors for at-risk youth (Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Lightfoot, Stein, Tevendale, & Preston, 2011). Third, experts disagree on the best model to test PBT and its longitudinal effects. This study utilized CFA for the same observed variables over repeated data collections. Other researchers may prefer to utilize latent growth curve modeling or other models that separate the time dimension. Third, this study did not test a full model of PBT by estimating the impact of personality and environment components. The data were not available to test such a full model. Finally, this study utilized data from truant youths alone. Future studies should utilize data collected from both truant youths and non-truant youths to determine differences in these populations. Moreover, the label of truant was determined based on school and law enforcement officials' decisions. Since there are a variety of ways that truancy can be defined, it is important for future research to also examine differences within the truant population based on differences in how it is defined. Such research may better inform prevention and intervention efforts.

The results of this study provide support that among a truant population, there is a relatively high prevalence of and interrelationships among the three problem behaviors studied, associated with serious distal outcome. This finding has important implications because it underscores the at-risk quality of truancy. If replication of this study confirms this finding, additional research is needed to explore reasons for multiple problems of truant youth, and to develop methods to protect against or treat such problems.

Quality screening and assessment of truant youth are critical to identify youth in need of assistance, to reduce the likelihood of problem behavior development or progression, leading to adverse outcomes. For youths already involved in problem behavior, such as substance use for this sample, this study found a significant reduction in 24 month follow-up arrest charges for youths receiving Brief Intervention services for substance use. More intervention services are needed for troubled truant youth, to improve their chances of leading fulfilling and socially productive lives.

Acknowledgments

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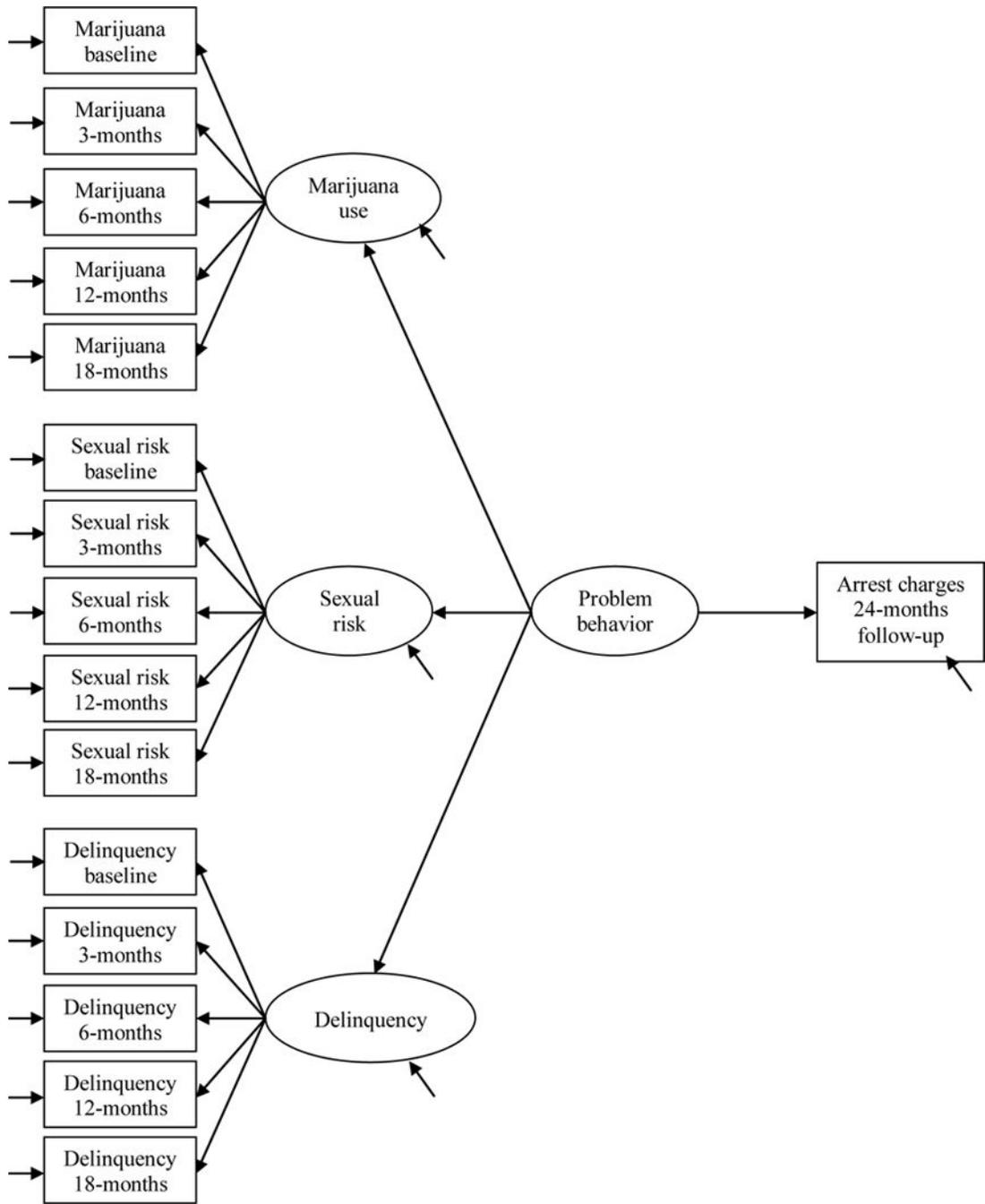
Figure 1.
Core Second-Order Problem Behavior Factor Model Predicting 24-Month Arrest Charges

Table 1

Descriptive Information for Covariates and Recidivism (n = 300)

Age of youth:	%	Gender of youth:	%
11	1	Female	37
12	3	Male	63
13	11		100
14	22		
15	37	Ethnicity/race of youth:	%
16	13	African American	26
17	11	Anglo	37
18 [*]	<1	Asian	1
	99	Hispanic	29
Mean = 14.80; SD = 1.30		Other	7
			100
Youth resided with whom:	%		
Birth mother and father	17	Traumatic events in family, lifetime:	%
Birth mother	33	Accidental injury, requiring hospitalization	12
Birth father	3	Death of loved one	58
Birth mother and significant other	23	Divorce of parent(s)	39
Birth mother and other	10	Eviction from home	17
Birth father and significant other	4	Legal problem resulting in jail or detention	27
Birth father and other	<1	Serious illness	31
Adoptive parents	3	Unemployment of parent	50
Grand parents	4	Victim of violent crime	17
Other arrangement	3	Other traumatic event	50
	100		
		Average number of traumatic events:	
Annual family income (n = 297):	%	Mean = 2.99; SD = 1.76	
$5,000 or less	5		
$5,001 to $10,000	8	Treatment condition:	n
$10,001 to $25,000	26	Brief Intervention-youth (BI-Y)	101
$25,001 to $40,000	28	Brief Intervention-youth parent (BI-YP)	98
$40,001 to $75,000	23	Standard truancy services (STS)	101
More than $75,000	10		300
	100		

	Minimum	Maximum	Mean	SD
Time in secure facility (log), 24-month follow-up	−1.0	2.26	−0.70	0.83
Recidivism (log), 19–24-month follow-up	−1.0	0.95	−0.81	0.46

[*] Youth turned 18 years old after enrollment, but before baseline interview.

Table 2

Marijuana Use, Sexual Risk Behaviors, and Self-Reported Delinquency over Time

Measures	Baseline	Follow-up period (%)			
		3-month	6-month	12-month	18-month
Marijuana use:					
Denied use and urine test negative/missing due to reasons beyond control (e.g., incarceration) or refusal	7.7	45.4	37.7	36.7	36.3
Reported use 1–4 times and urine test negative or missing	17.0	11.7	10.3	8.6	8.8
Reported use 5 or more times and urine test negative or missing	29.3	7.4	8.2	11.8	5.6
Urine test positive	46.0	35.5	43.8	42.9	49.3
Sexual risk behaviors:					
Sexual intercourse	67.0	62.4	61.9	62.8	63.4
Sexual intercourse without using a condom	33.3	28.4	31.7	33.5	36.2
Sex with two or more people	29.7	32.3	33.6	33.8	33.7
Sexually transmitted disease (STD)	2.7	1.4	2.1	2.6	3.7
Total number of sexual risk behaviors reported:					
0	32.4	36.9	36.7	30.2	25.8
1	23.7	19.1	18.9	21.6	18.8
2	23.7	27.3	25.3	26.5	29.6
3	20.2	16.7	19.2	21.6	25.8
Total delinquency reported:					
0	6	43	43	46	52
1–4	22	28	29	30	30
5–29	38	21	19	17	14
30–54	12	3	4	2	3
55–99	7	4	1	3	<1
100–199	7	1	3	2	<1
200+	8	<1	1	<1	0
Total	100	100	100	100	100
N	300	282	281	245	215

Table 3

Confirmatory Factor Analysis of Three Problem Behaviors (WLSMV Estimation; Standardized Solution)

Variable	Estimate	S.E.	Estimate/S.E.
Marijuana factor BY:			
Marijuana, baseline	0.632	0.061	10.407***
Marijuana, 3-months	0.910	0.044	20.511***
Marijuana, 6-months	0.768	0.050	15.226***
Marijuana, 12-months	0.643	0.069	9.372***
Marijuana, 18-months	0.614	0.074	8.333***
Sexual risk factor BY:			
Sexual risk, baseline	0.792	0.034	23.123***
Sexual risk, 3-months	0.848	0.026	32.872***
Sexual risk, 6-months	0.859	0.028	31.108***
Sexual risk, 12-months	0.765	0.037	20.691***
Sexual risk, 18-months	0.751	0.044	17.182***
Delinquency factor BY:			
Delinquency, baseline	0.590	0.057	10.259***
Delinquency, 3-months	0.663	0.061	10.823***
Delinquency, 6-months	0.715	0.050	14.183***
Delinquency, 12-months	0.703	0.064	10.999***
Delinquency, 18-months	0.558	0.074	7.504***
Sexual risk factor WITH:			
Marijuana factor	0.534	0.065	8.194***
Delinquency factor WITH:			
Marijuana factor	0.228	0.078	2.910**
Sexual risk factor	0.392	0.063	6.196***
Sexual risk, 12-months WITH:			
Sexual risk, 18-months	0.443	0.075	5.913***
Marijuana, 12-months WITH:			
Marijuana, 18-months	0.386	0.096	4.032***
Marijuana, 6-months WITH:			
Marijuana, 12-months	0.570	0.087	6.537***
Intercepts:			
Delinquency, baseline	1.262	0.068	18.518***
Delinquency, 3-months	0.029	0.065	0.439
Delinquency, 6-months	0.013	0.069	0.195
Delinquency, 12-months	−0.067	0.073	−0.911
Delinquency, 18-months	−0.268	0.076	−3.551***

Variable	Estimate	S.E.	Estimate/S.E.
Thresholds:			
Marijuana, baseline, $1	−1.428	0.107	−13.380 ***
Marijuana, baseline, $2	−0.685	0.079	−8.684 ***
Marijuana, baseline, $3	0.100	0.072	1.385
Marijuana, 3-months, $1	−0.116	0.075	−1.548
Marijuana, 3-months, $2	0.179	0.075	2.381 *
Marijuana, 3-months, $3	0.373	0.077	4.871 ***
Marijuana, 6-months, $1	−0.313	0.076	−4.110 ***
Marijuana, 6-months, $2	−0.049	0.075	−0.656
Marijuana, 6-months, $3	0.157	0.075	2.087
Marijuana, 12-months, $1	−0.339	0.082	−4.145 ***
Marijuana, 12-months, $2	−0.118	0.080	−1.469
Marijuana, 12-months, $3	0.180	0.081	2.235 *
Marijuana, 18-months, $1	−0.351	0.087	−4.015 ***
Marijuana, 18-months, $2	−0.123	0.086	−1.432
Marijuana, 18-months, $3	0.017	0.085	0.205
Sexual risk, baseline, $1	−0.455	0.075	−6.049 ***
Sexual risk, baseline, $2	0.156	0.073	2.139 *
Sexual risk, baseline, $3	0.839	0.083	10.164 ***
Sexual risk, 3-months, $1	−0.335	0.076	−4.398 ***
Sexual risk, 3-months, $2	0.152	0.075	2.024 *
Sexual risk, 3-months, $3	0.967	0.089	10.891 ***
Sexual risk, 6-months, $1	−0.341	0.076	−4.465 ***
Sexual risk, 6-months, $2	0.139	0.075	1.849
Sexual risk, 6-months, $3	0.870	0.086	10.114 ***
Sexual risk, 12-months, $1	−0.519	0.084	−6.165 ***
Sexual risk, 12-months, $2	0.046	0.080	0.575
Sexual risk, 12-months, $3	0.785	0.090	8.747 ***
Sexual risk, 18-months, $1	−0.649	0.093	−6.994 ***
Sexual risk, 18-months, $2	−0.136	0.086	−1.575
Sexual risk, 18-months, $3	0.649	0.093	6.994 ***
Variances:			
Marijuana factor	1.000	0.000	—
Sexual risk factor	1.000	0.000	—
Delinquency factor	1.000	0.000	—
Residual variances:			
Delinquency, baseline	0.652	0.068	9.624 ***
Delinquency, 3-months	0.560	0.081	6.883 ***

Variable	Estimate	S.E.	Estimate/S.E.
Delinquency, 6-months	0.489	0.072	6.797***
Delinquency, 12-months	0.506	0.090	5.633***
Delinquency, 18-months	0.688	0.083	8.286***

Note. Chi-squared = 98.60, df = 84, *p* = 0.13; RMSEA = 0.02; CFI = 0.993; TLI = 0.992.

Two-tailed *p*-values:

*
p < .05;

**
p < .01;

***
p < .001.

Table 4

Second-Order Factor Analysis of Problem Behaviors (WLSMV Estimation; Standardized Solution)

Variable	Estimate	S.E.	Estimate/S.E.
Marijuana factor BY:			
Marijuana, baseline	0.632	0.061	10.407 ***
Marijuana, 3-months	0.910	0.044	20.511 ***
Marijuana, 6-months	0.768	0.050	15.226 ***
Marijuana, 12-months	0.643	0.069	9.372 ***
Marijuana, 18-months	0.614	0.074	8.333 ***
Sexual risk factor BY:			
Sexual risk, baseline	0.792	0.034	23.123 ***
Sexual risk, 3-months	0.848	0.026	32.872 ***
Sexual risk, 6-months	0.859	0.028	31.108 ***
Sexual risk, 12-months	0.765	0.037	20.691 ***
Sexual risk, 18-months	0.751	0.044	17.182 ***
Delinquency factor BY:			
Delinquency, baseline	0.590	0.057	10.259 ***
Delinquency, 3-months	0.663	0.061	10.822 ***
Delinquency, 6-months	0.715	0.050	14.182 ***
Delinquency, 12-months	0.703	0.064	10.998 ***
Delinquency, 18-months	0.558	0.074	7.504 ***
Multi-problem factor BY:			
Marijuana factor	0.558	0.099	5.162 ***
Sexual risk factor	0.957	0.140	6.845 ***
Delinquency factor	0.409	0.088	4.632 ***
Marijuana factor WITH:			
Sexual risk factor	0.000	0.000	—
Delinquency factor	0.000	0.000	—
Sexual risk factor WITH:			
Delinquency factor	0.000	0.000	—
Sexual risk, 12-months WITH:			
Sexual risk, 18-months	0.443	0.075	5.912 ***
Marijuana, 12-months WITH:			
Marijuana, 18-months	0.386	0.096	4.032 ***
Marijuana, 6-months WITH:			
Marijuana, 12-months	0.570	0.087	6.537 ***
Intercepts:			
Delinquency, baseline	1.262	0.068	18.518 ***

Variable	Estimate	S.E.	Estimate/S.E.
Delinquency, 3-months	0.029	0.065	0.439
Delinquency, 6-months	0.013	0.069	0.195
Delinquency, 12-months	−0.067	0.073	−0.911
Delinquency, 18-months	−0.268	0.076	−3.551 ***
Thresholds:			
Marijuana, baseline, $1	−1.428	0.107	−13.380 ***
Marijuana, baseline, $2	−0.685	0.079	−8.684 ***
Marijuana, baseline, $3	0.100	0.072	1.385
Marijuana, 3-months, $1	−0.116	0.075	−1.548
Marijuana, 3-months, $2	0.179	0.075	2.381 *
Marijuana, 3-months, $3	0.373	0.077	4.871 ***
Marijuana, 6-months, $1	−0.313	0.076	−4.110 ***
Marijuana, 6-months, $2	−0.049	0.075	−0.656
Marijuana, 6-months, $3	0.157	0.075	2.087 *
Marijuana, 12-months, $1	−0.339	0.082	−4.145 ***
Marijuana, 12-months, $2	−0.118	0.080	−1.469
Marijuana, 12-months, $3	0.180	0.081	2.235 *
Marijuana, 18-months, $1	−0.351	0.087	−4.015 ***
Marijuana, 18-months, $2	−0.123	0.086	−1.432
Marijuana, 18-months, $3	0.017	0.085	0.205
Sexual risk, baseline, $1	−0.455	0.075	−6.049 ***
Sexual risk, baseline, $2	0.156	0.073	2.139 *
Sexual risk, baseline, $3	0.839	0.083	10.164 ***
Sexual risk, 3-months, $1	−0.335	0.076	−4.398 ***
Sexual risk, 3-months, $2	0.152	0.075	2.024 *
Sexual risk, 3-months, $3	0.967	0.089	10.891 ***
Sexual risk, 6-months, $1	−0.341	0.076	−4.465 ***
Sexual risk, 6-months, $2	0.139	0.075	1.849
Sexual risk, 6-months, $3	0.870	0.086	10.114 ***
Sexual risk, 12-months, $1	−0.519	0.084	−6.165 ***
Sexual risk, 12-months, $2	0.046	0.080	0.575
Sexual risk, 12-months, $3	0.785	0.090	8.747 ***
Sexual risk, 18-months, $1	−0.649	0.093	−6.994 ***
Sexual risk, 18-months, $2	−0.136	0.086	−1.575
Sexual risk, 18-months, $3	0.649	0.093	6.994 ***
Variances:			
Multi-problem factor	1.000	0.000	—
Residual variances:			

Variable	Estimate	S.E.	Estimate/S.E.
Delinquency, baseline	0.652	0.068	9.624 ***
Delinquency, 3-months	0.560	0.081	6.883 ***
Delinquency, 6-months	0.489	0.072	6.798 ***
Delinquency, 12-months	0.506	0.090	5.634 ***
Delinquency, 18-months	0.688	0.083	8.286 ***
Marijuana factor	0.689	0.111	6.210 ***
Sexual risk factor	0.085	0.267	0.317
Delinquency factor	0.832	0.072	11.511 ***

Note. Chi-squared = 98.60, df = 84, p = 0.13; RMSEA = 0.02; CFI = 0.993; TLI = 0.992.

Two-tailed p-values:

*
p < .05;

**
p < .01;

***
p < .001.

Table 5

SEM of Problem Behavior Effect on Arrest Charges During 24-Month Follow-Up (WLSMV Estimation; Standardized Solution)

Variable	Estimate	S.E.	Estimate/S.E.
Marijuana factor BY:			
Marijuana, baseline	0.630	0.061	10.371 ***
Marijuana, 3-months	0.910	0.044	20.637 ***
Marijuana, 6-months	0.768	0.051	15.201 ***
Marijuana, 12-months	0.642	0.069	9.346 ***
Marijuana, 18-months	0.616	0.074	8.366 ***
Sexual risk factor BY:			
Sexual risk, baseline	0.792	0.034	23.115 ***
Sexual risk, 3-months	0.847	0.026	32.805 ***
Sexual risk, 6-months	0.860	0.028	31.154 ***
Sexual risk, 12-months	0.764	0.037	20.658 ***
Sexual risk, 18-months	0.752	0.044	17.240 ***
Delinquency factor BY:			
Delinquency, baseline	0.587	0.058	10.161 ***
Delinquency, 3-months	0.664	0.062	10.791 ***
Delinquency, 6-months	0.715	0.051	14.143 ***
Delinquency, 12-months	0.701	0.064	10.922 ***
Delinquency, 18-months	0.562	0.074	7.556 ***
Multi-problem factor BY:			
Marijuana factor	0.574	0.095	6.047 ***
Sexual risk factor	0.922	0.124	7.457 ***
Delinquency factor	0.426	0.086	4.976 ***
Arrest charges, 24-month ON:			
Multi-problem factor	0.136	0.082	1.656 +
Marijuana factor WITH:			
Sexual risk factor	0.000	0.000	—
Delinquency factor	0.000	0.000	—
Sexual risk factor WITH:			
Delinquency factor	0.000	0.000	—
Sexual risk, 12-months WITH:			
Sexual risk, 18-months	0.443	0.075	5.950 ***
Marijuana, 12-months WITH:			
Marijuana, 18-months	0.385	0.096	4.014 ***
Marijuana, 6-months WITH:			

Variable	Estimate	S.E.	Estimate/S.E.
Marijuana, 12-months	0.570	0.088	6.519 ***
Intercepts:			
Delinquency, baseline	1.262	0.068	18.518 ***
Delinquency, 3-months	0.029	0.065	0.439
Delinquency, 6-months	0.013	0.069	0.195
Delinquency, 12-months	−0.067	0.073	−0.911
Delinquency, 18-months	−0.268	0.076	−3.551 ***
Arrest charges, 24-month	−1.784	0.079	−22.458 ***
Thresholds:			
Marijuana, baseline, $1	−1.428	0.107	−13.380 ***
Marijuana, baseline, $2	−0.685	0.079	−8.684 ***
Marijuana, baseline, $3	0.100	0.072	1.385
Marijuana, 3-months, $1	−0.116	0.075	−1.548
Marijuana, 3-months, $2	0.179	0.075	2.381 *
Marijuana, 3-months, $3	0.373	0.077	4.871 ***
Marijuana, 6-months, $1	−0.313	0.076	−4.110 ***
Marijuana, 6-months, $2	−0.049	0.075	−0.656
Marijuana, 6-months, $3	0.157	0.075	2.087 *
Marijuana, 12-months, $1	−0.339	0.082	−4.145 ***
Marijuana, 12-months, $2	−0.118	0.080	−1.469
Marijuana, 12-months, $3	0.180	0.081	2.235 *
Marijuana, 18-months, $1	−0.351	0.087	−4.015 ***
Marijuana, 18-months, $2	−0.123	0.086	−1.432
Marijuana, 18-months, $3	0.017	0.085	0.205
Sexual risk, baseline, $1	−0.455	0.075	−6.049 ***
Sexual risk, baseline, $2	0.156	0.073	2.139 *
Sexual risk, baseline, $3	0.839	0.083	10.164 ***
Sexual risk, 3-months, $1	−0.335	0.076	−4.398 ***
Sexual risk, 3-months, $2	0.152	0.075	2.024 *
Sexual risk, 3-months, $3	0.967	0.089	10.891 ***
Sexual risk, 6-months, $1	−0.341	0.076	−4.465 ***
Sexual risk, 6-months, $2	0.139	0.075	1.849
Sexual risk, 6-months, $3	0.870	0.086	10.114 ***
Sexual risk, 12-months, $1	−0.519	0.084	−6.165 ***
Sexual risk, 12-months, $2	0.046	0.080	0.575
Sexual risk, 12-months, $3	0.785	0.090	8.747 ***
Sexual risk, 18-months, $1	−0.649	0.093	−6.994 ***
Sexual risk, 18-months, $2	−0.136	0.086	−1.575

Variable	Estimate	S.E.	Estimate/S.E.
Sexual risk, 18-months, $3	0.649	0.093	6.994 ***
Variances:			
Multi-problem factor	1.000	0.000	—
Residual variances:			
Delinquency, baseline	0.655	0.068	9.667 ***
Delinquency, 3-months	0.559	0.082	6.839 ***
Delinquency, 6-months	0.489	0.072	6.760 ***
Delinquency, 12-months	0.508	0.090	5.637 ***
Delinquency, 18-months	0.684	0.084	8.175 ***
Arrest charges, 24-months	0.982	0.022	44.207 ***
Marijuana factor	0.671	0.109	6.165 ***
Sexual risk factor	0.151	0.228	0.661
Delinquency factor	0.819	0.073	11.253 ***

Note. Chi-squared = 121.53, df = 98, p = 0.05; RMSEA = 0.03; CFI = 0.990; TLI = 0.987.

Two-tailed p-values:

*
$p < .05$;

**
$p < .01$;

***
$p < .001$.

One-tailed p-values:

+
$p < .05$

Table 6

Parameter Estimates and Standard Errors for Problem Behavior Latent Variable and 24-Month Follow-Up Arrest Charges Covariates (Standardized Estimates)

Variable	Estimate	S.E.
Problem behavior:		
Age	0.209[**]	0.071
Gender (1 = female)	−0.062	0.069
Family income	0.197[**]	0.069
Youth lives with (1 = mother)	0.002	0.069
Race (1 = African American)	0.130	0.078
Ethnicity (1 = Hispanic)	−0.007	0.074
Number of traumatic events	0.114	0.065
24-Month follow-up arrest charges:		
Age	−0.312[***]	0.077
Gender (1 = female)	−0.174	0.094
Family income	−0.055	0.074
Youth lives with (1 = mother)	0.063	0.063
Race (1 = African American)	0.064	0.064
Ethnicity (1 = Hispanic)	−0.158	0.091
Number of traumatic events	−0.096	0.085

Note. For race, reference category is non-African American, mostly white. For ethnicity, reference category is non-Hispanic.

Two-tailed *p*-values:

[*] $p < .05$;

[**] $p < .01$;

[***] $p < .001$.