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Predictors of Physical Altercation among Adolescents in Residential Substance Abuse Treatment

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Abstract

This study tested the hypothesis that basic social information-processing components represented by family conflict, peer aggression, and pro-aggression cognitive scripts are related to aggression and social problems among adolescents in substance abuse treatment. The sample consisted of 547 adolescents in two community-based residential facilities. Correlation results indicated that more peer aggression is related to more pro-aggression scripts; scripts, peer aggression, and family conflict are associated with social problems; and in-treatment physical altercation involvement is predicted by higher peer aggression. Findings suggest that social information-processing components are valuable for treatment research.

Keywords

Adolescents; substance abuse treatment; pro-aggression cognitive scripts; delinquency; aggression

INTRODUCTION

Longer retention in substance abuse treatment, higher motivation, and higher therapeutic engagement are associated with favorable treatment outcomes among adolescents (Hser et al. 2001; Joe et al. 2014; Simpson and Joe 2004; Williams and Chang 2000). Progress in treatment, however, is hindered by behavioral problems. Adolescent substance abusers frequently have coexisting mental health and behavioral challenges (Substance Abuse and Mental Health Services Administration 2012a; 2012b) which are most commonly manifested as conduct disorder and oppositional defiant disorder (Armstrong and Costello 2002). Aggression and delinquency, which are characteristic of these disorders, are disruptive to the process of substance abuse treatment (Broome et al. 2001; Dobkin et al. 1998; Latimer et al. 2000; Piotrkowski and Baker 2004; Shane et al. 2003; Wong et al. 2002). For example, juvenile delinquency and problem behaviors are both associated with unsuccessful treatment termination (Dobkin et al. 1998; Latimer et al. 2000; Piotrkowski and Baker 2004). Those who have terminated treatment unsuccessfully (e.g., discharged due to noncompliance) have often reported greater alienation, more aggression, and more negative social adjustment than their peers (Dobkin et al. 1998). Furthermore, at-risk

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adolescents often report lower treatment readiness (Broome et al. 2001) and lower treatment compliance (Wong et al. 2002). At-risk youth represent a significant proportion of clients in treatment with the juvenile justice system being the most frequently reported referral source for enrollment in publicly funded treatment facilities (Substance Abuse and Mental Health Services Administration 2012a; 2012b). Thus, coexisting problem behaviors among teens present a unique challenge for community-based providers. Understanding the needs of these adolescents is important for the development of collaborative-care treatment models.

Multiple models and theories have been posited, including empirically supported delinquency developmental models such as coercion theory (Patterson 1982; Patterson 1995; Patterson and Yerger 2002), the general theory of crime (Gottfredson and Hirschi 1990), and the model of social information-processing (SIP; Crick and Dodge 1994). Although all three of these models may be appropriate to apply in substance abuse treatment settings, the social information-processing model appears to be more inclusive with respect to identifying social and cognitive relationships with deviance.

The coercion theory suggests that children develop early onset aggression as a function of parenting practices and negative reinforcement, and late onset aggression as a function of peer influences and positive reinforcement (Patterson 1982; Patterson 1995; Patterson and Yoerger 2002; Stoolmiller et al. 1997). This model implies that negative parenting practices and associating with deviant peers would indicate higher potential for behavioral problems in treatment. It also implies that the associated clinical needs would include interpersonal behavioral modification for the youth and parent training in cases of early onset delinquency (Dishion and Kavanagh 2002; Patterson and Reid 1973; Reid and Eddy 2002). From another perspective, the general theory of crime suggests that delinquency is a reflection of the inability to delay desired gratification (Gottfredson and Hirschi 1990; Pratt and Cullen 2006). This latter model implies that low self-control may be an indicator for problem behaviors and that improving self-control would then be identified as a clinical need. The social information-processing (SIP) model suggests that deviance is a function of biases in cognitive processing, which can be influenced by social exposure to problem behaviors (Crick and Dodge 1994). SIP implies that social exposure to deviance would indicate a higher risk of cognitive processing biases, which would indicate a higher potential for problem behaviors. The presence of these risk factors would point to the need for increasing pro-social interactions and addressing cognitive processing biases.

All three models include constructs that may be represented by assessment measures in treatment settings (e.g., measures of family control and conflict, peer deviance, cognitive biases, and impulsivity) and identify clinical needs that are commonly addressed in treatment (e.g., cognitive-behavioral- and family-based treatments; Winters et al. 2011). However, coercion theory does not include internal mechanisms for delinquency or change (Crosswhite and Kerpelman 2012; Patterson 2002), and the general theory of crime does not account for a variety of correlates of deviance that are specifically important to youth (e.g., the influence of peers; Levine and Singer 1988; Prinstein et al. 2011). SIP, however, accounts for both social and cognitive correlations with deviance which has the advantage of offering a broader choice of treatment targets than coercion theory and the general theory of

crime. To the authors' knowledge, there have been no studies applying SIP concepts to adolescent substance abuse treatment settings.

The purpose of this study is to evaluate the utility of a basic SIP framework for identifying possible risk factors and clinical needs of substance abusing adolescents enrolled in community-based residential treatment. This study identifies assessment scales and items that are commonly available in treatment settings that can serve as markers for important SIP constructs. These markers are then utilized to test expected associations with aggression and social problems and to determine if they predict overt aggressive behavior occurring later during treatment.

SOCIAL INFORMATION-PROCESSING MODEL OF DELINQUENCY DEVELOPMENT

The social information-processing (SIP) model is an empirically supported developmental explanation for delinquency (for reviews see Dodge 1993; Dodge and Rabiner 2004; Dodge and Pettit 2003). As described by Crick and Dodge (1994), social influences can impact cognitive processing which directly impacts behavior. Cognitive processing may be described in the following six steps.

1. Perceiving incoming information from the environment (*encoding cues*).
2. Formulating a mental representation of the situation (*interpretation*).
3. Clarifying the desired gains for responding to the situation (*goal clarification*; e.g., staying out of trouble, getting something he/she wants, etc.).
4. Gathering possible response options or creating a new response (*options*).
5. Choosing a response that will most likely achieve the desired goal (*decision*).
6. Acting out the response (*response*).

While these steps represent a cognitive processing heuristic thought to be consistent and universal for all, individual variability in behavior is explained as the interaction between the unique internal memory content of each person and the cues in each processing step (feedback loops). Therefore, social experiences can impact behavior by altering an individual's memory content and impacting cue processing at different steps. For example, pervasive social exposure to aggression may alter memory content such that a child becomes sensitive to potentially aggressive cues (step 1), interprets neutral social cues as hostile (step 2), has limited non-aggressive response options (step 4), and/or views aggression as the most effective way to solve a problem (step 5). Thus, problem behaviors can be explained by biases or deficits occurring within internal and external cue interactions such as lack of feedback at stages, maladaptive feedback (e.g., emotional reactions or problems), bias in perceiving cues (e.g., only attending to potentially hostile cues), misinterpretation of social cues (hostile attribution bias), and having a bias toward and/or expecting positive results in response to aggressive behaviors (Burks et al. 1999; Crick and Dodge 1996; Crosswhite and Kerpelman 2009; Dodge and Coie 1987). It is reasoned that the deficits and biases that occur

with exposure to deviant social cues develop into cognitive scripts (social-response routines; Schank and Abelson 1977) that are maladaptive and generate automated deviant behaviors.

Empirical evidence supports the associations suggested by SIP and suggests assessment measures that may serve as markers for SIP components. First, greater exposure to aggression and conflict at home, with peers, in the community, and at school is linked with youth aggression, delinquency, and social problems (David et al. 1996; Dodge et al. 1995; Dodge et al. 1997; Jaycox and Repetti 1993; Kirk and Hardy 2012; López et al. 2008; Megens and Weerman 2012; Molano et al. 2013; Mrug and Windle 2010; Shukla and Wiesner 2013; Wadsworth and Compas 2002; Warr and Stafford 1991; Weiss et al. 1992). Youth responses to assessment items that estimate general family conflict (including verbal and physical aggressive behaviors) and association with deviant/aggressive peers may indicate increased risk for behavioral and social problems such as increased overt aggression, hostility, criminal behaviors, and decreased perceived social support. Second, increased exposure to aggression and conflict is also associated with increased processing deficits, biases, and maladaptive cognitive scripts such as having limited response options, hostile attribution bias (attributing aggressive intentions to social cues), and expecting aggression to result in positive outcomes (Dodge et al. 1995; López et al. 2008; Shahinfar et al. 2001; Teisl and Cicchetti 2008; Weiss et al. 1992). Assessment items indicating response-step processing errors such as limited response options and expecting aggression to result in a desired outcome are embedded within social interaction scales such as the TCU Power Orientation Scale (e.g., “The only way to protect yourself is to be ready to fight;” Criminal Thinking Scales; CTS; see Knight et al. 2006). Like family conflict and peer deviance, these cognitive items could indicate possible risk factors for social problems and aggression in treatment. Third, pro-aggression cognitive scripts are associated with increased aggression and externalizing problems (negative acting out behaviors; Burks et al. 1999; Lansford et al. 2006; Weiss et al. 1992) among youth. Modeled simultaneously, the effect of exposure to aggression on problem behaviors is mediated by maladaptive scripts (Bradshaw et al. 2009; Chaux et al. 2012). Studies indicate that, accounting for each other, indicators of family conflict, peer deviance, and response-step processing errors could indicate higher risk of aggression and social problems.

This study aims to test associations between the basic components of the SIP model and the ability of SIP components to predict future in-treatment overt aggression (physical fighting). Applying a SIP framework to constructs that are important to and already available in substance use treatment may help identify the risk factors and needs for at-risk youth. Figure 1 depicts the links of these basic components and summarizes the possible influences associated with errors in cognitive processing. First, incoming social information is perceived (indicated by the down arrow). Exposure to social cues such as family conflict and aggressive peers may facilitate the development of maladaptive cognitive scripts or biases. Earlier processing steps such as encoding and interpreting social cues (steps 1 and 2) are represented by the first box. Biases within the first steps could lead to erroneously interpreting social cues as hostile (e.g., hostile attribution bias). Response-oriented steps such as clarifying response goals, recalling possible responses, evaluating, and choosing a response (steps 3–5) are represented by the second box. Response-oriented processing issues such as being able to only recall aggressive responses or believing aggressive responses will

result in a positive outcome could also influence behaviors. The cognitive scripts (deficits and biases) impacting social cue processing through steps 1–5 are indicated by the down arrow. The final shape indicates the final processing step (step 6) - acting out a decision such as overt physical aggression.

Overview and Hypotheses

Adolescents with problem behaviors often have greater difficulty engaging in the substance abuse treatment process. This study aimed to evaluate the utility of the social information-processing (SIP) model of delinquency by examining links among treatment assessment measures suggested by the model to identify the needs of these at-risk youth. Specifically, this study tested the following relationships: (a) SIP components are interrelated such that pro-aggression cognitive scripts are correlated with family conflict and aggressive peers; (b) SIP components are related to social problems (hostility, criminal behavior, and perceived social support); and (c) SIP components predict future in-treatment overt physical aggression (physical altercation).

It is expected that greater family conflict and having more aggressive peers will be associated with having more pro-aggression cognitive scripts (hypothesis 1). It is further expected that greater endorsement of SIP components (family conflict, aggressive peers, and pro-aggression cognitive scripts) will be associated with social problems indicated by higher hostility, lower social support, and more severe criminal history (hypothesis 2). Hypotheses 1 and 2 examine the general applicability of SIP markers to adolescent treatment settings. Understanding the associations among these measures is basic to more targeted future research in the area.

Of even greater clinical value, SIP component markers may provide an early indicator to treatment providers of later overt aggressive behavior among clients. Identifying these risk factors early in treatment (e.g., at intake) may allow providers the opportunity to address potentially disruptive cognitive and behavioral issues immediately. Thus, hypothesis 3 extends beyond basic associations. Higher SIP factors (family conflict, peer aggression, and prog-aggression cognitive scripts) measured at treatment intake are expected to indicate an increased likelihood of overt physical aggression during treatment (hypothesis 3). Finally, it is expected that, compared to participants not involved in a physical altercation during treatment, those in the altercation group will report higher family conflict, higher aggression among peers, more pro-aggression cognitive scripts, higher hostility, lower social support, and more extensive crime histories (hypothesis 4).

METHOD

Procedure

This study uses data collected in 2011 and 2012 as a part of a larger research project funded by the National Institute on Drug Abuse (NIDA), National Institutes of Health (NIH), and Department of Health and Human Services. The broader study aimed to make substance abuse treatment assessments commonly administered to adults more accessible for use in adolescent treatment settings (Knight et al. 2014). Eight community-based residential

substance abuse treatment programs located in 3 US states were recruited in 2010 to participate in the study. Institutional Review Boards for the research facility and the treatment programs' parent agency reviewed and approved study protocols. All participating facilities agreed via a qualified service organization agreement with the research team to incorporate a youth assessment package into their standard operating protocol and in exchange provide de-identified assessment data. Two of the 8 facilities also documented client incidents (rule infractions) on a weekly basis. Therefore, data from 2 of the 8 facilities are used in the current study.

Prior to incorporating the assessment package into standard procedure, each facility chose representatives to participate in a researcher-lead training. During training, facility staff were introduced to the research study's aims and assessment package and were trained to use the web-based assessment program to administer the client assessments, track assessment completion across time, and interpret the reports generated by the program. Facilities then began conducting assessments via the web-based assessment program at treatment intake, and at 35 and 90 days into treatment. Each facility and each facility staff member was assigned an identification number to use within the web-based system. Researchers were available to assist facility staff with procedural concerns via phone and e-mail. Researchers also made several computer-based tools available to treatment staff to assist their assessment tracking efforts.

To administer assessments, facility staff were instructed to use researcher-provided log-in identification numbers to access the web-based assessment system. Staff then created an account for each newly enrolled treatment participant using identification numbers. Youth identification numbers were not connected to identifiable information, and only treatment staff had access to information that could connect youth identification numbers to identifying information. Once a new account was created for a youth, staff entered basic date and demographic information about the youth (date of treatment enrollment, gender, race, etc.) and then scheduled the first assessment administration. Youth completed intake assessments via the web-based program using a point-and-click interface. Client use of the computers was monitored by treatment staff to avoid improper computer use. Staff were available to the youth to answer questions about the assessments, but youth completed the assessment items independently. Once a youth completed the first assessment administration, treatment staff could then access a report generated by the web-based system that summarized the youth's responses and identified responses that significantly differed from the facility's general population. These reports could be printed and used to assist treatment staff with treatment planning and documentation.

Participants

Participants included 591 youth enrolled in 2 of the 8 participating facilities. Participants who demonstrated likely response bias, as indicated by a score of 2 standard deviations above the mean on the Social Desirability Scale (from the Client Evaluation of Self and Treatment; CEST; see Garner et al. 2007; Joe et al. 2002; adapted from Crowne and Marlowe 1960), and who demonstrated systematic response patterns (responding the same for all items on a form; e.g., responding "uncertain" to every item) were excluded from the

study. Of the initial 591 participants, 37 were excluded due to high social desirability, and 7 were excluded due to systematic response patterns, leaving a final sample of 547 participants.

The majority of participants are male ($n = 349$, 64%). The most frequently reported race is Hispanic ($n = 243$, 44%), followed by White ($n = 188$, 34%), and Multiracial ($n = 65$, 12%). Black/African American participants comprise 5% of the sample. Participants range in age from 13 to 19 years ($M = 15.71$, $SD = 1.07$). Because studies suggest that physical aggression tends to decrease with age, and younger adolescents tend to be more physically aggressive than older adolescents (Brame et al. 2001; Patterson and Yoerger 1997), age group was used as variable in the analyses to control for this possible effect. A mean split was used to dichotomize youth into age groups representing younger (less than 16) and older (16 and older) participants (see Table 1 for participant demographics). Marijuana was the most commonly identified problem drug ($n = 163$, 30%), with “none” reported by 18% of participants, and methamphetamine by 15%. The majority of participants ($n = 393$, 72%) scored within the high drug use severity range on the TCU Drug Screen II screening tool (TCUDS II; Knight et al. 2002). Consistent with SAMHSA (Substance Abuse and Mental Health Services Administration 2012a; 2012b) estimates, over half of the sample ($n = 307$, 56%) reported juvenile justice involvement during the 30 days immediately prior to treatment enrollment. According to rule infraction reports provided weekly by the facilities, 78 participants (14%) were observed by facility staff as engaging in a physical altercation (fighting).

Measures

Intake assessments gathered demographic, previous drug use, and general risk factor data (TCU RSK; Simpson et al. 2012; TCUDS II; Knight et al. 2002). Risk Form items used multiple choice and yes/no response options. Participants also responded to questions about their psychosocial functioning and motivation (Client Evaluation of Self and Treatment; CEST; see Garner et al. 2007; Joe et al. 2002), general and criminal thinking patterns (General Thinking Scales; TCU THK Forms; Knight et al. 2014; Criminal Thinking Scales; CTS; see Knight et al. 2006), and family and peer relationships (Time 1 only; Family, Friends, and Self Form; TCU FFS; Simpson and McBride 1992). For most items, response options were recorded along a 5-point Likert-type scale (1 = *disagree strongly*, 3 = *uncertain*, and 5 = *agree strongly*). Most scale scores were calculated by averaging client responses to scale items and multiplying the average by 10, resulting in scores that ranged from 10 to 50, with higher scores indicating greater agreement with the measured construct. All scales demonstrate good reliability with standardized alpha values above .75 (see Knight et al. 2014).

Family Conflict—Studies suggest that family conflict may be linked to the development of behavior and social problems (David et al. 1996; Jaycox and Repetti 1993; López et al. 2008; Wadsworth and Compas 2002). Family Conflict (FC) is comprised of 5 items from the Family Conflict Scale (FFS Form; $\alpha = .85$; Knight et al. 2014) assessing non-physical and physical aggressive conflict among family members (see Table 2).

Peer aggression—Research also indicates that social exposure to aggression and delinquency, especially peer aggression, facilitates the development of problem behaviors (Levine and Singer 1988; Megens and Weerman 2012; Mrug and Windle 2010; Prinstein et al. 2011; Shukla and Wiesner 2013; Warr and Stafford 1991). Peer Exposure to Aggression (Peer ETA) comprises 4 items from the Peer Trouble Scale (FFS Form; $\alpha = .86$; Knight et al. 2014) assessing the antisocial and aggressive behaviors of peers (e.g., “You have friends who have used a weapon (gun, knife, or club) in a fight”; see Table 2).

Pro-Aggression Cognitive Scripts—The measure of pro-aggression cognitive scripts (CS) comprises 4 items from the Power Orientation Scale (CTS Form; $\alpha = .82$; Knight et al. 2014) assessing the willingness to behave aggressively in social situations (see Table 2). This measure is expected to represent biases occurring in the response option steps of processing.

Hostility—In addition to physical aggression (indicated by fighting), research suggests at-risk youth will also experience social problems such as lower social support and increased delinquency. One of the measures representing social problems is the Hostility Scale. This scale is a self-reported assessment of general antisocial and aggressive behaviors (8 items from the CEST; $\alpha = .84$; Knight et al. 2014; see Table 2).

Social Support—Also representing social problems, the Social Support Scale (9 items from the CEST; $\alpha = .80$; Knight et al. 2014; see Table 2) assesses the perceived degree of support from others outside of treatment. Lower social support is associated with poor adjustment and increased conduct problems and aggression (Demaray et al. 2005; Malecki and Demaray 2003; Demaray and Malecki 2002). Consistent with previous studies using the social support measure, one item (“You are often in situations where drug use is common”) was reflected by subtracting the raw item response from 6 (e.g., *agree strongly* is reflected from a raw score of 5 to a score of 1) prior to computing scale scores (Knight et al. 2014; Garner et al. 2007; Joe et al. 2002; Myers et al. 2010).

Crime History—The final measure of social problems is an index of crime history. Although specific types of criminal behaviors are not assessed in this study, items assessing a participant’s lifetime history of arrest, involvement with probation, and incarceration in juvenile detention are used to represent varying levels of criminal behavior. The Crime History Index comprises 3 “Yes/No” items from the RSK Forms. Because each item represents increasingly restrictive involvement with the juvenile justice system, a weighted sum scoring method rather than a simple sum was considered to be a more accurate reflection of criminal history. Previous studies have applied higher weight values to more serious criminal behaviors to create severity-weighted indices of criminal behavior (Evans et al. 1995; Evans et al. 1997; Oudekerk et al. 2012). Similarly, the Crime History Index items were weighted by severity so that more restrictive involvement with the juvenile justice system represented a higher value. A “yes” response to history of arrest was coded as 1, history of probation as 2, and history of incarceration in juvenile detention as 3. A response of “no” to an item was coded as 0. Response codes were summed for each participant, thus,

those responding “no” to all items received a score of 0, and those responding “yes” to all items received a score of 6.

Physical altercations—Participants were classified into two groups using rule infraction reports. The fighting group (FI) comprises participants who were observed engaging in at least one physical altercation during the treatment stay. Documented incidents were considered to be fighting if the facility specified “fighting” as a physical altercation. Incidents that did not specifically indicate physical aggression, such as “argument,” were not used in classification. The non-fighting group (NF) comprises participants for whom there were no reports of physical altercation incidents.

Analytic Strategy

A series of hierarchical multiple linear regressions were used to test hypotheses 1 that family conflict and peer aggression were predictors of pro-aggression cognitive scripts. For this hypothesis, family conflict was initially tested as the sole predictor of pro-aggression cognitive scripts. Then a second model was estimated that included both family conflict and peer aggression as independent variables.

Chi-Square analyses were used to identify potential demographic covariates for testing hypothesis 2 (the prediction of social problems), hypothesis 3 (the prediction of the fighting dependent variable), and hypothesis 4 (differences between fighting groups). In testing hypothesis 2, three separate hierarchical multiple linear regression models were conducted, one for each of the three dependent variables (hostility, social support, and crime history). The first model for each dependent variable included family conflict as the sole independent measure. The second model included peer aggression as the sole independent measure. The third model included pro-aggression cognitive scripts as the sole independent measure. These were followed with the fourth model (the full model) including age group, family conflict, peer aggression, and pro-aggression scripts as independent variables.

Logistic regression was used to test hypothesis 3. Similar to hypothesis 2, each SIP measure (family conflict, peer aggression, pro-aggression scripts) predicting fighting (1 = *fighting*, 0 = *non-fighting*) was tested in separate models, followed by a full model predicting fighting by all SIP factors and age group entered simultaneously. The full model testing of Hypotheses 2 and 3 allowed an examination of the interrelationship between the SIP factors and each dependent variable.

Analysis of covariance was used to test hypothesis 4. A separate ANCOVA model was computed for each dependent measure including family conflict, peer aggression, pro-aggression cognitive scripts, hostility, social support, and crime history. Fighting group (fighting/non-fighting) was included as the independent measure, and age group was included as a covariate.

RESULTS

Covariates

The equality of proportions of fighting and non-fighting participants across gender (male/female), age group (younger/older), ethnicity (Hispanic/non-Hispanic), and drug use severity (low/high; see Table 1) were assessed. Only age group was found to be significant. There were proportionally fewer older participants in the fighting group than in the non-fighting group ($\chi^2(1) = 8.680, p < .01$). There were similar proportions of gender, ethnicity, and drug use severity groups among the fighting and non-fighting participants. Juvenile justice involvement in the 30 days prior to treatment enrollment was not assessed as a possible covariate due to the non-significant relationship between the SIP factors and lifetime criminal history. Therefore, age group was included as a covariate in all analyses of hypotheses 2, 3, and 4.

Hypothesis 1

Hypothesis 1 predicted that higher family conflict and peer aggression would be related to more pro-aggression cognitive scripts. Results for Model 1 indicated that higher family conflict was associated with higher pro-aggression cognitive scripts ($t(1) = 2.81, p < .01, \beta = .125$, squared semi-partial correlation = .122, adjusted $R^2 = .020$). Model 2 results indicated that family conflict lost significance ($t(1) = -.11, p = .909, \beta = -.005$, squared semi-partial correlation = $-.005$) with the addition of peer aggression as an independent variable. Higher peer aggression was significantly related to higher cognitive scripts ($t(1) = 10.32, p < .001, \beta = .390$, squared semi-partial correlation = .428, adjusted $R^2 = .186$).

Hypothesis 2

Hypothesis 2 stated that higher social problems (hostility, social support, and crime history) at treatment entry would be associated with higher SIP factors (family conflict, peer aggression, and pro-aggression cognitive scripts). Treatment entry hostility was independently significantly related to higher family conflict ($t(1) = 7.52, p < .001, \beta = .283$, squared semi-partial correlation = .309, adjusted $R^2 = .103$), peer aggression ($t(1) = 13.73, p < .001, \beta = .417$, squared semi-partial correlation = .510, adjusted $R^2 = .268$), and cognitive scripts ($t(1) = 16.98, p < .001, \beta = .535$, squared semi-partial correlation = .599, adjusted $R^2 = .363$). When assessed simultaneously, all 3 independent variables retained significance and accounted for 47% of the variability in hostility. A post-hoc review of the squared semi-partial correlations between SIP factors and hostility indicated that scripts uniquely explained the greatest amount of variance in hostility (17%), compared to 5% explained by peer aggression, and 3% explained by family conflict.

Family conflict was the only SIP factor significantly related to social support. Higher family conflict ($t(1) = -4.19, p < .001$, squared semi-partial correlation = $-.190$, adjusted $R^2 = .029$) was related to lower social support.

Family conflict ($t_{\text{Family}}(1) = -2.90, p < .01$, squared semi-partial correlation = $-.122$, adjusted $R^2 = .033$), peer aggression ($t_{\text{Peer}}(1) = 2.38, p < .05$, squared semi-partial correlation = .101, adjusted $R^2 = .028$), and cognitive scripts ($t(1) = 2.22, p < .05$, squared

semi-partial correlation = .096, adjusted $R^2 = .029$) were independently related to crime history. Unlike peer aggression and pro-aggression scripts, which were each related positively to crime history, higher family conflict was related to lower crime history. Entered simultaneously, family conflict and peer aggression variables remained significantly associated with crime history ($t_{\text{Family}}(1) = -4.00, p < .001$, squared semi-partial correlation = $-.178$; $t_{\text{Peer}}(1) = 2.50, p < .001$; squared semi-partial = $.122$, adjusted $R^2_{\text{Model}} = .059$), but cognitive scripts lost significance ($t(1) = 1.37, p = .170$, squared semi-partial correlation = $.065$). See Table 3 for results of the full models.

Hypothesis 3

Hypothesis 3 stated that higher SIP factors (family conflict, peer aggression, and pro-aggression scripts) would be associated with a higher likelihood of fighting incidents during treatment. Model 1 results indicated that family conflict did not independently predict fighting. Model 2 results indicated that higher peer aggression significantly predicted fighting (Wald's $\chi^2(1) = 7.44, p < .01$). Model 3 results indicated that more pro-aggression scripts independently predicted fighting (Wald's $\chi^2(1) = 5.00, p < .05$). Results of the full model (see Table 4) indicated that, controlling for family conflict and pro-aggression scripts, only peer aggression predicted fighting (Wald's $\chi^2(4) = 4.97, p < .05$) such that for every unit increase in peer aggression, the likelihood of fighting increased 4%.

Hypothesis 4

Hypothesis 4 predicted that participants who engaged in fighting incidents would report higher family conflict, peer aggression, pro-aggression cognitive scripts, and social problems. Using age group as a covariate, ANCOVA results indicated that, compared to the non-fighting (NF) group, youth in the fighting (FI) group reported higher peer aggression ($M_{(FI)} = 36.33$; $M_{(NF)} = 32.98$; $F(2,543) = 7.52, p < .01$), pro-aggression scripts ($M_{(FI)} = 32.77$; $M_{(NF)} = 30.22$; $F(2,523) = 5.07, p = .02$), hostility ($M_{(FI)} = 31.54$; $M_{(NF)} = 28.07$; $F(2,532) = 11.95, p < .001$), and crime history ($M_{(FI)} = 4.53$; $M_{(NF)} = 3.49$; $F(2,544) = 13.27, p < .001$). Family conflict ($M_{(FI)} = 25.90$; $M_{(NF)} = 25.98$) and social support ($M_{(FI)} = 37.66$; $M_{(NF)} = 37.48$) were similar across groups.

DISCUSSION

Problem behaviors are pervasive among treatment-seeking youth and interfere with rehabilitation efforts. As proposed by Crick and Dodge (1994), the social information-processing (SIP) model is useful for understanding how problem behaviors develop and persist and may facilitate identification of the unique clinical needs of youth in substance use treatment. The model suggests that persistent social exposure to aggression impacts memory content resulting in maladaptive cue processing and aggressive behavior. Thus the primary aims of this study were to explore the links suggested by the social information-processing (SIP) model of delinquency using assessment measures commonly available in substance abuse treatment settings, and to evaluate the utility of SIP to identify the clinical needs of at-risk youth. The hypotheses tested that a youth's exposure to conflict and aggression, and their maladaptive thinking would predispose them to social problems at treatment entry and aggression during treatment.

Summary of Results

Results provided partial support for all four hypotheses. Higher family conflict and higher peer aggression were independently related to more pro-aggression scripts, thereby supporting hypothesis 1. This is consistent with the model and literature suggesting exposure to aggression and conflict is linked to positive beliefs about aggression (Brezina 1998; Dodge et al. 1995; Heimer and Matsueda 1994; López et al. 2008; Shahinfar et al. 2001; Teisl and Cicchetti 2008; Weiss et al. 1992). Peer aggression appeared to have a more robust relationship with pro-aggression scripts than family conflict, and thus may be a better risk indicator of pro-aggression scripts.

Hypothesis 2 stated that higher social problems (hostility, social support, and crime history) at treatment entry would be associated with higher SIP factors (family conflict, peer aggression, and pro-aggression cognitive scripts). There was also some support for this hypothesis. The SIP factors were related to higher participant hostility, with scripts as the strongest link to hostility. The relationship between SIP components and other social problems were partially consistent with expectations. Family conflict, but not peer aggression or scripts, was related to social support. These findings are consistent with literature suggesting that early negative interactions with family directly impact perceived overall social support later in adolescence (Gayman et al. 2011). Findings additionally indicated that family conflict and peer aggression, but not scripts, was related to criminal history. Similar to other studies indicating that association with deviant peers is related to increased delinquency (Levine and Singer 1988; Prinstein et al. 2011), these data indicated that higher peer aggression is related to a more severe criminal history. Contrary to expectations and to the literature (Fagan et al. 2011), lower family conflict, rather than higher, was associated with greater crime history. In this study, higher crime history scores indicate more restrictive levels of juvenile justice intervention. It could be that juvenile justice intervention has an effect on family conflict such that youth who are on probation or removed from their families via juvenile detention experience less family conflict.

Hypotheses 3 tested whether having higher SIP measures at intake increased the likelihood of overt physical aggression during treatment. Indeed, pro-aggression scripts and peer aggression independently predicted in-treatment fighting; however, contrary to expectation, family conflict did not predict in-treatment fighting. It was expected that, modeled together, all SIP factors would predict fighting; however, results suggested the relationship between scripts and fighting was accounted for by peer aggression exclusively. Although age was not a variable of interest in this study, age group (younger/older) was a significant predictor of fighting such that younger clients are more likely to engage in a fighting incident during treatment than older teens.

Hypothesis 4 tested for differences between the fighting and non-fighting groups on SIP factors and social problem measures. In partial support of the hypothesis, results indicated that participants who were observed fighting later in treatment reported higher peer aggression, more positive attitudes toward aggression, a greater tendency toward hostility, and more extensive crime histories at treatment entry. Contrary to expectations, family conflict and social support were similar for both groups.

Implications for SIP

Although this study was not intended to test SIP directly, the results raise some interesting questions. First, controlling for peer aggression, family conflict was no longer significantly associated with pro-aggression cognitive scripts or fighting. This probably reflects the fact that the measures of peer aggression and family conflict that were used are sufficiently highly correlated, such that the family conflict relationship with pro-aggression cognitive scripts is “accounted for” in the analysis. An implication is that those who have higher family conflict may be more likely to associate with peers who are involved in more aggressive or illegal types of activities, which suggests that both issues deserve attention in counseling. If data had been collected on social cues, then it might have been useful to address whether social cues associated with family conflict are generalizable across contexts such as from home to treatment or from family to peers. Literature suggests that aggressive and disruptive behaviors can be context-specific such that children tend to respond aggressively only in specific social situations (Matthys et al. 2001) or with specific individuals (e.g., peers, parents, other adults; Gray et al. 2012). It would be of interest to investigate the proximity of family conflict cues and physical aggression cues. The family conflict’s unique relationship with hostility may indicate that it could be farther down the stimulus generalizability gradient as physical family violence but is associated with more general hostile behaviors. Perhaps youth who experience more family conflict where there is little physical violence develop biases in earlier processing stages instead of in later stages (e.g., reactive versus proactive aggression; Dodge & Coie, 1987) or develop scripts that are specific to non-physical aggression. The type of aggression youth display tends to differentially depend on the processing step affected by biases (Crick and Dodge 1996).

Second, results other than pro-aggression cognitive scripts were consistent with the literature suggesting that pro-aggression biases are uniquely related to general aggression (Burks et al. 1999; Crick and Dodge 1996; Dodge and Coie 1987), or in this case, hostility. Pro-aggression cognitive scripts were not predictive of fighting when controlling for peer aggression as hypothesized. Because the measure of scripts in this study only approximated response-option-related biases, measurement limitation may have been a possible contributor to this unexpected finding. It is possible that biases that were not measured here or a specific combination of biases would predict fighting. Another possible explanation for the lack of association between family conflict, pro-aggression cognitive scripts, and fighting is that youth who abuse substances are at risk for developing processing biases and deficits independent of the expected influences. Research suggests that substance use affects brain development and functioning among youth (Bellis et al. 2005; Clark et al. 2008; Jacobsen et al. 2004; Lubman et al. 2007; Medina et al. 2007; Squeglia et al. 2009) and may significantly interfere with the development of cognitive scripts and the processing steps. It may be informative to examine the relationship between substance use measures (e.g., problem drug, substance use frequency, etc.) and pro-aggression scripts, physical aggression, hostility, and social problems among young substance abusers.

Implications for Treatment

This study was the first to use a SIP framework to identify substance abuse treatment related risk factors and needs among youth. Although assessment measures available in treatment

programs are not intended to assess the specific SIP constructs found in the literature, results suggest that the measures that are already available in the field may help identify clinical needs early in the recovery process. Results indicate that youth endorsing higher peer aggression may benefit from early interventions targeting social interactions, pro-aggression beliefs, hostility, and delinquency. Similarly, youth indicating higher pro-aggression beliefs may benefit from early interventions addressing those beliefs as well as general hostility. Perhaps addressing these needs early in the treatment process will reduce the negative impact that problem behaviors have on treatment. Also, reports of higher family conflict may indicate the need for a family assessment or increased family involvement in treatment. Family-based substance abuse treatment programs are among the most effective (Winters et al. 2011) and research indicates that parenting training can improve family functioning and youth behavior (Dishion and Kavanagh 2002). Early interventions with youth and their families – such as increased psychoeducation targeted at families about addiction and parenting, and increased family counseling to improve communication, conflict resolution, and interpersonal skills – may decrease a youth's general hostility and increase perceived social support.

Limitations

It is important to note that, with the exception of in-treatment physical altercation, all variables were measured at treatment intake; thus associations among assessment variables do not represent causal but rather associative relationships. This sample is comprised of adolescents enrolled in community-based residential treatment; thus the results may not generalize to adults or youth in other treatment settings (e.g., outpatient or juvenile justice-based). In addition, the adolescents in the study had varying levels of exposure to the juvenile justice system; therefore, there may be participants who represent chronically deviant youth and/or youth with varying levels of additional coexisting psychiatric disorders. Furthermore, the sample includes both males and females, and there might also be gender differences with regard to the study's findings. Although this study found no gender differences in fighting, associations among other variables of interest could potentially differ for males and females. This is because there are substantiated differences in a variety of factors (e.g., history of trauma, substance abuse severity) between males and females at treatment enrollment that are well documented (Green et al. 2002; Peters et al. 1997; Wechsberg et al. 2008). The possibility that fighting incidents were underreported may also limit findings. In this study, incidents of fighting were identified by facility staff reports. It is possible that unobserved physical altercation incidents occurred that were not reported or that reported incidents were recorded in a manner that did not meet the classification criteria for physical altercation.

Finally, the environment of residential treatment may represent a unique social context for youth. It is possible that the factors influencing adolescent behaviors while in treatment are different or vary in salience compared to influences at home or school. This study also did not account for the possible treatment-related changes in social and cognitive processes that may have occurred between the time of the intake assessment and fighting incidents. Away from their families and friends, youth may be exposed to social interactions during treatment that are not common in their everyday lives. For example, counselor-youth interactions may

expose youth to pro-social adult interactions and challenge some previously held cognitive biases. Frequent group counseling sessions may also expose youth to positive adult-to-peer and peer-to-peer social skills (De Leon 1997). There is also the possibility that youth in treatment learn negative behaviors from each other (Gifford-Smith et al. 2005). Treatment effects may have reduced the risk of aggressive behaviors and should be considered when interpreting the findings.

Conclusion

This study demonstrated that applying a basic SIP model to youth in a substance abuse treatment setting provided clinically relevant information. These findings suggest that high exposure to aggressive peers, as reported at intake, is a risk factor for aggressive behavior in treatment and that exposure to aggressive peers, family conflict, and pro-aggression cognitive scripts are risk factors for increased hostility. Implications on how to impact aggressive behavior include encouraging prosocial peer relationships in treatment and giving attention to maladaptive beliefs about aggression. The latter may impact hostility, which is linked to treatment drop-out (Hiller et al. 2006). In addition, the connection between family conflict and decreased social support implies that family involvement in treatment is important. Findings suggest that further investigation of SIP among substance abusing youth may (1) further inform SIP theory by expanding its generalizability and (2) improve substance abuse treatment planning for at-risk youth by identifying risk factors for problem behaviors. Future studies may also inform the content of youth and family interventions to lessen the negative effect of problem behaviors on treatment progress. Overall, findings suggest that delinquency developmental models, particularly the SIP model, have the potential to guide the advancement of collaborative-care treatment for adolescents.

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Basic Processing Steps

Possible Influences Associated with Processing Errors

Exposure to aggression and conflict could facilitate the development of processing biases.

Biases may include oversensitivity to aggressive social cues and falsely perceiving neutral social cues as combative.

Biases may include having limited non-aggressive response options or expecting aggression to yield a positive outcome.

Processing errors could be associated with aggressive and delinquent behaviors as well as social problems.

Figure 1.
Basic Components of the Social Information-Processing Model with Influences Associated with Processing Biases

Table 1

Sample Demographics

	Sample (N = 547) n (Percent of Sample)	Fighting Group	
		Fighting (n = 78) n (Percent of Row)	Non-Fighting (n = 469) n (Percent of Row)
Facility			
Facility A	288 (53)	48 (17)	240 (83)
Facility B	259 (47)	30 (12)	229 (88)
Gender			
Male	349 (64)	55 (16)	294 (84)
Female	198 (36)	23 (12)	175 (88)
Age Group			
Younger (13–15)	220 (40)	43 (20)**	177 (80)
Older (16–19)	327 (60)	35 (11)	292 (89)
Ethnicity/Race			
Hispanic	243 (44)	31 (13)	212 (87)
White	188 (34)	32 (17)	156 (83)
More than one race	65 (12)	8 (12)	57 (88)
Black/African American	25 (5)	5 (20)	20 (80)
Other	12 (2)	1 (8)	11 (92)
Missing	14 (3)	1 (7)	13 (93)
Problem Drug			
Marijuana/Hashish	163 (30)	24 (15)	139 (85)
None	98 (18)	14 (14)	84 (86)
Methamphetamines	82 (15)	13 (16)	69 (84)
Alcohol	55 (10)	7 (13)	48 (87)
Other Drugs	37 (7)	4 (11)	33 (89)
Cocaine	37 (7)	4 (11)	33 (89)
Heroin	24 (4)	4 (17)	20 (83)
Sedatives	17 (3)	3 (18)	14 (82)
Crack/Freebase	16 (3)	3 (19)	13 (81)

	Fighting Group		
	Sample (N = 547) n (Percent of Sample)	Fighting (n = 78) n (Percent of Row)	Non-Fighting (n = 469) n (Percent of Row)
Hallucinogens	11 (2)	2 (18)	9 (82)
Missing	7 (1)	0 (0)	7 (100)
Drug Use Severity			
Low	154 (28)	15 (10)	139 (90)
High	393 (72)	63 (16)	330 (84)

Note. Chi-square analyses indicated there were proportionally fewer older participants in the fighting group ($\chi^2(1) = 8.680, p < .01$).

Table 2**Measure Items***Family Conflict Scale^a ($\alpha = .828$)*

- There are lots of arguments or fights in your family.
- Members of your family often get really mad at one another.
- Members of your family talk badly about each other.
- Your family members often yell at each other.
- Your family members often hit each other.

Peer Aggression Scale^b ($\alpha = .798$)

- You have friends who have damaged other people's property.
- Your friends do things that can get them into trouble with the law.
- You have friends who are in gangs of some type.
- You have friends who have used a weapon (gun, knife, or club) in a fight.

Pro-Aggression Cognitive Scripts Scale^c ($\alpha = .810$)

- The only way to protect yourself is to be ready to fight.
- When people tell you what to do, you become aggressive.
- You think you have to pay back people who mess with you.
- If someone disrespects you then you have to straighten them out, even if you have to get physical.

Hostility Scale^d

- You have carried weapons, like knives or guns.
- You feel a lot of anger inside you.
- You have a hot temper.
- You like others to feel afraid of you.
- You feel mistreated by other people.
- You get mad at other people easily.
- You have urges to fight or hurt others.
- Your temper gets you into fights or other trouble.

Social Support Scale^e

- You have people close to you who motivate and encourage your recovery.
- You have close family members who want to help you stay away from drugs.
- You have good friends who do not use drugs.
- You have people close to you who can always be trusted.
- You have people close to you who understand your situation and problems.
- You are often in situations where drug use is common. [®]
- You have people close to you who expect you to make positive changes in your life.
- You have people close to you who help you develop confidence in yourself.
- You have people close to you who respect you and your efforts.

[®] Denotes item is reverse-scored.

^a All items are from the Family Conflict Scale (TCU FFS Form; Knight et al. 2014)

^b All items are from the Peer Trouble Scale (TCU FFS Form; Knight et al. 2014)

^c All items are from the Power Orientation Scale (TCU CTS Form; Knight et al. 2014)

^d All items are from the Hostility Scale (TCU SOC Form; Knight et al. 2014)

^e All items are from the Social Support Scale (TCU SOC Form; Knight et al. 2014)

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Table 3Hypothesis 2: Bivariate Correlation and Full Model Regression Estimates and *t*-Values

	Hostility			Social Support			Crime History		
	<i>r</i>	<i>B</i>	<i>t</i>	<i>r</i>	<i>B</i>	<i>t</i>	<i>r</i>	<i>B</i>	<i>t</i>
Age Group	-.107**	-.746	-1.40	.034	.586	1.04	.143***	.815***	3.98
Family Conflict	.307***	.157***	5.08	-.173***	-.136***	-4.19	-.121**	-.047***	-4.00
Peer Aggression	.514***	.215***	7.10	-.014	.010	.32	.092*	.029***	2.50
Pro-Aggression Cognitive Scripts	.601***	.415***	13.01	.004	.018	.55	.082	.017	1.37

Note. Pearson *r* values indicate bivariate correlations between each independent variable and dependent variable. Full model regression estimates for each dependent variable account for all independent variables simultaneously.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4

Hypothesis 3: Bivariate Correlation and Full Model Logistic Regression with Fighting Group as the Dependent Measure

	<i>r</i>	β	<i>SE</i> β	Wald's χ^2	<i>e</i> β (odds ratio)
Age Group	-.126**	-.588*	.256	5.283	.555
Family Conflict	-.004	-.018	.015	1.398	.982
Peer Aggression	.123**	.035*	.016	4.966	1.036
Pro-Aggression Cognitive Scripts	.107*	.019	.016	1.408	1.019

Note. Pearson *r* values indicate independent bivariate correlations between each independent variable and fighting group (fighting/non-fighting). Full model logistic regression estimates account for all independent variables simultaneously.

*
 $p < .05$.

**
 $p < .01$.