HHS Public Access

Author manuscript

Addict Disord Their Treat. Author manuscript; available in PMC 2017 March 01.

Published in final edited form as:

Addict Disord Their Treat. 2016 March ; 15(1): 17–24. doi:10.1097/ADT.0000000000000070.

Family Functioning as a Mediator of Relations between Family History of Substance Use Disorder and Impulsivity

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Abstract

Impulsivity is strongly related to the development of adolescent substance use. Therefore, understanding factors that influence impulsive characteristics is important for the development of prevention and intervention programs. Intervention and prevention programs focused on factors that influence impulsive characteristics are especially important for those at particularly high risk for the expression of impulsivity - those with a family history of substance use disorder. A factor of particular interest is family functioning.

Aim—To examine family functioning as a mediator of relations between having a family history of substance use disorder and impulsivity.

Methods—Participants included a majority Hispanic sample of pre-adolescent boys and girls (mean age 10.99, *SD* = .84) recruited from the community who did (FH+) and did not (FH−) have a family history of substance use disorder. FH status and the quality of family functioning were compared at the initial visit with impulsiveness assessed a year later.

Results—Results showed FH+ children had worse family functioning; worse family functioning was related to higher levels of impulsivity, and higher levels of impulsivity among FH+ children were due to the influence of family functioning on levels of impulsivity. In other words, family functioning mediated relations between having a family history of substance use disorder and impulsivity.

Conclusion—These results indicate that higher levels of impulsivity in FH+ children are due in part to worse family functioning.

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Conflicts of Interest

There are no conflicts of interest to report.

Keywords

family history of substance use; family functioning; impulsivity

Children of substance abusing parents are 4–9 times more likely than children of parents who do not abuse substances to develop a substance use disorder.[1] This association has led to research examining factors involved in transmission of substance use liability,[1,2] such as impulsivity. [3] There is substantial research suggesting that offspring of parents with a history of drug use demonstrate higher levels of impulsivity. [4] One hypothesis for this link is a genetic transmission of impulsivity. Parents who abuse substances are high in impulsivity themselves[5] and parental levels of impulsivity are positively related to offspring levels of impulsivity. [6]

Because impulsivity is related to substance use, it is important to understand factors that shape the impulsive characteristics of children with a family history of substance use disorders. An intervening variable of particular interest is family functioning. A history of parental drug use disorder is related to several aspects of family functioning and parent behaviors, such as discipline and support. [7,8] Parents with a history of substance use disorders may demonstrate lower parenting skills due to differences in stressful life experiences, school and career trajectories, and personality, [9] which affects overall family functioning.

Aspects of family functioning that are associated with family history of substance use disorder are also related to the development of impulsivity. For example, high levels of parental support and positive affect are related to increased child self-regulation[10,11,12] and decreased impulsivity. [13] Age-appropriate limit setting and discipline[14] and control[13] are also related to lower levels of impulsivity. One explanation for these relations is that positive interactions and parental structure are internalized by offspring over time and used as strategies to control impulsive responding. [15] Supporting this idea, longitudinal research shows that the parent-child relationship is related to the development of self-regulation. [16,17] Pre-adolescence is key developmental period in which to examine these relations, as substance use and other externalizing behaviors peak a few years later in mid-adolescence. [18] Thus, knowledge concerning the role of family functioning in the relation between family history of substance use disorder and impulsivity may lead to more effective interventions to reduce behaviors that are related to impulsivity, namely substance use.

Although previous research shows significant associations between family history of substance use disorder, family functioning, and impulsivity, no research to date has examined whether family functioning mediates relations between having a family history of substance use disorder and levels of offspring impulsivity during late childhood or early adolescence. Furthermore, few longitudinal studies have examined whether having a family history of substance use disorder and family functioning is related to levels of impulsivity. [16,17] The current paper aimed to begin to fill these gaps. We examined whether family functioning (FF) assessed at the initial visit impacts relations between having a family history of substance use disorder (FH) and levels of impulsivity reported one year later. This study used the Family Assessment Measure (FAM-III), [19] which measures many

of the family variables previously related to parent drug use, such as communication, affect, discipline, and support. We tested three hypotheses: (1) FH would be associated with FF; (2) FF would be associated with impulsivity; and (3) FH influences levels of impulsivity at least partly through FF.

Method

Participants and sample selection

Participants for this study included 274 boys and girls (mean age 10.99; *SD* = .84 at study entry) with (FH+; *n* = 223) and without (FH−; *n* = 51) a family history of substance use disorder. This sample comes from a larger cohort (*N* = 386) of children in a longitudinal study focused on impulse control development and substance use. The subsample for the current study consisted of children who reported never having tried substances (using the Drug History Questionnaire); [20] and in cases where siblings were enrolled, only the first enrolled sibling was included in the current subsample.

Children and their parents were recruited from the community through radio, newspaper, and television advertisements. Inclusion criteria into the larger study included children ages 10 to 12, good physical health, and for the FH+ group, a biological father with a history of a substance use disorder. Exclusionary criteria included a physical or neurological condition that prevented study participation, regular substance use (defined as use of a substance for three consecutive months), current or past DSM-IV-TR psychiatric disorders, and Full Scale IQ < 70 (using the Wechsler Abbreviated Scale of Intelligence). [21] Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), Attention Deficit Hyperactivity Disorder (ADHD), Dysthymia or Anxiety Disorders were not exclusionary for the FH+ group, as these disorders are commonly co-morbid with substance use involvement. [22] Written informed consent was obtained by the parent/guardian and assent was obtained by the adolescent prior to study participation and the experimental protocol was approved by our Institutional Review Board.

Procedures

After study eligibility was determined, children and their parents attended the initial study visit where families were assigned to FH+ or FH− groups and the assessment of family functioning was completed. Both child and parent completed assessments and interviews on the same visit and in separate rooms. Child self-report of impulsiveness was collected a year later.

Measures

Demographics—Parents reported their child's birth date, sex, race, and ethnicity. Parental marital status, education, and employment were self-reported on the *Four Factor Index of Social Status* (FFIS), [23] which was used to calculate family socioeconomic status (SES). Scores for this scale range from 8 (unskilled laborer) to 66 (major business professional).

Family history groups

Family History Assessment Module (FHAM). [24]: At the initial visit, the participating parent was interviewed by trained research staff using the FHAM to assess for current and lifetime histories of substance use disorders in the biological father, mother and second-degree relatives as well as other psychiatric diagnoses in the biological father and mother. Children in the FH+ group had to have a biological father with a history of substance use disorder; and having a mother or second degree relative with a history of substance use disorder was not exclusionary. Children who did not have a father or other first or second degree relative (i.e., mother or grandparents) with a history of substance use disorder were placed in the FH− group. The results of this interview were used to make FH+ and FH− group assignments.

Child diagnostic assessment

Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime (K-SADS-PL). [25]: The KSADS-PL is a semi-structured interview with established reliability and validity. [25,26] Children and one parent were interviewed separately using the K-SADS-PL to determine the presence or absence of a current DSM-IV-TR mental health diagnoses in the child. Interviews were completed by trained research staff; and all diagnoses were made by consensus review with the study's board certified child and adolescent psychiatrist.

Family functioning

Family Assessment Measure (FAM-III). [19]: At the initial visit, the FAM-III General Scale was given to parents and children to obtain a quantitative index of the family environment in the prior 6 months. The FAM-III General Scale is a 50-item self-report measure that yields scores on seven subscales (task accomplishment, role performance, communication, affective expression, involvement, control, and values and norms), which are summed and then averaged to provide an overall rating. Parent and child overall rating scores were converted to *T*-scores and then averaged to provide one continuous measure. The FAM-III General Scale shows adequate validity[27] and produced satisfactory reliability for the current sample (Adolescents Cronbach's α = .90, Parents α = .93).

Impulsivity—Children completed the *Barratt Impulsiveness Scale* (BIS-11) [28] to provide a self-report measure of impulsiveness and was measured 1 year after the initial visit. The BIS-11 is a 30-item questionnaire used to rate the frequency of several common impulsive traits. The BIS-11 was summed to compute a total score ranging from 30 to 120, with higher scores indicating more impulsiveness. The BIS-11 is valid in a variety of populations[28] and demonstrated adequate reliability in the current sample (α = .80).

Statistical Analyses

To determine whether family functioning mediates relations between FH and the primary outcome of child impulsivity, we followed procedures outlined by MacKinnon, Fairchild, and Fritz. [29] Specifically, a series of multiple linear regressions were conducted to examine whether the strength of the association between FH and impulsivity is reduced when

controlling for family functioning. Our independent variable (i.e., FH) has two levels (FH+ and FH−), therefore one dummy variable was created using FH− as the reference group.

A four-step procedure was used to conduct the mediation analyses. [29] Step 1, impulsivity (i.e., the primary outcome) was regressed on FH (i.e., the primary predictors) adjusting for ADHD, ODD, and CD (proxy measures of impulsivity at study intake) diagnoses and age; Step 2, family functioning (i.e., the mediator) was regressed on FH adjusting for ADHD, ODD, and CD diagnoses, gender and SES; Step 3, impulsivity was regressed on family functioning adjusting for ADHD, ODD, and CD diagnoses and age; and Step 4, impulsivity was regressed on family functioning and FH adjusting for ADHD, ODD, CD diagnoses and age.

Results

Child characteristics

Table 1 presents child sociodemographic and psychiatric characteristics, as well as family environment and impulsivity levels of the sample by group. There were significant differences in age, SES, and IQ (although both groups were within the normal IQ range). Because of the design of the larger study, there were no children in the FH− condition with a mental health diagnoses. Thus, there were also significant differences between the groups in child mental health diagnoses (ADHD, ODD, CD, and anxiety; see Table 1). As shown in Table 1, FH+ families reported higher levels of difficulties; and FH+ children demonstrated higher levels of impulsivity.

Parent histories of substance use and other psychiatric disorders

On average, FH+ fathers had two substance use diagnoses and 36.8% had both a substance use and another psychiatric diagnosis (Antisocial Personality Disorder, Bipolar Disorder, Conduct Disorder or Major Depression). Fifty-nine (26.8%) FH+ families had both a father and a mother with a history of a substance use disorder. Forty-six percent (n = 102) of FH+ mothers had either a substance use or other psychiatric diagnoses (Antisocial Personality Disorder, Bipolar Disorder, Conduct Disorder or Major Depression), and 10.5% had both a substance use and other psychiatric diagnoses. An alcohol use disorder (abuse or dependence) was the most prevalent diagnosis for both fathers (73.1%) and mothers (17.0%), followed by cocaine (fathers: 57.4%; mothers: 11.2%) and cannabis abuse or dependence (fathers: 53.8%; mothers: 10.3%).

Correlations between variables of interest

Given research showing that age, SES, and gender are related to family functioning and levels of impulsivity, correlation analyses between age, SES, gender and the dependent variables (family functioning in Step 2, and impulsivity in Steps 1 and 3) were conducted to determine if these variables should be entered as covariates into the regression model (see Table 2). Given the pattern of results, age was entered into the regression models at Steps 1, 3, and 4 and SES and gender were entered into the regression models at Step 2.

Mediation Models

Figure 1 summarizes the results from the four regression models as described in the Statistical Analysis section and shows the meditational effect of family functioning on relations between FH and levels of impulsivity.

Step 1 (path "*c*" in the figure) showed that, after adjusting for ADHD, ODD, and CD diagnoses and age, FH+ children had significantly higher levels of impulsivity than FH− children (β = 3.33, $p = .03$). Step 2 (path "*a*" in the figure) showed that, after adjusting for ADHD, ODD, and CD diagnoses, gender and SES, FH+ children had significantly worse family functioning than FH− children (β = 4.16, $p < .001$). Step 3 (path "*b*" in the figure) showed that, after adjusting for ADHD, ODD, and CD diagnoses and age, higher scores on the family functioning measure (i.e., poorer family functioning) were associated with significantly higher levels of child impulsivity (β = .43, $p < .001$). Step 4 (path "*c′*" in the figure) showed that, after adjusting for ADHD, ODD, and CD diagnoses, age and family functioning, the difference in child impulsivity among the FH groups was no longer significant (β = 1.43, $p = .36$). However, higher scores on the family functioning measure (i.e., worse family functioning) were still associated with significantly higher levels of child impulsivity (path "*b′*" in the figure; β = .40, $p < .001$).

The findings of the four-step mediation analyses suggested that family functioning completely mediated the relationship between FH and subsequent levels of impulsivity. After adjusting for ADHD, ODD, and CD diagnoses, age and family functioning (i.e., the mediator), the direct effect of FH+ on child impulsivity relative to the reference group was not significantly different from zero. Relative to the reference group (FH−), the indirect effect of FH+ on subsequent impulsivity through family functioning was $a \times b' = 1.68$ (95% CI: 0.56 to 2.79).

Discussion

The purpose of this study was to examine family functioning as a mediator of relations between having a family history of substance use disorder and impulsivity. Our results demonstrated that family history of substance use disorder and relatively poorer family functioning were related to higher levels of impulsivity. Furthermore, relations between family history of substance use disorder and impulsivity were mediated by family functioning. The current study offers new evidence for the role of family functioning in shaping levels of impulsivity. [16,30]

Relations of family functioning to family history of substance use

The current results are consistent with previous research showing family history of substance use disorder is related to worse family functioning, [8] possibly due to inadequate parenting. Previous research has suggested that parental substance use is related to several aspects of parenting behavior, including inconsistent discipline and lower levels of parental support. [8] Parenting differences among those with a history of substance use disorder may be due to personality characteristics that are related to both substance use and parenting behaviors or because drug use during the parents' adolescence or early adulthood interfered

with positive role development or the acquisition of social skills. [9] Although research has suggested that children with ADHD, ODD, and CD are more likely to have a family history of substance use disorders [31] and report worse family functioning, [32,33] the current results suggest that the relation between family history of substance use disorder and family functioning remained even after controlling for children's ADHD, ODD, and CD.

Relations of child impulsivity to family functioning

The current findings showed that children with relatively higher levels of impulsivity also live in families with worse family functioning. These results are consistent with previous research showing parenting behaviors and family functioning are related to child self-regulation[10,11,12] and impulsivity. [13] These results support family systems theories on the role of parenting and family functioning in shaping child characteristics. [34] One interpretation is that over time, parental structure and positive interactions are internalized by children and used as strategies for their own regulation. [15] In fact, family-based therapeutic techniques for remediating child problem behaviors that are impulsive in nature focus heavily on reordering the family environment to be predictable and consistent for the child, and have shown to lower problem behaviors that are highly impulsive. [35]

The current results add to the literature by using a family functioning measure that covers many areas of family functioning. Others have focused on selective dimensions such as sensitive responding and involvement, [10,11,12] limit setting and discipline[14] or control[13] and have focused on younger aged children. Our measure simultaneously captures these domains along with additional domains that are targets of family-based therapeutic approaches shown to decrease impulsive displays of behavior[35] and we include children in their preadolescent years.

Family functioning as a mediator of relations of child impulsivity to FH

The current findings showed that family functioning mediated relations between family history of substance use disorder and impulsivity. This paper offers evidence for the impact of family functioning on impulsive behaviors among FH+ children. These results further demonstrate the importance of therapeutic approaches that aim to modify family structures and parenting behaviors to be more supportive, predictable, and less conflictual. [35] A therapeutic approach that may be of particular interest is one that targets the family environment, while also challenging impulsive processes through the consistent implementation of consequences in response to adolescent substance use. [36,37] Such programs have been shown to decrease adolescent substance use among adolescents with impulsive characteristics compared to those without. [38]

Limitations and strengths

The current results must be considered within the context of a couple of limitations. First, our analyses only included family functioning as a mediator. Research has suggested that peers also have an impact on the development of impulsivity. [39] Future research should include an analysis of peer associations and other family variables. A second limitation is that there was only one year between our measure of family functioning and impulsivity. Due to neurological development, impulse control may undergo significant changes across

adolescence. [40] Subsequent studies should examine the impact of family functioning on changes in impulsivity throughout adolescence. Despite these limitations, the current study has some strengths. First, by including a composite score of child and parent perceptions of family functioning, we avoid mono-method reporting bias. Second, this sample includes a majority Hispanic population, thereby broadening the literature on relations among family history of substance use, family functioning and impulsivity.

Summary

Results of the current study expand existing research by suggesting that among youth with a family history of substance use disorders, reports of a family functioning with moderate levels of difficulty accounts for elevated levels of impulsivity compared to youth without a family history of substance use disorders. To our knowledge, this is the first study to examine family functioning as a mediator of family history of substance use disorders and later reports of impulsivity. Given the therapeutic implications for prevention programs, future studies should attempt to replicate these results.

Acknowledgments

Sources of Funding

Research supported in this manuscript was supported by NIDA of the National Institutes of Health under award numbers R01DA026868, R01DA033997-02S2, T32DA031115.

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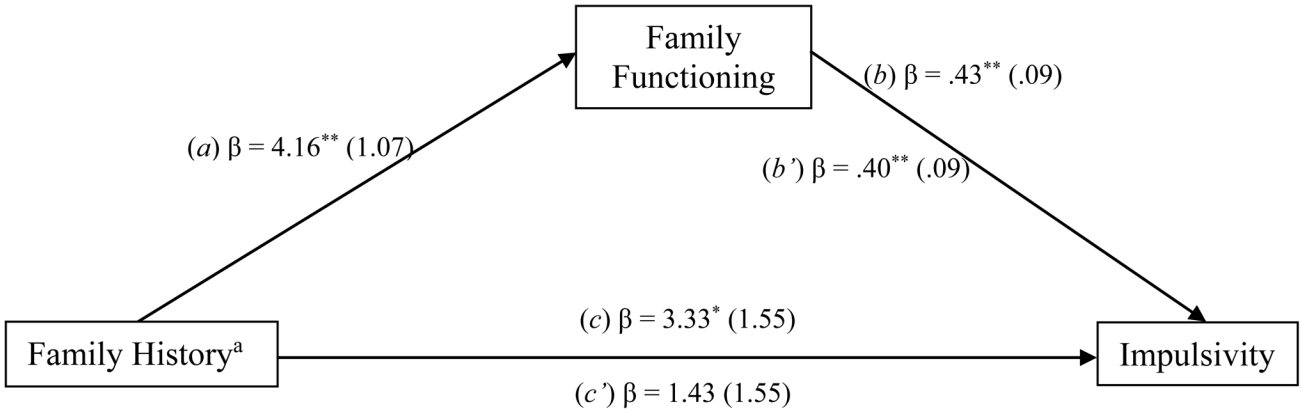

Figure 1.

Multiple Linear Regression Analyses Predicting Impulsivity from Family History Status and Family Functioning

Table 1

Child Characteristics for FH Groups

	FH− (*n* = 51)	FH+ (*n* = 223)		
Child Characteristics	***M* (SD) or %**	***M* (SD) or %**	***F*(df), X^2(df), or Fisher Exact**	***p***
Child Demographics				
Age	11.22 (.78)	10.99 (.84)	4.79 (1, 272)	0.03
Male Gender	24 (47.1%)	109 (48.9%)	0.06 (1)	0.82
Race				0.50
White	92.0%	84.8%		
African American	8.0%	13.5%		
Other[a]	0.00%	1.8%		
Ethnicity			1.85 (1)	0.17
Hispanic	70.6%	79.4%		
Non-Hispanic	29.4%	20.6%		
Intelligence (IQ)	102.14 (12.46)	95.05 (11.32)	15.65 (1, 272)	< 0.001
Socioeconomic Status	42.76 (10.75)	32.31 (11.25)	36.44 (1, 272)	< 0.001
Psychiatric Disorders				
ADHD	0.00%	26.9%		< 0.001
ODD or CD	0.00%	10.8%		0.01
Any Anxiety[b]	0.00%	17.5%		< 0.001
Model Variables				
Family Functioning	46.32 (5.73)	51.66 (6.45)	29.57 (1, 272)	< 0.001
Impulsivity	58.80 (10.52)	62.11 (9.53)	4.81 (1, 272)	0.03

Note: FH− = Families without a history of a substance use disorder; FH+ = Families with a history of a substance use disorder. ADHD = Attention-Deficit/Hyperactivity Disorder. ODD = Oppositional Defiant Disorder. CD = Conduct Disorder.

[a] Represents American Indian or Alaska native (*n* = 2), Native Hawaiian or Pacific Islander (*n* = 1), and Unknown (*n* = 1).

[b] Generalized Anxiety Disorder, Separation Anxiety Disorder, Specific/Simple Phobia, Post-traumatic Stress Disorder, or Panic Disorder.

Table 2

Correlations Among Variables

	Age	Gender	SES	FH	Family Functioning	Impulsivity
Age	------					
Gender[a]	.01	------				
SES	.04	−.09	------			
FH[b]	.13*	−.01	.34***	------		
Family Functioning	−.01	−.14*	−.18***	.31***	------	
Impulsivity	.17**	−.04	−.07	.13*	.31**	------

Note.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

[a] Dummy coded as male = 0, female = 1. FH = Family History. SES = socioeconomic status.

[b] Dummy coded as families without a history of a substance use disorder (FH−) = 0, families with a history of a substance use disorder (FH+) = 1.

Addict Disord Their Treat. Author manuscript; available in PMC 2017 March 01.