Does parental substance use always engender risk for children? Comparing incidence rate ratios of abusive and neglectful behaviors across substance use behavior patterns

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Abstract

Parent substance use disorder (SUD) is associated with an added risk for child abuse and neglect, but less is understood about how a range of parental use behaviors is associated with differential maltreatment frequencies. This study used the National Survey of Child and Adolescent Well-Being (NSCAW I) to create categories for parental substance use behaviors there are conceptually associated with varying levels of substance-related impairments. The study sample was composed of 2,100 parents of children ages 2 to 17 from Wave 4 data collection. Weighted negative binomial regression models assessed the relationship between substance use behavior patterns and maltreatment frequencies by type. Behavior patterns defined by some form of past year substance use were associated with a higher frequency of physical or emotional abuse compared to non-users. In contrast, only past year SUD was associated with a higher frequency of neglect compared to other categories. In sum, the relationship between substance use and maltreatment frequencies differed for abuse and neglect, suggesting different pathways may be underlying these observed relationships.

keywords: alcohol use, illicit drug use, physical abuse, emotional abuse, neglect

Parental substance misuse is a prevailing risk factor that has been targeted by the child welfare systems since society's increased awareness of substance-using mothers during the late 1980s (Wulczyn, 2009). The vast majority of literature supports a positive relationship between parental substance use disorder (SUD) and any child maltreatment occurrence (Dunn et al., 2002; Stanton-Tindall, Sprang, Clark, Walker & Craig, 2013). However, the focus on SUD is likely a product of the vast majority of studies measuring substance use and child maltreatment as dichotomous conditions (BLINDED FOR PEER REVIEW). This study aimed to examine if and how frequency of child maltreatment behaviors may vary across a range of substance use behavior patterns (defined by a recurrent way one uses alcohol or drugs) within a high-risk, child welfare sample. Further, decomposing this relationship by child maltreatment type can inform new ways of thinking about how we identify and address the needs of substance-using parents.

Before delving into the extant literature, it is important to define how substance use is measured. *Psychoactive substances* can alter one's mood, distort one's perceptions, and/or impair other motor and biological functions (NIDA, 2012). S*ubstance use* is defined as any use of psychoactive substances, such as steroids, alcohol, cannabis, stimulants, opioids, sedatives/hypnotics/anxiolytics, inhalants, and hallucinogens (APA, 2000, 2013). *Illicit drug use* refers to any use of federally scheduled substances, including prescription drugs used without a medical prescription or more than prescribed (Kessler, 1998). Diagnostic categories clinically-define problematic substance use through measuring consumption, substance-related effects (e.g., tolerance, withdrawal), and/or substance-related consequences (e.g., injury, job problems) (APA, 2000, 2013; WHO, 2000). Thus the term s*ubstance use disorder (SUD)* in this paper captures diagnostic definitions, including DSM-III to DSM-5 categories of substance abuse, substance dependence, or substance use disorder (APA, 2000, 2013).

Parental Substance Use & Types of Child Maltreatment Behaviors

This study focuses on three types of child maltreatment behaviors: physical abuse, emotional abuse, and neglect. Physical abuse and emotional abuse are two distinct forms of child abuse. The former is defined by physical assault whereas the latter is defined by verbal assault. Of the two, emotional abuse tends to occur more frequently (Straus & Field, 2003). Child neglect is a multidimensional construct that includes emotional, cognitive, supervisory, and physical domains; it is distinguished from abuse by focusing on a parent's failure to act in ways that meet a child's basic needs, resulting in actual or potential harm to the child (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008; Straus & Kantor, 2005).

Physical abuse is consistently associated with any SUD (Chaffin et al., 1996; Stith et al, 2009), but mixed results exist for the association between any harmful and/or risky substance use (defined by any heavy drinking and/or illicit substance use) and physical abuse (Leonard, 2002; Walsh et al., 2003; Widom & Hiller-Sturmhofel, 2001). In addition, a lifetime history of SUD was associated with a higher likelihood of self-reported physical abuse behaviors (Kelleher et al., 1994) and child physical abuse potential (Ammerman et al., 1999). However, Hien et al. (2010) observed that a lifetime history of SUD was not significantly associated with child abuse potential, after controlling for depressive disorder with a small sample ($n = 152$). Initial evidence also exists for the importance of frequency or intensity of alcohol use for physical abuse: (a) frequency of maternal intoxication from alcohol was associated with an increased likelihood of physical abuse behaviors (Berger, 2005), and (b) all past year drinking patterns (including light and moderate drinking patterns of 1 to 4 drinks) were associated with a higher frequency of maltreatment than abstainers (Freisthler, Holmes, & Price Wolf, 2014).

While there is evidence that parental substance use may contribute to increased risk of emotional abuse, the specific relationships between specific substance use behaviors and emotional abuse remain unclear (Dube et al., 2001; Gibbs et al., 2008; Palusci & Ondersma, 2012; Sedlak et al., 2010). Parental alcohol use disorder has been identified as a predominant issue among families with individuals who likely experience childhood emotional abuse (Dube et al., 2001; Sedlak et al., 2010). Among a sample of military families, bivariate analyses indicated emotional abuse was significantly more likely to be present if substance use was indicated at time of first incident (Gibbs et al., 2008). In a child welfare sample, SUD treatment after a CPS investigation for emotional abuse was associated with an increased likelihood of emotional abuse re-occurrence (Palusci & Ondersma, 2012). It is plausible that SUD treatment is a proxy for severity of parental substance use problems that contribute to future emotional abuse.

Neglect studies have predominantly focused on parental SUD as a risk factor for neglect outcomes (Chaffin et al., 1996; Dunn, 2002; Dube et al., 2001; Kelleher et al., 1994; Ondersma, 2002; Sedlak et al., 2010). However, a few studies with nonsignificant or more complex findings are present, complicating our understanding of this association (BLINDED FOR PEER REVIEW; Slack et al., 2011; Slack et al., 2004). For example, Slack et al. (2004) observed no significant relationship between alcohol or illicit drug use and CPS reports for neglect; however, this study only measured substance use that was in response to a stressful life event. In a subsequent study, heavy drinking and illicit drug use were also not associated with CPS substantiation of neglect; however, illicit drug use was associated with self-reported neglect (Slack et al., 2011). Another study observed (a) frequent heavy drinking (defined by 5+ drinks for 3 to 5 days a week) drinks to be associated with a higher likelihood of leaving a child where the parent was not sure the child was safe compared with abstainers and (b) infrequent heavy

drinking (defined by 5+ drinks once a month or less) and moderate drinking (defined by 3 to 4

drinks in the past month but no more than 4 drinks) to be associated with a lower likelihood of

unsafe monitoring of a child compared with abstainers (BLINDED FOR PEER REVIEW).

As a whole, the extant literature creates a disjointed understanding of the relationship

between parental substance use and child maltreatment. A few of the prior studies suggest that a

range of drinking behaviors may better inform our understanding of different types of

maltreatment behaviors. However, further research is needed that explicitly: (a) measures a range

of alcohol *and* drug use behaviors within one study and (b) compares the relationship between

substance use behavior patterns and maltreatment frequency across types of maltreatment. This

approach may provide insight into processes unique for each maltreatment type. For example,

only the most intense forms of substance use, such as parents with SUD, may cause parents to

fail to meet their child's basic needs while less intense forms of substance use, such as light or

moderate drinking, may be sufficient for a momentary verbal assault of a child.

Substance Use Behavior Patterns by Hypothesized Effects

Concerns about parental use of psychoactive substances are based on their association

with compromised parental functioning and with child harm (Wells, 2009). Epidemiological

evidence demonstrates substance use behaviors and their associated impairments occur along a

continuum (Institute of Medicine, 1990). If so, higher intensity of substance use (defined by

increasing amount of use and/or severity of substance-related problems) may be related to higher

impairments in parents' ability to attend to, interpret, decide a response to and/or execute a

decision related to their children's words or actions (Crittenden, 1993; Milner, 2000).

Based on this rationale, this study used social information processing (SIP) models of

child abuse and neglect to guide hypotheses about how specific substance use behavior patterns

may be associated with varying levels of maltreatment frequency (see Table 1 for a summary of hypothesized relationships). SIP models suggest parents' abilities to process child behaviors and appropriately respond can be compromised *when impairments occur at any one of four stages*: (1) attention, (2) interpretation, (3) decision-making, and (4) implementation (Crittenden, 1993; Milner, 2000). For example in cases for abuse (physical or emotional), parents may develop a skewed perspective of the child's behavior if they: (a) only attend to misbehavior, (b) interprets behavior as threatening, (c) selects abusive behaviors when behavioral response options are limited or mitigating contextual factors for a specific situation are ignored, or (d) implement an abusive responses if self-regulation is compromised (Milner, 2000). In contrast for cases of neglect, parents may: (a) fail to notice or notice and fail to respond to a child's communication for help, (b) interpret or evaluate the signal as not severe enough to require a response, (c) have limited response options and/or believe he or she is not responsible for or incapable of implementing any given response, or (d) may be distracted before being able to implement a decision by a competing need (Crittenden, 1993).

Psychoactive substance affect the cognitive and emotional processes underlying social information processing; however, the substance use literature frames these substance-related effects as impairment in neuropsychological functioning (Fuster, 2008). Some forms of substance use may impair neuropsychological functioning either through producing or exacerbating neuropsychological deficits in ways that impair SIP and contribute to the creation of maltreatment behaviors (Milner, 2000). Thus substance use behavior patterns developed for this study (BLINDED FOR PEER REVIEW) were guided by the current literature on how substance-related neuropsychological impairments are associated with each substance use behaviors pattern (e.g., Fernandez-Serrano et al., 2011; Fillmore, 2012).

<INSERT TABLE 1 HERE>

Psychoactive substances have generalized effects (e.g., generally sedative or stimulating sensations) that impair or lessen cognitive and emotional processing important for completing general behavioral tasks such as caring for a child (see Cohen (2010) and Fernández-Serrano, Pérez-García, & Verdejo-García (2011) for comprehensive review). In cases of light to moderate drinking (defined by drinking behaviors less likely to result in intoxication), there may be no substantial substance-related impairments with only low levels of disinhibition indicated; in fact, there may be desirable effects such as euphoria and relaxation (Oscar-Berman & Marinkovic, 2007). Thus light or moderate drinking is likely to be associated with low frequency neglect and not significantly differ from non-use. However, mild disinhibition may produce a low level of risk for abuse behaviors in particular, given that impairments related to the later stage of implementation (where selected parental responses are enacted) can result in a higher likelihood that parents act upon initial impulses (Matusiewicz, Macatee, Guller, & Lejuez, 2013; Milner, 2000).

In contrast, acute neuropsychological impairments are associated with intoxication and withdrawal resulting from heavy drinking and/or other psychoactive drug use (Fernandez-Serrano et al., 2011; Vik et al., 2004). This harmful or risky use pattern can create temporary impairments in a broader range of parents' cognitive processing (i.e., alertness, attention, judgment, decision-making abilities, and disinhibition) and emotional processing (i.e., attending to and interpreting emotional cues, emotion regulation) (Fernandez-Serrano et al., 2011; Oscar-Berman & Markinovic, 2007; Vik et al., 2004), suggesting a higher expected frequency of both abuse and neglect behaviors compared to either light to moderate drinking or non-use. That being said, the time limited nature of neuropsychological impairments associated with harmful or

risky use (ranging from minutes to days) indicates a parent's use at this level would need to align with his/her exposure to the child to create conditions for maltreatment. In other words, child harm may be more likely when parents are using alcohol or other drugs or immediately after use when they are recovering (e.g., hangovers). This timing issue may help to explain inconsistencies for problematic use observed within the child maltreatment literature (e.g., Widom & Hiller-Sturmhofel, 2001).

Prolonged, heavy use observed with SUD is associated with individuals experiencing more pervasive neuropsychological impairments, particularly for polysubstance use (Vik et al., 2004). Long-lasting impairments to cognitive processing (i.e., attention, novel problem solving, decision making) and emotional processing (i.e., attending to and interpreting emotional cues, emotion regulation) suggest a parent's impairments persist even when acute effects of intoxication and withdrawal are not present (Bates et al., 2004; Fernandez-Serrano et al., 2011; Oscar-Berman & Marinkovic, 2007; Vik et al., 2004). While the types of impairments can be similar across parents with harmful or risky use and with SUD, differences in timing of these impairments (i.e., acute versus chronic) suggest parents with SUD would be expected to have a higher frequency of all types of maltreatment behaviors compared to parents with harmful or risky use. These mechanisms align with observations within the prior described literature that consistently observed SUD to be associated with child abuse and neglect.

For past users who have recently become abstinent or reduced use, an emerging area of research suggests neurological damage from prior chronic and high-intensity substance is associated with impairments in working memory and increased disinhibition with lasting effects ranging from several months up to four years (Bolla et al., 2000; Fernandez-Serrano et al., 2011; Gansler et al., 2000; Garavan et al., 2013; Janke van Holst and Schilt, 2011). For individuals

with a past SUD history, evidence suggests that persisting, substance-related impairments in

social information processing is most likely for individuals with a prior history within less than 4

years. Despite a current reduction in use, enduring impairments associated with a prior SUD

history may contribute to child maltreatment frequencies similar to parents with current SUD and

higher than parents with harmful/risky use. For example, impairments in working memory can

make it difficult for a parent to hold onto information long enough to integrate important

information needed to accurately identify the child's need or to focus on a task long enough to

follow through on any given parenting response (Crittenden, 1993; Fuster, 2008). It may be that

inconsistencies within the child maltreatment literature around parental lifetime use arise from

distal experiences of SUD (i.e., more than 4 years prior) not being related to current functioning.

Study Aims

This study explored how the relative importance of parental substance use behaviors may

differ across physical abuse, emotional abuse, and neglect behaviors. This study used parent self-

reported alcohol and illicit drug use from three waves of data collection to construct substance

use behavior patterns that reflect both past year and prior use behaviors. Guided by SIP models,

this study theorized that neuropsychological impairments vary across five substance use behavior

patterns: non-use, light to moderate drinking, harmful/risky use, SUD, and prior SUD with past

year reduced use. Substance use behavior patterns identified as having higher levels of

substance-related impairment were hypothesized to be associated with higher relative

frequencies of child maltreatment. However, these patterns should differ by acts of omission and

acts of commission.

Method

National Survey of Child and Adolescent Well-being

This study conducted secondary data analysis on the National Survey of Child and Adolescent Well-being (NSCAW I - Restricted Release), a panel survey of children (N = 5,501) sampled from 9 regions across the United States and who were identified as being at high-risk for experiencing child maltreatment based on child welfare investigation or involvement (Dowd et al., 2008). All non-demographic measures used in this study were gathered using automated-computer assisted self-interviewing (ACASI) technology to increase privacy when reporting sensitive information such as substance use behaviors and to minimize need for mandatory reporting of child maltreatment behaviors by field interviewers. Research staff at Research Triangle International (RTI) assessed interview responses to determine if a child protective services (CPS) report was required to be filed (Dowd et al., 2008).

Study Sample

This study used reports from adult caregivers of the sampled children within the Child Protection Services sample (*N* = 4,034 at baseline) collected between 1999 and 2004 (Biemer, Dowd, & Webb, 2010). An adult caregiver was identified as a key respondent if he or she resided with the sampled child for 2 or more months in the past year and was identified as the person who was the "most knowledgeable" about the child and could provide the most accurate information about the child's well-being (Dowd et al., 2008). The final sample included 2,100 adult caregivers who met the following criteria: (a) maintained caregiver status during Wave 1 (Baseline), Wave 3 (18 months), and Wave 4 (36 months), (b) same key respondent from Wave 1 to Wave 4, and (c) complete information was available for all model variables. From this point forward, all respondents will be referred to as *parents*, since they were primarily identified as biological parents and/or legally identified parenting figures. Table 1 shows weighted sample characteristics.

<INSERT TABLE 2 ABOUT HERE>

A total of 1,934 (47.9%) of the 4,034 baseline respondents were excluded from the study because of different respondents reporting in prior waves ($n = 424$) or missing interviews in prior waves due to attrition ($n = 922$) or change in caregiver status ($n = 451$) in W3 or W4. For the final analytic sample, an additional 137 cases (3.3% of the entire CPS sample) were excluded because of one or more missing items. Given the large number of parents excluded from the final sample, attrition analysis was performed to identify any source of potential bias associated with item nonresponse. The respondents included in the analytic sample were significantly more likely to be younger in age ($\chi^2 = 38.7$, $p = .017$), female ($\chi^2 = 137.4$, $p < .001$), or identify as the biological parent of the child ($\chi^2 = 120.2$, $p < .001$) compared with the attrition sample. They were significantly less likely to have any history of a child being removed from their care ($\chi^2 = 47.5$, $p = .006$) and more likely to include parents reporting higher mean maltreatment counts ($F = 2.24$, $p = .028$) compared with the attrition sample.

Child maltreatment frequency

Annual frequency of physical abuse, emotional abuse, and neglect were operationalized using the Conflict Tactics Scale – Parent Child (CTS-PC) at Wave 4 (Straus, 2004; Straus et al., 1998). Each item was recoded to counts based upon coding instructions provided by Straus (2004): (a) *Never* or *Not in past 12 months, but before* were recoded to 0, (b) *1 time* was kept as 1; (c) *2 times* was kept as 2; (d) Subsequent values *3 to 5 times, 6 to 10 times,* and *11 to 20 times* were recoded to be their midpoints, and (5) *More than 20 times* was recoded to 25. For each type of maltreatment, the study used annual counts constructed from the sum of all selected items to obtain a number of incidents enacted by the key respondent during the prior year.

The study measured three types of maltreatment: (1) physical abuse (M = 0.5, LSE = 0.1,

Range = [0, 48]), (2) emotional abuse (M = 3.4, LSE = 0.3, Range = [0, 75]), and (3) neglect (M

= 2.9, LSE = 0.4, Range = [0, 100]). As is normal for count data, the frequency distributions for

each maltreatment type were highly right-skewed and zero-inflated and were addressed by this

study's selection of analytic models. *Physical abuse* included four severe physical assault items

(e.g., "threw or knocked child down") and four very severe physical assault items (e.g., "burned

or scalded child on purpose"); the item for "shook child" was excluded because all of the sample

children were older than 2 years during Wave 4 (Straus, 2004). *Emotional abuse* included three

severe psychological aggression items (e.g., "called child dumb or lazy or some other name like

that") that prior studies identified as more severe forms of psychological aggression of a parent

towards a child (Straus, 2004; Straus & Field, 2003). *Neglect* included five items (e.g., "had to

leave child home alone") that covered aspects of supervision, emotional expression of love,

provision of food, and provision of medical care (Straus, 2004). Internal consistency for physical

abuse was $\alpha = 0.43$; emotional abuse was $\alpha = 0.63$; and neglect was $\alpha = 0.47$. The current study's

alpha coefficients were similar to or better than those reported by Straus et al. (1998) ($\alpha = 0.55$

for physical assault, including corporal punishment; $\alpha = 0.02$ for severe physical assault; $\alpha =$

0.60 for psychological aggression; and $\alpha = 0.22$ for neglect). The lower internal consistency ($\alpha <$

0.70) is likely due to the focus on items measuring rare events and possessing a skewed

distribution (Straus et al., 1998).

Parental substance use pattern

Parental substance use patterns were constructed using the Composite International

Diagnostic Interview-Short Form (CIDI-SF) (Kessler, 1998). First, general substance use

measures were constructed for (a) Wave 4 drinking patterns, (b) Wave 4 illicit drug use, and (c)

alcohol and/or other SUD for Wave 1, Wave 3, and Wave 4. *Drinking patterns* were based on

parents self-report of the largest number of drinks the respondent had in any single day during

the 12 months prior to Wave 4 data collection: (a) no alcohol use (0 drinks at most), (b) light to

moderate drinking (1–3 drinks at most), and (c) heavy drinking (4 or more drinks) (Freisthler et

al., 2014). *Illicit drug use* was based on parent self-report to Yes/No options for use of

marijuana/hashish, sedatives, tranquilizers, analgesics, heroin, cocaine/crack/ freebase,

amphetamines, inhalants, or LSD/hallucinogens during the 12 months prior to Wave 4 data

collection. This study used the categorization approach for SUDs defined by the *DSM 5*; the

parent was categorized as having a SUD if they endorsed two or more substance-related

impairments in functioning (American Psychological Association, 2013).

To capture a range of substance use behaviors that aligned with theorized impairments,

this researcher created a variable with mutually exclusive ordinal categories for *substance use*

patterns. The categories were defined by incorporating past year substance use behaviors (i.e.,

drinking patterns, illicit drug use, and SUD during Wave 4) and prior history of SUD within the

past 4 years (defined as meeting criteria for SUD during Wave 1 or Wave 3): (1) Non-use - no

past year alcohol or illicit drug use with no prior SUD history within the past 4 years; (2) Light

to Moderate Drinking – past year light or moderate drinking with no past year illicit drug use and

no prior SUD history within the past 4 years; (3) Harmful/Risky Use – past year heavy drinking

and/or illicit drug use with no SUD history within the prior 4 years; (4) SUD - meets criteria for

a SUD within the past year; and (5) Prior SUD with Past Year Reduced Use - prior history of

SUD but does meet criteria for a SUD within the past year.

Control variables

Risk factors. The study used two constructs for parents' physical and emotional health from the Short-form Health Survey (SF-12; Ware, Kosinski, & Keller, 1996). This 12-item survey assessed general physical and emotional functioning and associated role limitations that were due to identified problems. Standardized scores were constructed for physical health and mental health separately with higher scores indicating higher functioning. Internal consistency was $\alpha = 0.59$ for physical health and $\alpha = 0.79$ for mental health (Dowd et al., 2008). To capture parents' history of criminal involvement, a binary variable was created from a question asking respondents if they had ever been arrested for any offense.

Services and treatment history. Three variables were constructed to capture prior service and treatment history that may act as potential confounding variables (Grella, Needell, Shi, & Hser, 2009). *CPS Case at W1* was based upon NSCAW documentation of a CPS case being open at baseline W1 for the sampled child. *Any Mental Health or Drug Treatment* was based upon any lifetime or current history of (a) alcohol or drug treatment reported at W1, W3 or W4; (b) mental health treatment reported at W1, W3, or W4; or (c) any recent support group participation reported during W1, W3, or W4. *Any Family/Parenting Services* included any recent family counseling, parent skills training, and/or respite child care reported at W1, W3, or W4.

Demographic characteristics. All demographic variables were obtained from Wave 4. Demographic characteristics of parents included self-reported age, gender, race/ethnicity, and partnership status. Measures of socioeconomic status included parental education level, parental employment status, and household receipt of any government support by household member (i.e., TANF or other general assistance, WIC, food stamps, housing support, or disability SSI). Child demographic characteristics included gender and age. For a detailed description of the original measures used for NSCAW, please refer to Biemer et al. (2010).

Statistical Analyses

The study used negative binomial regression models (NBRM) that addressed over-dispersion of counts associated with measuring rare events (Hilbe, 2011). NSCAW I weights account for variation in selection probabilities that arose from the multistage stratified sampling design and adjust for nonresponse and undercoverage (Biemer et al., 2008). The analyses were conducted using Stata 13 (Stata Corp, 2013) survey estimation and domain analysis procedures to apply the survey weights for a specific subpopulation (i.e., parents) and sample selection (i.e., national sampling weights for analyses incorporating data collection Waves 1, 3, and 4). For ease of interpretation, all model coefficients were exponentiated to create incidence rate ratios (IRR; Hilbe, 2011). Holm's sequential version of the Bonferroni correction was applied when conducting marginal comparisons across categorical groups to minimize likelihood of Type I errors (Holm, 1979; Abdi, 2010). Finally, predictive margins (i.e. mean count predicted by the full model with corresponding standard errors) were calculated for physical abuse, emotional abuse, and neglect for each substance use behavior pattern.

Results

Table 3 shows the results from the full model for each maltreatment type. Compared to parents reporting non-use, parents reporting light to moderate drinking, risky and/or harmful use, and SUD were associated with a higher yearly incidence of physical abuse (148%, 386%, and 562% respectively). The annual frequency of physical abuse for parents reporting prior SUD with reduced use was not significantly different than those observed for parents reporting non-use. Similar relationships were observed for emotional abuse frequency when past year substance use categories were compared to non-use (*light to moderate drinking:* 65% higher incidence; *harmful and/or risky use:* 165% higher incidence; *SUD:* 329% higher incidence). In contrast, yearly incidence of neglect was 140% higher for parents reporting SUD compared to

those reporting non-use and was 58% lower for parents reporting prior SUD with reduced use

compared to those reporting non-use.

<INSERT TABLE 3 ABOUT HERE>

Table 4 details the pairwise comparisons between substance use patterns, correcting for

multiple comparisons. While differences between past year use and non-use categories remain

significant for physical abuse frequency, there were no differences observed between past year

use categories (i.e., light to moderate drinking, harmful and/or risky use, SUD). The results

suggest a gradient effect for emotional abuse frequency across substance use behavior patterns

(i.e., non-use < light to moderate < harmful/risky use < SUD). When adjusting for multiple

comparisons, differences in expected annual frequencies observed between harmful/risky users

and parents with SUD were no longer significant. Annual expected frequency of neglect

behaviors for parents reporting past year SUD were significantly higher than all other substance

use patterns; however, when adjusting for multiple comparisons, significant differences only

remain between parents reporting SUD and those reporting past year light to moderate drinking

and/or prior SUD with reduced use. Significantly lower annual neglect frequencies among

parents with reduce use compared to non-use, light to moderate drinking, and harmful/risky use

were no longer significant after adjusting for multiple comparisons.

<INSERT TABLE 4 ABOUT HERE>

The predictive margins (i.e., estimated mean frequency controlling for all other variables)

for physical abuse, emotional abuse, and neglect by substance use patterns. While parents

reporting SUD are expected to have 562% more yearly instances of physically assaultive

behaviors than parents reporting non-use, this difference translates to an average annual physical

abuse frequency of 1.54 incidents for parents reporting SUD (95% CI = [0.64, 2.44]) compared

with an average frequency of 0.23 incidents for parents reporting being abstainers or ex-users (95% CI = [0.15, 0.32]). This small substantive difference in average frequency may account for no differences being observed across light to moderate drinking, harmful and/or risky use, and SUD categories. In comparison, substantive differences are apparent in average frequency for emotional abuse across substance use behavior patterns. Finally, predictive margins for neglect frequency are substantively similar across non-users ($\bar{y}$ = 3.84, 95% CI = [1.96, 5.72]), light to moderate drinkers ($\bar{y}$ = 2.97, 95% CI = [1.47, 4.47]), and harmful and/or risky users ($\bar{y}$ = 3.49, 95% CI = [1.69, 5.30]). Predictive margins for neglect frequency is lowest for reduced use ($\bar{y}$ = 1.59, 95% CI = [0.75, 2.43]) and highest for those with SUD ($\bar{y}$ = 9.23, 95% CI = [3.22, 15.25]).

Discussion

Parental substance use does not globally indicate risk for high frequency child maltreatment behaviors. In fact, the relationship between use patterns and child maltreatment frequency may vary by type of maltreatment. More importantly, frequency of acts of commission (such as physical abuse and emotional abuse) can vary across substance use behavior patterns in a way that is distinct from frequency of acts of omission (such as neglect).

Frequencies of abuse behaviors were associated with a broad range of substance use behavior patterns ranging from light/moderate drinking to SUD. These results reflect findings from other studies that suggest a range of alcohol use is associated with physical abuse behaviors (Berger, 2005; Freisthler, Holmes, & Price Wolf, 2014). They also build upon findings from studies that observed a positive association between emotional abuse and various substance use behaviors (Dube et al., 2001; Palusci & Ondersma, 2012; Sedlak et al., 2010). These findings interpreted through a social information processing theoretical lens would suggest even low levels of disinhibition arising from light to moderate drinking may be sufficient to increase emotional and physical abuse frequency (Milner, 2000). That being said, the low average

frequency of physical abuse translates into small substantive differences across substance use behavior patterns (0 versus 1 incident, on average) while the higher average frequency of emotional abuse translates into larger substantive differences across substance use behavior patterns (2 to 9 incidents, on average). These differences may have contributed to why statistically significant differences in estimated frequencies were observed between substance use behavior patterns (i.e., light to moderate drinking < harmful/risky use < SUD) for emotional abuse but not physical abuse. Alternatively, some uncontrolled factors distinguishing past year users from non-users may better explain the observed relationship between physical abuse frequency and substance use. For example, differences in baseline cognitive functioning, emotional dysregulation, or impulsivity can also interfere with essential neuropsychological functions and associated social information processing that may contribute to aggressive behaviors (Holley, Ewing, Stiver, & Bloch, 2015; Matusiewicz et al., 2013; Tarter et al., 2003). Future studies on the association of abuse behaviors among substance-using parents should consider directly measuring neuropsychological functioning and these associated factors.

The results for neglect behaviors are consistent with the lack of associations observed between light drinking and various supervisory neglect behaviors (BLINDED FOR PEER REVIEW) and studies focusing primarily on the positive association observed between SUD and neglect outcomes (e.g., Chaffin et al, 2004; Dunn et al., 2002; Sedlak et al., 2010). Using a social information processing lens, it may be that chronic failure to meet the basic physical, supervisory, and emotional needs of a child requires more pervasive impairments associated with prolonged, heavy use (Crittenden, 1993; Fillmore, 2012). These differences in patterns observed across types of maltreatment could suggest that maltreatment type arises from different types of impairments in social information processing, with neglect chronicity being attributable to

pervasive impairments associated with SUD and abuse chronicity being attributable to

impairments arising from any past year substance use. Neglect, in particular, may be more likely

to occur when on-going and pervasive psychoactive drug use "hijacks" reward centers of the

brain important for parents to feel motivated to engage with and nurture their children

(Rutherford, Williams, Moy, Mayes & Johns, 2011). Alternatively, it could be that measures for

neglect used in the CTS-PC required a higher threshold of impairment compared with abuse

behaviors to occur multiple times (i.e., leaving child home alone versus calling a child dumb or

lazy; Straus et al., 1998).

Contrary to my hypotheses, parents reporting reduction in substance use after reporting a

prior SUD within the last 4 years did not significantly differ from parents reporting non-use or

light to moderate drinking for any type of maltreatment. In fact, the results indicated that this

group was associated with a significantly lower frequency of neglect than parents reporting past

year SUD. It may be that the past year substance use behaviors matter more than previously

meeting criteria for SUD, or the choice to reduce use after a prior history of SUD is associated

with changes in one's overall lifestyle and associated behaviors. The large variance and the small

sample size for this group could also have contributed to non-significant findings for abuse

frequencies. The variance may be due to a wide range in functioning within this group based

upon time since reduction (which was not specifically measured in this cross-sectional study) or

combining past year non-users, light/moderate drinkers, and heavy drinkers with a prior (but not

past year) SUD history.

These results can help us begin to better hypothesize how different pathways may be

influencing abuse and neglect behaviors among substance-using parents. The use of theory-

driven substance use behavior patterns allowed for a more nuanced and detailed story to emerge

about the range of maltreatment risk around parental substance use. However, these findings

should be interpreted with the limitations of the current study in mind. First, the cross-sectional

nature and an annual timeframe for behaviors to occur can only highlight associations that may

not be causal. In addition, the secondary analysis limits the variables available given the survey

was not designed to specifically answer this study's research questions. For example, the

substance use measures provided gross measures of intensity, considering question and sample

size constraints did not allow for specific measure on the type of drug, duration of heavy use, and

simultaneous polysubstance use (Ives & Ghelani, 2006; Mayes & Truman, 2002). Specifically,

43.4% of harmful/risky users and 87.7% of parents reporting SUD in this sample indicated that

they used multiple substance which made it unlikely to identify specific effects of a single drug

type; however, this may be indicative of high polysubstance use rates for high-risk, child welfare

populations in general (BLINDED FOR PEER REVIEW). Despite these limitations, this study's

findings suggest extent and recency of parental substance use can be an effective screen to

identify need for further assessment, investigation, and/or prevention (specifically past year

alcohol or illicit substance use for abuse behaviors and past year SUD for neglect behaviors).

Prior work suggests assessing for these behavior patterns may be more informative than single

drug type or polysubstance use alone (BLINDED FOR PEER REVIEW). It's also important to

note that parent neuropsychological functioning was not measured; this functioning and

presumed influence on social information processing of abuse and neglect were only used to

guide the formation of this study. Several other important parent variables were also omitted

from the study because no comprehensive measures were available: prior trauma, substance use

history prior to W1, baseline cognitive functioning, impulsivity/disinhibition, and stress.

However, the most prevailing parent risk factors discussed by prior studies (e.g., parent arrest

history, mental health, and service history) were included as controls within all final models

(e.g., Dunn et al., 2002; Dubowitz et al., 2011; Grella et al., 2009). Finally, the self-reporting

child maltreatment behaviors may not have been fully mitigated by ACASI procedures given that

parents were informed that researchers were still held accountable to mandated reporting laws;

this design issue may have resulted in an underestimation of more severe maltreatment behaviors

(Dowd et al., 2008). Under-reporting of substance use behaviors is less likely given substance

use was not a reportable behavior and prior research suggests ACASI procedures result in a

higher likelihood of endorsing substance use than with a live interviewer, particularly for illicit

substance use (Turner et al., 2005).

The study sample also suffered from a large amount of attrition from changes in key

respondents and caregiver status across waves. As a result, the final analytic sample excludes

children with nonpermanent caregivers and parents experiencing informal or formal child

removal during the timeframe of the study due to NSCAW not collected data related to key study

variables from these caregivers (Biemer et al., 2010). These limitations in generalizability

suggest the findings are more likely to represent a narrow range of the general population, such

as female adult caregivers who have come to the attention of child protective services but have a

lower likelihood of experiencing the most severe forms of maltreatment that require child

removal. That being said, the proportion of male respondents (6% of the analytic sample) was

large enough to observe a significant effect by gender with male respondents having a lower

estimated annual frequency of physical abuse than female respondents when controlling for all

other variables. In addition, the relationships observed in this study may differ from the general

population of parents. For example, it may be that light to moderate drinkers have added risk for

physical and emotional abuse when other problems are present but not for families with low

levels of stress and/or identified problems. Finally, the direct effects of alcohol and drug use alone do not dictate the individual's experience and subsequent substance-related consequences because of many other factors that are likely to moderate these effects (Zinberg, 1984). For example, types of social supports may play a role in mitigating or exacerbating the effects of parent impairments in social information processing (Milner, 2000). That being said, one study using a general population sample controlling for parenting stress and social support still demonstrated higher frequency of physical abuse among light and moderate drinkers compared to lifetime abstainers (Freisthler, Holmes, & Price Wolf, 2014).

Within the context of these limitations, the findings can still begin to inform research and practice with the substance-using parents. Several potential pathways for future research are indicated. First, timing of parents' most recent experience of SUD varies widely within the current study (current to 4 years), which may have contributed to large variances observed for parents reporting a prior (but not past year) SUD. Longitudinal statistical approaches would provide more precise timing (past 12 to 18 months) for how current and past use behaviors contribute to child maltreatment frequency. In addition, future studies can improve upon the measures of parent substance use and child maltreatment used within this study. For substance use, more precise measurement of use behaviors such as type of primary substance used, concomitant versus simultaneous polysubstance use, frequency of use, quantity of use, duration of use, and age at onset of use may address observed heterogeneity within groups (Mayes & Truman, 2002). Studies designed to measure neuropsychological impairments and child maltreatment behaviors directly would better test social information-processing models of abuse and neglect and provide insight into the underlying mechanisms that may help to explain differences observed between groups (Crittenden, 1993; Milner, 2000). In addition, over-

sampling by type of substance use pattern may be required to obtain enough power to compare

groups with lower rates in the population, such as those indicating reduced use or being in

recovery from SUDs.

In sum, substance use behaviors are complex and varied, and practitioners can benefit

from thinking about substance use along multiple dimensions (Mayes, 2002). This study focused

on one of many ways that we can frame use behaviors: as a range that varies by extent of use and

severity of problems. More importantly, any practitioner working with substance-using parents

can improve their practice by screening and assessing for (a) a range of substance use behaviors

(including light to moderate levels of drinking) and (b) how parental substance use may impair

their functioning and associated ability to care for their child. Based on the assumption that

generalized effects of psychoactive substances exist (Fernandez-Serrano et al., 2011), this study

clearly identified that different use patterns likely have varying implications for different child

maltreatment types. To minimize frequency of physical and emotional aggression toward

children among high-risk populations, practitioners could apply substance use models (like

Screening, Brief Intervention, and Referral to Treatment [SBIRT]; SAMHSA, 2012) to screen in

any substance-using parent, assess for problematic parenting behaviors, and apply brief

intervention techniques to educate and modify both substance use and parenting practices. That

being said, more intensive treatment that targets the intersection of substance use and parenting

behaviors may be required for parents with more severe substance use behavior patterns

(particularly past year SUD; Osterling & Austin, 2008). For neglect, these findings reinforce

prior findings that (a) practitioners should be focused on assessing and addressing risk among

parents identified with past year substance use disorder and (b) prior history of substance use

disorder (even recent) may not be as useful of information for assessing risk for neglectful

behaviors. Systems can leverage this information to improve screening, assessment, and

prevention efforts through developing nuanced and flexible approaches that address the diverse

needs that exist among substance-using parents; the most effective approach for substance-using

populations is an individualized approach (NIDA, 2012). The application of these ideas supports

an end goal to reduce the high rates of child welfare involvement among substance-using parents

through targeting problematic parenting behaviors before they escalate to the levels of physical

abuse, emotional abuse, or neglect (Drabble, 2007).

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Table 1

Substance Use Behavior Pattern, Neuropsychological Impairment, and Child Maltreatment Risk

Substance Use	Neuropsychological Impairments	SIP Stages	Child Maltreatment Risk
Non-use	No substance-related impairments.	None	No substance-related risk
Light to Moderate Drinking	No ongoing impairments. Low levels of temporary disinhibition may be present.	Implementation	Abuse: Low risk due to decreased disinhibition Neglect: No substance-related risk
Harmful or Risky Use	No ongoing impairments. Temporary impairments due to acute intoxication and withdrawal: - Reduced executive control - Attention problems - Poor decision making - Disinhibition - Altered emotional processing - Misinterpret emotional cues - Emotional dysregulation (e.g., increased hostility/aggression)	Attention Interpretation Decision-Making Implementation	Abuse: Moderate risk due to temporary impairments in decision making, inhibition, and emotion regulation Neglect: Moderate risk due to temporary impairments in attention and interpretation
Substance Use Disorder (SUD)	Ongoing impairments due to chronic use: - Cognitive processing - Attention problems - Impaired novel problem solving - Poor decision making - Altered emotional processing - Not attending to and misinterpreting emotional cues - Emotion dysregulation Temporary impairments due to acute intoxication and withdrawal (same as listed under *problematic use*).	Attention Interpretation Decision-Making Implementation	Abuse: High risk due to higher likelihood of both temporary and ongoing impairments in novel problem solving, decision making, and emotion regulation Neglect: High risk due to higher likelihood of both temporary and on-going impairments in attention and interpretation of emotional cues
Prior SUD with Reduced Use	Persisting impairments due to chronic use within last 4 years: - Working memory problems - Disinhibition Impairments from current use behaviors would apply (non-use to harmful/risky use).	Decision-Making Implementation	Abuse: High risk due to pervasive impairments in working memory and disinhibition Neglect: High risk due to pervasive impairments in working memory

Table 2

Study Sample Characteristics (n = 2,100 Parents at Wave 4)

	n	Weighted %
Sampled child characteristics		
Child age (years)		
2–5	764	20.3
6–10	607	37.4
11–16	729	42.3
Child gender		
Male	1,029	51.0
Female	1,071	49.0
Parent characteristic		
Age (years)		
< 35	1,240	53.4
35–44	649	35.2
≥ 45	211	11.4
Gender		
Male	111	6.0
Female	1,989	94.0
Race/Ethnicity		
Non-Hispanic White	1,093	52.8
Non-Hispanic Black	559	23.9
Hispanic	334	16.8
Other	114	6.4
Partnership status		
Married / Co-habit	1,021	52.8
Other	1,079	47.2
Relationship to child		
Biological parent	2,016	97.0
Other	84	3.0
Education completed		
Less than high school	606	27.6
High school or more	1,494	72.4
Employment Status		
Employed	1,095	55.4
Unemployed	312	11.2
Other	693	33.4
Household characteristics		
Receipt of govt aid		
No	720	38.4
Yes	1,380	61.6

Table 2

Study Sample Characteristics (n = 2,100 Parents at Wave 4)

	Physical Abuse			Emotional Abuse			Neglect		
	IRR	95% CI		IRR	95% CI		IRR	95% CI	
Substance use patterns (ref: Non-use)									
Lt to Mod Drinking	2.48	[1.40, 4.40]	**	1.65	[1.22, 2.25]	**	0.77	[0.46, 1.32]	
Harmful/Risky Use	4.86	[2.72, 8.68]	***	2.65	[1.93, 3.63]	***	0.91	[0.53, 1.54]	
SUD	6.62	[3.65, 12.01]	***	4.29	[2.98, 6.19]	***	2.40	[1.22, 4.75]	*
Prior SUD	1.96	[0.55, 6.91]		1.83	[0.99, 3.39]		0.41	[0.22, 0.79]	**
Parent Risks									
Arrest history	1.69	[1.01, 2.85]	*	1.50	[1.09, 2.06]	*	1.52	[0.93, 2.48]	
Physical health	0.99	[0.97, 1.02]		0.99	[0.97, 1.00]	*	0.99	[0.97, 1.01]	
Mental health	0.97	[0.95, 0.99]	**	0.96	[0.95, 0.98]	***	0.95	[0.92, 0.97]	***
Parent service variables									
CPS services @ W1	1.24	[0.79, 1.92]		1.35	[1.05, 1.73]	*	1.35	[0.94, 1.94]	
Lifetime MH or AOD tx	1.34	[0.78, 2.29]		1.28	[0.98, 1.69]		1.79	[1.11, 2.90]	*
Recent family services	1.14	[0.70, 1.86]		1.40	[1.01, 1.93]	*	1.46	[0.97, 2.20]	
Focal child demographics									
Age (years) (ref: 2 to 5)									
6 to 10	1.01	[0.53, 1.93]		2.39	[1.66, 3.43]	***	1.71	[1.06, 2.76]	*
> 11	1.49	[0.79, 2.78]		3.28	[2.13, 5.06]	***	4.88	[2.74, 8.68]	***
Male	1.17	[0.73, 1.88]		0.87	[0.64, 1.17]		0.80	[0.51, 1.26]	
Parent demographics									
Age (years) (ref: < 35)									
35 to 44	1.67	[0.85, 3.28]		1.35	[0.95, 1.91]		0.65	[0.40, 1.09]	
≥ 45	1.59	[0.72, 3.51]		1.00	[0.61, 1.62]		0.81	[0.44, 1.51]	
Male	0.12	[0.04, 0.34]	***	0.76	[0.45, 1.28]		0.95	[0.46, 1.97]	
Race/Ethnicity (ref: NH white)									
Non-Hispanic black	1.62	[0.97, 2.71]		0.87	[0.61, 1.25]		1.33	[0.84, 2.10]	
Hispanic	1.64	[0.79, 3.43]		0.85	[0.51, 1.43]		1.57	[0.91, 2.71]	
Other	0.12	[0.05, 0.33]	***	0.56	[0.30, 1.07]		0.92	[0.51, 1.67]	
Married/co-habitating	0.86	[0.55, 1.36]		1.24	[0.92, 1.67]		1.02	[0.66, 1.57]	
Employment (ref: Emp)									
Unemployed	1.45	[0.75, 2.80]		1.12	[0.69, 1.81]		0.54	[0.29, 0.99]	*
Other	2.23	[1.31, 3.78]	**	0.88	[0.63, 1.22]		0.78	[0.48, 1.27]	
Household characteristics									
Receipt government aid	0.77	[0.44, 1.36]		0.89	[0.63, 1.25]		1.23	[0.84, 1.81]	
alpha	8.24	[5.46, 12.43]		3.10	[2.58, 3.72]		6.52	[5.09, 8.35]	
F	6.59	***		9.98	***		5.62	***	

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.00.

Table 4

Multiple Comparisons of Substance Use Patterns (n = 2,100)

Comparisons*	Physical Abuse			Emotional Abuse			Neglect		
	t	*p*	Holm's *p*	*t*	*p*	Holm's *p*	*t*	*p*	Holm's *p*
Light to Moderate Drinking vs.									
Non-use	3.17	.002	.018	3.27	.002	.011	-0.96	.340	ns
Harmful/Risky Use vs.									
Non-use	5.43	< .001	< .001	6.16	< .001	< .001	-0.36	.721	ns
Light to Moderate Drinking	1.71	.092	ns	2.81	.006	.037	0.50	.621	ns
Substance Use Disorder (SUD) vs.									
Non-use	6.32	< .001	< .001	7.92	< .001	< .001	2.56	.012	ns
Light to Moderate Drinking	2.71	.008	ns	4.75	< .001	< .001	3.41	.001	.009
Harmful/Risky Use	0.86	.390	ns	2.28	.025	ns	2.18	.032	ns
Prior SUD w/ Reduced Use vs.									
Non-use	1.06	.292	ns	1.96	.053	ns	-2.71	.008	ns
Light to Moderate Drinking	-0.38	.705	ns	0.32	.747	ns	-1.88	.064	ns
Harmful/Risky Use	-1.45	.150	ns	-1.05	.297	ns	-2.16	.034	ns
SUD	-1.75	.084	ns	-2.64	.010	ns	-4.31	< .001	< .001

* Controlling for parent confounders, parent services, and demographics variables.