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Self-Regulation, Daily Drinking, and Partner Violence in Alcohol Treatment-Seeking Men

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Abstract

This study builds on research identifying deficits in behavioral self-regulation as risk factors for intimate partner violence (IPV). It also builds on alcohol administration research identifying these deficits as moderators of the association between acute alcohol consumption and aggression in laboratory paradigms. Participants analyzed were 97 men seeking residential treatment for alcohol dependence who were involved in a current or recent heterosexual relationship of at least one year. Participants completed a self-report measure of impulsivity, neuropsychological tests of executive function, and computerized delay discounting and behavioral inhibition tasks. With the exception of the self-report measure of impulsivity, performance on measures of behavioral self-regulation was not associated with the occurrence or frequency of past year IPV in this sample. Similarly, self-reported impulsivity moderated the association between daily drinking and IPV in multivariate models controlling for daily drug use, but deficits in performance on other measures did not. Performance on a tower task moderated the association between daily drinking and the occurrence of IPV, but contrary to hypotheses, better task performance was associated with greater likelihood of IPV on drinking days. These results suggest that self-perceived impulsivity is a better predictor of IPV in alcohol treatment seeking men than deficits in performance on behavioral measures of delay discounting, behavioral inhibition, and executive function.

Keywords

Intimate partner violence; alcohol use disorders; drinking; executive cognitive function; impulsivity; timeline followback

Heavy drinking and alcohol use disorders are robust risk factors for male-to-female intimate partner violence (IPV) (Leonard, 1993; Schumacher, Feldbau-Kohn, Slep & Heyman, 2001;

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Stith, Smith, Penn, Ward, & Tritt, 2004). Thus, it is not surprising that the one year prevalence of male-to-female IPV perpetration in substance abuse treatment samples is 58–85% (Stuart, O'Farrell & Temple, 2009), compared to 5.2%–13.6% in the U.S. married and cohabiting population (Schafer, Caetano & Clark, 1998). However, it is important to note that despite the well-established increased risk for IPV associated with heavy drinking and alcohol use disorders, most men who drink heavily do so without ever aggressing against a romantic partner (Kantor & Straus, 1987). This is consistent with a growing body of research suggesting that an adequate explanation of alcohol-related violence, including IPV, will rely on the identification of relevant individual difference variables (Higley, 2001; Leonard, 2005).

Studies examining differences between men in alcohol treatment samples with and without a pretreatment year history of IPV perpetration have identified a variety of variables that distinguish these two groups including: antisocial personality features, substance use problem severity, arrest history, and family history of alcoholism (Bennett, Tolman, Rogalski, & Srinivasaraghavan, 1994; Gondolf and Foster, 1991; Murphy and O'Farrell, 1994; Murphy, O'Farrell, Fals-Stewart & Feehan, 2001). Although these studies identify characteristics associated with IPV in alcohol treatment populations, they do not provide a clear explanation of how or why risk for IPV is heightened in these populations.

Giancola (2000) proposed a conceptual framework for alcohol-related aggression in which executive functioning (EF) serves as both a mediator and moderator of alcohol-related aggression. EF refers broadly to the putative functions of the frontal lobes, such as initiation, self-regulation, self-monitoring, and planning (Lezak et al., 2004). Within the Giancola (2000) framework, EF mediates this association in that acute alcohol intoxication disrupts EF. EF also moderates this association in that the acute effects of alcohol on aggression are more pronounced in those who are low in EF and diminished in those who are high in EF. Research combining alcohol-administration and laboratory aggression paradigms has supported this model in healthy social drinkers (Giancola, 2004), and a recent study found that a "Behavioral Regulation Index" comprising inhibition, emotional control, flexible thinking, and self-monitoring was the best predictor of aggression (Giancola, Godlaski, and Roth, 2011).

Behavioral regulation, EF, and related constructs have been identified as important predictors of both substance use disorders (Bickel & Marsch, 2001; Fals-Stewart & Bates, 2003), and aggressive behavior (Giancola, 1995). Many of the measures of behavioral self-regulation that have received attention in the substance abuse literature, such as delay-discounting tasks, have received comparatively little attention in the aggression literature. However, as research using these tasks emerges, the findings are generally consistent with the conclusion that diminished behavioral self-regulation is associated with aggression (e.g., Cherek, Moeller, Dougherty, and Rhoades, 1997).

The association between EF and IPV specifically has been a focus of increasing research attention (e.g., Walling, Meehan, Marshall, Holtzworth-Munroe & Taft, 2011). In studies comparing controls to men who were court-ordered to batterer treatment or had a history of domestic violence arrest, deficits in EF relative to controls are generally evident. The most commonly administered measures of EF in these studies are the Trails B test (which measures the ability to initiate, switch, and stop sequence of complex purposive behavior), the Wisconsin Card Sorting Test (which measures the ability to abstract and shift cognitive sets), and the Stroop Color-Word Test (which measures the ability to inhibit overlearned response and maintain a cognitive set). Although the literature generally supports differences between groups on these measures of EF (Cohen, Rosenbaum, Kane, Warnken & Benjamin, 1999; Stanford, Conklin, Helfritz & Kockler, 2007; Teichner, Golden, Van

Hasselt, and Peterson, 2001), Westby and Ferraro (1999) found differences on Trails B, but not on the Wisconsin Card Sorting Test, or the Stroop Color-Word Test. Cohen et al. (1999), also observed differences on Digit Symbol (which is a commonly used measure of EF that also assesses processing speed).

More mixed findings for the association of EF and IPV emerge when men without IPV-related criminal justice involvement are studied. Walling et al. (2011) found that partner-violent men recruited from the community showed deficits relative to controls on the Wisconsin Card Sorting Test, but not Trails B or the Symbol Digit Modalities Test. In a study of treatment-seeking men with alcohol dependence, Easton, Sacco, Neavins, Wupperman, and George (2008) found that men with and without a history of IPV did not differ on EF or impulsivity tasks. In contrast, in a study of men recovering from substance abuse recruited through community advertisements, Schafer and Fals-Stewart (1997) found differences on Stroop, Trails B, and the Booklet Category Test (which measures the ability to abstract and shift cognitive sets), but not Digit Symbol. In sum, while there is evidence for differences in EF in male IPV perpetrators compared to controls, particularly perpetrators with criminal justice involvement, findings in the literature have been inconsistent and incomplete. No measure of EF has consistently emerged as a predictor of IPV across all studies, and much of the previous research has focused on measures of EF that assess the ability to maintain and shift cognitive sets. Little is known about how other aspects of EF such as verbal fluency and planning may be related to IPV.

Research that examines self-report measures of impulsivity as predictors of IPV suggests that the relationship between self-reported impulsivity and IPV is also complex and nuanced. For example, in a community sample, the relationship between husband self-reported impulsivity and psychological IPV was mediated by substance abuse and marital dissatisfaction. The relationships between substance abuse and marital dissatisfaction and husband physical IPV were mediated, in turn, by psychological IPV (Stuart & Holtzworth-Munroe, 2005). In an undergraduate sample, self-reported urgency emerged as an important predictor of IPV whereas other aspects of self-reported impulsivity, sensation seeking and lack of premeditation, predicted general violence (Derefinko, DeWall, Metze, Walsh, & Lyman, 2011).

The current study sought to simultaneously build upon the three bodies of research outlined above: 1) the body of research examining EF and other self-regulatory constructs as risk factors for IPV; 2) the body of research examining alcohol dependence as a risk factor for IPV; and 3) the body of alcohol-administration research examining EF and other self-regulatory constructs as moderators of the association between acute consumption and aggressive behavior. In the current study, we examined the association of performance on laboratory impulsivity tasks, a broad battery of neuropsychological tests of EF, and self-reported impulsivity at the time of alcohol treatment entry with pretreatment year history of IPV. We hypothesized 1) that men with a pretreatment year history of IPV would evidence greater impulsivity and less executive control than men without a pretreatment year history of IPV. Among men with a pretreatment history of IPV, we further examined whether these measures of self-regulation processes were associated with the frequency of pretreatment year IPV. We hypothesized 2) that those with the greatest deficits in self-regulation would report the most frequent IPV in the year prior to treatment. Finally, we examined these self-regulation processes as moderators of the proximal association of alcohol consumption and IPV. We hypothesized 3) that IPV would be more likely to occur on drinking days for men who were low in self-regulation, but not for men who were high in self-regulation, and that no difference between these groups in IPV would be evident on non-drinking days. We had no hypotheses about which specific measures would be the most important predictors of IPV

in this sample. Rather, a secondary goal of the current study was to identify which constructs and measures were most important.

Method

Participants

Study participants were men enrolled in residential substance abuse treatment, who met criteria for a primary alcohol dependence diagnosis, reported at least five occasions of drinking in the 60 days prior to treatment entry during screening, were in a current or recent (ended within 1 month of study participation) heterosexual relationship of at least one-year duration. Eligible participants were identified through a two-phase process. In the first phase, study staff conducted weekly group recruitment sessions at two residential substance abuse treatment facilities. At these sessions, the study was described to all men who had been admitted to the facility in the past week and interested men were invited to complete the pre-screening questionnaire to determine whether they were likely to meet study eligibility criteria. The pre-screening criteria included: an AUDIT score of at least 8, which is indicative of a strong likelihood of hazardous or harmful alcohol consumption, a self-report of at least five occasions of drinking in the 60 days prior to treatment entry; a current or recent (ended within 1 month of study participation) relationship of at least one year duration; and an answer of “alcohol” or “both equal” to at least one of the five questions about drug and alcohol use. Men who met pre-screening criteria ($N = 139$) were scheduled for a 3–4 hour interview and self-report questionnaire assessment session during which study eligibility was fully assessed.

A total of 36 men did not meet study eligibility criteria during the interview and self-report questionnaire session for the following reasons: no current dependence diagnosis ($n = 4$), non-qualifying romantic relationship ($n = 7$), primary drug of abuse was not alcohol ($n = 19$), active psychotic symptoms ($n = 1$), multiple criteria not met ($n = 1$), discontinued the session so eligibility could not be determined ($n = 5$). This resulted in a sample of 103 eligible participants. Seventy-seven percent of participants ($n = 79$) met criteria for at least one substance use disorder in addition to alcohol dependence. Approximately equal numbers of men were cohabiting ($n = 54$; 52%) and non-cohabiting ($n = 49$; 48%) with their female partners. Six participants were excluded from analyses (5 left treatment before the second session and 1 had extensive missing data due to vision problems and an injury), resulting in a final sample of 97. Demographic and diagnostic characteristics of these participants are presented in Table 1.

Measures

Pre-Screening—During recruitment, prospective participants completed this form to determine whether they were likely to meet study eligibility criteria. The first 6 items assessed: age, relationship status and duration, and number of days of alcohol use in the past 2 months. The next 5 items assessed whether alcohol or drugs had: been used more in the past 90 days and in the past year, been causing more problems, led to the majority of treatment experiences, and led to the current treatment. The final 10 items were the Alcohol Use Disorders Identification Test, an alcohol problem screening measure (Saunders, Aasland, Babor, de la Fuente & Grant, 1993).

Screening

Historical/demographic interview: This interview included items assessing age, race, ethnicity, employment, education, and relationship status and duration.

Computerized Diagnostic Interview Schedule (C-DIS IV; Robins et al., 2000): The C-DIS IV was used to assess DSM-IV diagnostic criteria for substance abuse and dependence for alcohol and 9 classes of drugs (cannabinoids, stimulants, sedatives, cocaine, opiates, PCP, hallucinogens, inhalants, and other). The psychometric properties of this measure are well established (e.g., Greist et al., 1987; Vandiver & Sher, 1991).

Primary Substance of Abuse Decision Tree: A decision tree described by Fals-Stewart (1996) was adapted for the current study to determine whether alcohol was a primary substance of abuse for each participant. An examiner completed the tree based on participant responses to the C-DIS IV, timeline followback interview, demographic form, and screening form. In the first step of the decision tree, the examiner noted whether the participant met criteria for current dependence on any substance. If not, the tree was ended. If only one substance was listed, that substance was considered the primary substance of abuse. If two or more substances were listed, the examiner noted: which substance was used first, which first caused symptoms, which had caused the most symptoms, which had been used most in the past 90 days, which had been used most in the past year, and which had been an issue most often in treatment. The substance(s) with the most endorsements were the primary substance(s) of abuse.

Outcomes

The Conflict Tactics Scales – Revised (CTS-2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996): The CTS-2 is a 78-item scale that asks respondents to endorse the number of times in the past year they or their partners engaged in each of 39 conflict behaviors during a disagreement using a 7-point scale (never, once, twice, 3–5 times, 6–10 times, 10–20 times, and 20+ times). The CTS-2 was scored according to standard scoring procedures (Straus et al., 1996) to create frequency scores for five subscales: Negotiation, Psychological Aggression, Physical Assault, Sexual Coercion, and Injury. Higher subscale scores indicate greater use of that type of conflict tactic. The reliability estimates (Cronbach's alphas) for the physical assault and psychological aggression subscales in the current sample are 0.80 and 0.77, respectively.

The Timeline Followback (TLFB; Sobell & Sobell, 1996): The TLFB uses a calendar method to gather retrospective information on alcohol use for a specified time interval. Participants were asked to identify how many standard drinks, if any, were consumed on each day in the 90 days prior to study participation as well as which, if any, drugs were used on each day. On days on which IPV was reported, participants are asked to indicate when drug or alcohol use was initiated relative to the IPV.

Timeline Followback Interview – Spousal Violence (TLFB-SV; Fals-Stewart, Birchler & Kelley, 2003): On this measure of IPV, interviewees were shown a list of the 8 physical aggression items from the original Conflict Tactics Scale (Straus, 1979), and asked to indicate the types of aggression performed or received on each day in the past 90 days using a calendar. Participants also indicated which days they had contact with their romantic partner.

Predictors and Moderators

The Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire (IVE; Eysenck & Eysenck, 1978): The IVE is a 63-item questionnaire that has been used to assess impulsivity, venturesomeness and empathy in drug dependent samples (e.g., Allen, Moeller, Rhoades & Cherek, 1998). Cronbach's alpha for the Impulsiveness subscale of the IVE, which is of interest for the current analyses is 0.82. Higher scores on this subscale indicate greater impulsivity.

Trail Making Test (Forms A and B) (TMT; Reitan, 1969): The TMT is a commonly used measure of EF (Arbuthnott & Frank, 2000), which assesses the ability to initiate, switch, and stop a sequence of complex purposive behavior. The examinee must first draw lines to connect consecutively numbered circles on a work sheet (Form A), and then on a second work sheet (Form B), must quickly connect consecutively numbered and lettered circles by drawing lines alternating between the two sequences. The task has been frequently used as a measure of EF in individuals with alcohol use disorders (e.g., Bates et al., 2004, Zinn, Stein & Swartzwelder, 2004). Completion time was utilized in analyses; higher scores indicate poorer performance.

Stroop Neuropsychological Screening Test (SNST; Trenerry, Crosson, DeBoe & Leber, 1989): The SNST is a two-part task that assesses the ability to inhibit an overlearned response and maintain a cognitive set (Golden, 1978; Stroop, 1935). In the Color Task, the individual reads aloud a list of 112 color names in which no name is printed in its matching color. In the Color-Word Task, the individual names the color of ink in which the words are printed. This task has been used to assess EF in substance abuse samples (e.g., Bates, Labouvie & Voelbel, 2002). Total words correct was utilized in analyses; higher scores indicate better performance.

Controlled Oral Word Association (COWA; Benton & Hamsher, 1976): This brief assessment of verbal fluency requires individuals to list as many words as they can that begin with each of the letters F-A-S, excluding proper nouns, numbers, and the same word with a different suffix. This measure may be particularly sensitive to EF impairments in treatment-seeking, substance-dependent individuals (Morgenstern & Bates, 1999). Total number of unique words was utilized in analyses; higher scores indicate better performance.

Symbol Digit Modalities (SDM, Smith, 1982): In the symbol digit modalities test, participants are presented with a series of 9 geometric symbols, and a key linking each symbol to a number. Examinees must write the corresponding number next to as many symbols as possible in 90 seconds. The SDM and the very similar Digit Symbol test have been used as measures of EF in substance abuse samples (Fals-Stewart & Bates, 2003; Bates et al., 2002). Total number correct was utilized in analyses; higher scores indicate better performance.

Category Test Computer Version, Research Edition. (CAT:CVTM; De Fillippis & PAR Staff, 2005.): The Booklet Category Test is another common measure of EF which taps an individual's ability to abstract and shift cognitive sets (De Fillippis & McCampbell, 1991) and the CAT:CVTM, Research Edition accurately reproduces stimuli from the original measure. The Category Test requires participants to abstract the organizing principle for groups of stimuli and to benefit from performance feedback. This measure may be particularly sensitive to the types of impairments observed in substance abuse treatment seekers (Morgenstern & Bates, 1999). For the current study the 108 item version was utilized to reduce participant burden. Total error score on the CAT-CV was utilized in the analyses; higher scores indicate better performance.

Tower of London-Drexel University (TOL^{DX} Culbertson & Zillmer, 2001): The TOL^{DX} is a modification of the original Tower of London that provides a measure of planning and problem solving. The TOL^{DX} utilizes a tower structure with three pegs and three colored beads, and requires the participant to move the beads on his tower structure to match bead configurations presented by the examiner. Similar tasks have been used in research with substance abuse treatment populations (Bates et al, 2002). The Total Move score, the

primary measure of executive planning, was used in analyses; higher scores indicate poorer performance.

Ruff Figural Fluency Test (RFFT; Ruff, Light & Evans, 1987): The RFFT provides a brief assessment of non-verbal fluency, which has been found to distinguish men with AD from controls (Zinn et al., 2004). In this paper-and-pencil task, participants are presented sequentially with 5 unique stimuli, each containing 5 black dots. Each stimulus is repeated 35 times and participants are asked to draw as many unique designs as possible in 60 seconds by connecting the black dots in each stimulus with lines. The total number of unique designs was utilized in analyses; higher scores indicate better performance.

Computerized Delay Discounting Task (Robles & Vargas, 2008): In this computerized task, participants were presented with a hypothetical delayed reward of \$1000, 30 hypothetical immediate reward amounts ranging from \$1000 to \$1, and 8 hypothetical delays ranging from 6 hours to 25 years. Participants were presented the immediate rewards in both an ascending and descending order, and were asked to choose between receiving one of the two values presented on the screen (e.g., \$300 immediately or \$1000 two weeks later). Indifference points (i.e., the amount of immediate money a participant judges to be equivalent to the delayed reward) were determined for each of the eight delays and averaged across the ascending and descending presentations of stimuli. K values were calculated using the equation: $v_d = V/(1 + kd)$, where v_d is the present (discounted) value of a delayed reward, V is the objective value of the delayed reward, k is an empirically derived constant that is proportional to the degree of discounting, and d is the delay from the present to receipt of a delayed reward (Mazur, 1987). Higher k values indicate more rapid discounting of delayed rewards (i.e., greater impulsivity). DDTs have been used extensively to demonstrate differences between healthy control samples and substance abusers/smokers (e.g., Coffey, Gudleski, Saladin & Brady, 2003; Petry, 2001).

GoStop Impulsivity Paradigm (Version 1.01) (Dougherty, Mathias & Marsh, 2003): The GoStop task is a modified version of the Stop Task that measures behavioral response inhibition (Dougherty, Mathias, Marsh, & Jagar, 2005). Participants were presented with 2 blocks of trials, each comprising a series of 160 randomly generated 5-digit numbers presented on a computer screen in rapid succession. Fifty percent of the numbers in each block were presented as matched pairs (e.g., 93824 and 93824). Participants were instructed to respond to matched pairs, unless the second set of digits in the pair changed color from black to red. In that case they were to inhibit their response (i.e., stop trial). During a stop trial, the second set of digits remained black for 50 ms, 150 ms, 250 ms, or 350 ms before turning red (longer delays are associated with greater difficulty in inhibiting the potentiated mouse-click response) and these intervals were presented in a random fashion. The primary dependent measure is the number of stop trials on which the participant fails to inhibit the response. Higher scores indicate poorer performance.

Covariates

Head Injury: Head injury was assessed with a series of 9 yes/no items. The first item simply asked participants to indicate whether they had ever had a head injury. The next two items asked whether a head injury had resulted in a loss of consciousness or concussion. The remaining 6 items asked about other types of brain insults/events: stroke, seizure, coma, cranial radiation, neurosurgery, and illness or injury that required CPR to revive the participant. Affirmative responses were summed to create a head injury score.

Shipley Institute of Living Scale (SILS; Shipley, 1940; Zachary, 1986): The SILS is a brief, self-administered intellectual functioning test that has been validated against the

Wechsler Adult Intelligence Scale (Zachary, 1986). The SILS comprises two discrete subtests. The first assesses verbal ability with 40 multiple choice items requiring participants to choose a synonym for the target word from 4 possible choices. The second assesses abstraction ability with 20 completion items, which require the participant to provide an appropriate response based on the sequences or pairings presented. Verbal and abstraction subscales scores were computed following standard scoring procedures; higher scores indicate better performance.

Procedures

Study staff conducted weekly group recruitment and pre-screening sessions at two residential substance abuse treatment facilities. Men who met pre-screening criteria were scheduled for a 3–4 hour interview and self-report questionnaire assessment session during which study eligibility was fully assessed. These sessions were conducted in a private room at the treatment facility and were preceded by an IRB-approved documented informed consent procedure. Participants were compensated \$60 for this session. Men who met all study eligibility criteria during the interview and self-report questionnaire session were scheduled for a second session lasting 2–3 hours during which the neuropsychological tests and behavioral measures of delay discounting and behavioral inhibition were completed. All measures were administered by bachelor's level research assistants who were trained, tested for competence, and supervised by the first, second, and fourth authors who have considerable expertise and experience with interview and questionnaire assessments, behavioral measures of impulsivity and neuropsychological testing, respectively. Participants were required to maintain abstinence from alcohol and illicit drugs for 4 days prior to the laboratory session to reduce the risk that participant would be intoxicated or experiencing acute substance withdrawal during the session. Compliance with this requirement was assessed by self-report and confirmed by urine drug screen and breathalyzer testing. Due to the long half-life of THC metabolites, participants who tested positive for THC and reported marijuana use in the past 30 days, but not past 4 days, were allowed to participate in the laboratory session. In addition, participants were asked to abstain from nicotine and caffeine for 1 hour prior to the laboratory session. Participants were compensated \$60 for the second session.

Data Analysis

Raw DDT k-values, Trails B completion times, and CTS-2 physical aggression scores were non-normally distributed. Kendall's Tau, which is less sensitive to non-normal distributions than Pearson's r , was utilized to examine bivariate correlations among neuropsychological, laboratory, and self-report measures of self-regulation, IPV, and control variables. Non-normally distributed variables were log-transformed prior to linear regression analyses. To test the hypothesis that self-regulation would predict whether a man had engaged in pretreatment year IPV, we conducted a sequential logistic regression analysis. To test the hypothesis that among men with a pretreatment history of IPV deficits in self-regulation would predict frequency of IPV, we conducted sequential linear regression analysis. In each of these analyses, age, head injury, SILS-V, and SILS-A were included as covariates.

To test the hypothesis that self-regulation would moderate the association between daily alcohol use and IPV as measured by the TLFB, first a series of hierarchical generalized linear models (Raudenbush & Bryk, 2002) were tested. Six participants were excluded completely from these analyses, 4 of whom reported no contact with their partner and 2 of whom reported no alcohol or drug use during the 90-day TLFB (despite reports of 5 or more occasions of drinking during prescreening). In these models, the occurrence of male-to-female IPV on a given day was the dependent measure and alcohol use was modeled as a time-dependent covariate on level 1. Drug use on a given day was also modeled on level 1 to

control for its effects. To allow for clearer interpretation of results, days on which a participant reported no contact with his female partner ($n = 3012$) were excluded from the analyses. Similarly, days on which drug and alcohol use were initiated after an episode of IPV ($n = 1$) were excluded from analyses. This resulted in a final sample of 5420 days. Given that occurrence of male-to-female IPV had a value of 0 or 1, a Bernoulli sampling distribution was specified. A large difference between the robust and model standard errors was observed in the intercepts only models, suggesting a model misspecification. Given that the number of participants was reasonably large relative to the number of level 2 predictors and the outcome variable is non-normally distributed, results from the population-average model with robust standard errors, which are relatively insensitive to model misspecifications are reported for all models (Raudenbush & Bryk, 2002). In the univariate models, one index of self-regulation was included as a moderator on level 2. Using a model building approach, all indices of self-regulation with a p -value of less than .25 were retained as candidates for the final multivariate hierarchical generalized linear models (Fals-Stewart, Schumacher & Golden, 2003; Hosmer & Lemeshow, 1989).

Descriptive, analyses were conducted using IBM SPSS Statistics Version 19. Multiple imputation analyses, as well as logistic and linear regressions were performed using Stata 12. Multi-level models were conducted using the HLM2 module of HLM 6.06.

Results

Descriptive Analyses

Data cleaning revealed 4 participants who were missing a single data point necessary for primary analyses. Data were missing due to participant refusal (GoStop), administration errors (SILS-A, SNST), and participant non-response (CAT-CV). Multivariate regression multiple imputation was utilized to estimate these points for primary analyses. Results presented for models containing these measures are averaged across 10 multiple imputation data sets.

Means, standard deviations, and bivariate associations (Kendall's Tau) among independent and dependent variables are presented in Table 2. As expected, many of the neuropsychological, laboratory, and self-report measures of behavioral self-regulation are highly correlated with one another. Contrary to predictions, with the exception of the Eysenck Impulsivity scale, none of the measures of behavioral self-regulation demonstrated significant bivariate correlations with physical IPV in the full sample. Three control variables (age, head injury, and Shipley verbal functioning) demonstrated significant or trend level associations with physical IPV. Although we had no specific hypotheses about psychological aggression, it is interesting to note that no variable other than the Eysenck Impulsivity scale demonstrated a significant correlation with this form of IPV in the year prior to treatment.

Self-Regulation as a Predictor of IPV

Logistic Regression: A sequential logistic regression analysis was performed to examine prediction of pre-treatment year engagement in physical IPV on the basis of age, head injury, general intellectual functioning (SILS-A and SILS-V), and 10 measures of behavioral self-regulation. Average model results across 10 multiple-imputations revealed that model fit was not good $F(14, 8.3e+06) = 1.34, p = 0.17$. Examination of odds ratios and confidence intervals associated with head injury revealed that this variable was a significant predictor of the occurrence of physical aggression. With each 1-point increase in score on the head injury measure, a man was 1.5 times more likely to be classified as having perpetrated IPV in the year before treatment. The IVE impulsivity score was the only other

significant predictor in the model, with each 1-point increase in score associated with 1.12 times increase in likelihood of being classified as having perpetrated IPV in the year before treatment..

Linear Regression: Among men with a pretreatment history of IPV, we further examined whether these putative measures of self-regulation processes were associated with the frequency of pretreatment year IPV. As in the logistic regression analyses, age, head injury, SILS-V, SILS-A, and the 10 measures of self-regulation were entered in the model. Average model results across 10 multiple imputations revealed that the model was not significant $F(14, 38.1) = 0.42, p = 0.62$. Examination of the regression coefficients revealed that no variable was a significant unique predictor of IPV in the model. The IVE impulsivity score approached significance, $b = 0.03 (SE = 0.01), t = 1.76, p = 0.09$. Full results are not presented.

Self-Regulation as a Moderator of the Daily Association between IPV and Drinking

—In our final set of analyses we examined the self-regulation processes as moderators of the proximal association of substance use and IPV in multi-level models. A total of 5420 days were modeled on level 1, including: 82 IPV days, 4293 drinking days, and 2782 drug use days. In the intercepts-only model, controlling for daily drug use, the likelihood of IPV was higher on days of alcohol use, $\beta = 0.52$ (robust $SE = 0.24$), $t(5415) = 2.14, p = .03$; OR = 1.68 (95%CI = 1.05–2.69). As shown in Table 4, in the model building analyses, all measures of self-regulation and control variables with the exception of age, the COWA, SDM, DDT, and GoStop met criteria for inclusion in the multivariate model. The TMT, SNST, and IVE met criteria for inclusion in the multivariate model, but were not significant predictors of the daily association of IPV and alcohol consumption. Thus a total of 6 measures emerged as significant predictors of the daily association between alcohol consumption and IPV in univariate models: head injury score, SILS-V, SILS-A, RFFT, CAT-CV, and TOL^{DX}. Examination of model graphs revealed that effects for SILS-V, SILS-A, CAT-CV, and RFFT were contrary to predictions: Better performance appeared to be associated with *lower* likelihood of IPV on *non-drinking* days. No differences between high vs. low performers on drinking days, or between low performers on drinking vs. non-drinking days were apparent. Head injury scores produced an identical pattern of findings with less head injury being associated with *lower* likelihood of IPV on *non-drinking* days. Graphs for the TOL^{DX} suggested that those with better performance were more likely to engage in IPV on drinking days than non-drinking days and that alcohol consumption was not related to IPV for those without deficits.

As shown in Table 5, in the multivariate model controlling for daily drug use, only IVE and TOL^{DX} emerged as significant moderators of the association between daily alcohol consumption and the occurrence of IPV. As illustrated in Figure 1, only the relationship for IVE was as hypothesized: men reporting greater impulsivity as evidenced by higher scores on the IVE were more likely to engage in IPV on a drinking day than men reporting less impulsivity. As in the univariate models, the relationship for TOL^{DX} was contrary to predictions: men demonstrating better task performance were more likely to engage in IPV on a drinking day than men demonstrating poorer task performance. Differences in IPV were not evident on non-drinking days.

Discussion

In the current study, we examined the association of performance on laboratory delay discounting and behavioral inhibition tasks, neuropsychological tests of EF, and self-reported impulsivity at the time of alcohol treatment entry with reports of pretreatment IPV. First we examined whether greater impulsivity and less executive control predicted the

occurrence and frequency of IPV in the pretreatment year. Then we examined whether these constructs moderated the proximal association of alcohol consumption and IPV, controlling for drug use.

Hypotheses in the current study received very modest support. Contrary to our hypotheses that multiple measures of behavioral self-regulation would be significant predictors of the occurrence and frequency of IPV perpetration in the year prior to assessment, the self-report measure of impulsivity (IVE) was the only measure of self-regulation that significantly predicted the occurrence of IPV in a logistic regression model. Moreover, none of the measures were significant predictors of the frequency of IPV in the linear regression models, and the IVE was the only measure that approached significance in these models. Evaluation of the correlation matrix revealed that the IVE was also the only measure associated with past year reports of psychological aggression. These findings may reflect the fact that with the exception of the Schafer and Fals-Stewart (1997) study, many of the studies in which the most pervasive differences between groups were found compared men who were arrested or seeking treatment for domestic violence to controls recruited through other means. Given evidence that IPV perpetration is a heterogeneous phenomenon (e.g., Holtzworth-Munroe & Stuart, 1994; Johnson, 2008), it may be that EF is most useful for distinguishing men with more severe or pervasive patterns of IPV from controls. This interpretation is generally consistent with findings of Walling et al. (2011) who found that EF was better at differentiating men with a history of severe IPV from controls than men with low-level antisocial or family-only types of IPV. It may also be that measures of EF are less predictive of IPV in an alcohol dependent sample, because deficits in EF are much more common in such samples than in the general population (e.g., Bates et al., 2002). This interpretation is consistent with the findings of Easton et al. (2008) that neuropsychological test performance more reliably differentiated alcohol dependent men with and without IPV from non-alcohol dependent controls than from one another. Although importantly, examination of the means and standard deviations in Table 2, suggests there was reasonable variance in the predictors in this alcohol dependent sample.

It is interesting that despite the lack of association between the occurrence of IPV and neuropsychological and behavioral measures of self-regulation, head injury was a significant predictor of the occurrence of past year IPV. This is consistent with prior research demonstrating an association between head injury and IPV (Cohen et al., 1999; Rosenbaum & Hoge, 1989; Walling et al., 2011), and may suggest that a simple model in which the relationship between head injury and IPV is mediated by neuropsychological deficits does not capture the complexity of the relationship between head injury and IPV. It is also possible that neuropsychological deficits other than EF mediate this relationship.

General intellectual functioning, as indexed by the SILS-A and SILS-V, figural fluency (RFFT), and the ability to abstract and shift cognitive sets (CAT-CV) moderated the association between daily drinking (controlling for daily drug use) and IPV perpetration in the 90-days prior to assessment in univariate, multi-level models. However, contrary to our prediction that poor performance would predict IPV on drinking days, results suggested that better performance actually predicted a *lower* likelihood of IPV on *non-drinking* days. Directly contrary to hypotheses, better performance on the TOL^{DX} was associated with greater IPV on drinking days. In the final multivariate model, self-reported (IVE) and performance on the TOL^{DX} were the only significant predictors of the daily association between drinking and IPV perpetration controlling for daily drug use. However, as in the univariate models, the findings for the TOL^{DX} were directly contrary to hypotheses. The findings for the TOL^{DX} were not expected and must thus be interpreted with extreme caution. If this finding is replicated in future research, one potentially useful explanatory framework is the proactive versus reactive aggression conceptualization of IPV (e.g., Chase,

O'Leary, & Heyman, 2001). Within this framework, proactive aggression is planned and strategic aggression that is utilized to achieve relationship goals, whereas reactive aggression is inconsistent with overall relationship goals and occurs in reaction to conflict. Given the disinhibiting effects of alcohol, it is possible that IPV occurring on non-drinking days in dependent drinkers is more likely to be proactive than reactive. Moreover, given that successful performance on the TOL^{DX} relies, in part on planning and strategy, it is possible that partner-violent men who perform well on this task may be more likely to use proactive aggression. However, future research is needed to test this speculation.

The current study is important in that it sought to replicate and extend findings from laboratory aggression research documenting EF and other self-regulation constructs as a moderator of alcohol related aggression in men (Giancola, 2004; Giancola et al., 2011). With its reliance on a timeline followback method to assess naturally occurring alcohol consumption and IPV perpetration in treatment-seeking men diagnosed with alcohol dependence, the current study provides a complement to prior research using alcohol self-administration and laboratory aggression tasks with social drinkers. Overall, the findings of the current study suggest the findings from prior alcohol self-administration studies may not be fully applicable to treatment-seeking dependent drinkers, many of whom also engage in illicit drug use, and/or the types of IPV most common among men in alcohol treatment settings.

In addition, increased likelihood of men engaging in IPV following alcohol consumption found in the current study with a clinical population is consistent with prior research using non-alcohol-treatment seeking samples. For example, Moore and colleagues reported increased odds of engaging in IPV following alcohol consumption in a convenience sample of 184 college students (men=38; Moore, Elkins, McNully, Kivisto, & Handsel, 2011). Likewise, Roffman and colleagues found in a sample of emerging adults (age range 17–21) reporting to an urban emergency department ($N=397$, 44% male), increased odds of perpetrating dating abuse on drinking days as compared to nondrinking days. These data underscore the important role of alcohol consumption in some perpetrators of IPV.

Limitations & Future Directions

There are important limitations to the current study. The first is that we did not capture data on the number of prospective participants who were invited to participate in the prescreening and refused or who were prescreened and found ineligible. Thus it is impossible to determine how representative the sample obtained was of the recruitment facility. The second is that because of exploratory nature and small sample size of the current study, the focus was limited to heterosexual men. Although both men and women in substance abuse treatment (Stuart et al., 2009) and a variety of other contexts (Archer, 2000) report approximately equal rates of IPV perpetration, the majority of IPV research, including the current study, focuses on male perpetrators because of research demonstrating more significant physical and psychological consequences of male-perpetrated IPV (Archer, 1999; Coker et al., 2002). However, there is evidence that IPV perpetration by women may also have important public health implications, including serious psychological harms to male victims and thus should be studied (Archer, 1999; Coker et al., 2002; Hines & Malley-Morrison, 2001). There is also clear evidence for the public health significance of IPV in same-sex relationships (e.g., Island & Letellier, 1991) and additional research on the role of alcohol in IPV in these relationships is needed. A third limitation is the measurement strategy for IPV. As noted previously, there is compelling evidence that IPV is a heterogeneous phenomenon (e.g. Johnson, 2008), and the CTS2 and TLFB-SV do not yield sufficient information to categorize meaningful patterns of IPV. A related limitation is the reliance on men's self-reports of IPV perpetration. There is evidence that men may

underreport IPV relative to their female partners (Archer, 1999), and thus reports of IPV in the current study may be underestimates. However, requiring female partner participation for studies of men in substance abuse treatment may result in sample bias, as not all female partners may be successfully recruited to participate (Schumacher et al., 2011).

It is also important to note the challenges of conceptualizing and measuring self-regulation in substance abusing populations. First, although often described or alluded to as a one-dimensional construct, there is evidence that processes underlying impulsive, dysregulated behaviors are multidimensional (e.g. White et al., 1994). The current study sought to address this challenge with a multi-method battery that included several measures of putative self-regulatory processes. However, the findings of current study, as with prior research on self-regulation and IPV, do not lend themselves to firm conclusions about which aspects of self-regulation are most relevant to understanding the relationship between alcohol and IPV. The current study suggests that EF, delay discounting, and behavioral inhibition may not be that useful for understanding IPV among treatment-seeking alcohol dependent men. Another challenge in conceptualizing and measuring self-regulation in an alcohol treatment sample is that self-regulatory processes appear quite sensitive to the effects of substances. Chronic substance abuse may lead to persistent deficits that gradually improve with prolonged abstinence (e.g., Bates et al., 2004). As such, the self-regulatory processes under consideration in the current study represent a “moving target.”

A final challenge in studying treatment-seeking men with alcohol dependence is that many also use substances other than alcohol. Although men in the current study identified alcohol as a primary drug of abuse, the majority reported use of, abuse of, or dependence on other drugs. Daily drug use was included as a control variable in the HGLM analyses to provide a clearer indication of whether the variables of interest moderated the association between daily drinking and IPV. In future research, the unique effects of daily drug use, which has also been associated with IPV and deficits in self-regulation, must be examined. Future research must also examine whether the findings of this study are upheld in other populations including non-dependent and non-treatment-seeking drinkers as well as men who are arrested or seeking treatment for IPV.

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Figure 1.

Figure 1a. Likelihood of intimate partner violence perpetration on drinking and non-drinking days for men with various scores on the Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire impulsiveness subscale (higher scores = lower behavioral self-regulation).

Figure 1b. Likelihood of intimate partner violence perpetration on drinking and non-drinking days for men with various Tower of London-Drexel University Total Move Scores (higher scores = lower behavioral self-regulation).

Table 1

Sample Descriptive Statistics

	Mean (S.D.) or <i>n</i> (%)
Characteristic	
Age	33.48 (9.70)
Race (% White)	73.00 (75.30%)
(% African American)	18.00 (18.60%)
(% Other)	6.00 (6.20%)
Ethnicity (% Hispanic)	4.00 (4.10%)
Education (% < high school graduation)	21.00 (21.60%)
(% high school only)	24.00 (24.70%)
(% > high school education)	52.00 (53.70%)
Employed (% Full time)	47.00 (45.90%)
(% Part time)	5.00 (5.20%)
(% Not Employed)	45.00 (48.90%)
% Married or Cohabiting	51.00 (52.60%)
Relationship Duration (in years)	7.39 (7.74) ¹
AUDIT	29.77 (11.68)
Current Substance Diagnoses	
Alcohol	97.00 (100.00%)
Marijuana	32.00 (32.99%)
Amphetamine	14.00 (14.43%)
Sedative	28.00 (28.87%)
Cocaine	46.00 (47.42%)
Opiate	32.00 (32.99%)
PCP	3.00 (3.10%)
Hallucinogen	2.00 (2.10%)
Other Drugs	11.00 (11.34%)
CTS2 Psychological Aggression Score	45.92 (35.97) ²
Prevalence of Psychological Aggression	92.00 (95.83%) ²
CTS2 Physical Assault Score	6.62 (13.57)
Prevalence of Physical Assault	55.00 (56.7%)
Average Number of Head Injuries	1.55 (1.47)

Note. *N* = 97. CTS2 = Conflict Tactics Scales-Revised; AUDIT = Alcohol Use Disorders Identification Test.

¹ *n* = 94, due to missing data.

² *n* = 96, due to missing data.

Table 2
Means, Standard Deviations, and Bivariate Correlations among Measures of Self-Regulation

Variable	Mean(SD)	Kendall's Tau														
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CTS2-A	6.62(13.57)	.39***	-.13 ⁺	.18*	-.14 ⁺	-.04	-.03	-.01	-.05	-.06	.03	.05	.05	.09	-.03	.28***
2. CTS2-P	45.92(35.97)	--	-.06	.08	-.00	-.00	.06	.01	-.13	.05	-.02	-.04	.06	-.01	.03	.23**
3. Age	33.48(9.70)	--	--	.01	.12 ⁺	-.17*	-.17*	.07	.19**	-.25***	.21**	.17*	-.30***	.06	.06	-.11 ⁺
4. Injury	1.55(1.47)	--	--	--	-.00	-.05	.08	.11	-.12	.06	.06	.14 ⁺	.02	-.01	.10	.06
5. SILS- V	25.81(5.43)	--	--	--	--	.41***	.24**	.31***	-.28***	.20**	-.28***	-.16*	.15*	.23**	.03	-.01
6. SILS- A	21.19(9.28)	--	--	--	--	--	.26***	.24**	-.42***	.25**	-.45***	-.44***	.36***	-.22**	-.02	-.02
7. RFFT	71.70(24.21)	--	--	--	--	--	--	.31***	-.31***	.31***	-.33***	-.11	.31***	-.11	-.01	-.03
8. COWA	35.57(11.99)	--	--	--	--	--	--	--	-.26**	.20**	-.24**	-.05	.17*	-.19**	.02	.03
9. CAT-CV	31.31(19.88)	--	--	--	--	--	--	--	--	-.22**	.34***	.16*	-.28***	.16*	-.02	-.09
10. SDM	47.00(11.49)	--	--	--	--	--	--	--	--	--	-.45***	-.10	.45***	-.07	-.05	.08
11. TMT-B	96.95(67.04)	--	--	--	--	--	--	--	--	--	--	.21**	-.42***	.20**	-.10	-.03
12. TOL ^{DX}	29.39(17.96)	--	--	--	--	--	--	--	--	--	--	--	-.27***	.15*	-.02	.06
13. SNST	98.90(16.85)	--	--	--	--	--	--	--	--	--	--	--	--	-.07	-.05	.08
14. DDT	3.46(8.57)	--	--	--	--	--	--	--	--	--	--	--	--	--	.06	.05
15. GoStop	0.49(0.20)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-.07
16. IVE	15.42(4.70)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note: CTS2-A= CTS2 physical assault subscale; CTS2-P = CTS2 psychological aggression subscale; Injury = head injury score; SILS-V = Shipley Institute of Living Scale-Revised Verbal Subscale; SILS-A = Shipley Institute of Living Scale-Revised abstraction subscale; RFFT = Ruff Figural Fluency Test total unique designs; COWA = Controlled Oral Word Association total unique words; CAT-CV = 108-item Category Test Computer Version total errors; SDM = Symbol Digit Modalities Test total number correct; TMT-B = Trail Making Test Form B completion time; TOL^{DX} = Tower of London-Drexel University total moves; SNST = Stroop Neuropsychological Screening Test total score; DDT = Delay Discounting Task average *k* value; GoStop Impulsivity Paradigm total failures to inhibit response across all delays; IVE = Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire impulsiveness subscale score.

⁺ $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 3

Summary of Sequential Binary Logistic Regression Analysis Predicting Pre-Treatment Year Physical Intimate Partner Violence (IPV)

Variables	Beta	OR	95% CI	<i>p</i>
Age	−0.56	0.94	0.88–1.01	0.10
Head Injury	0.43	1.54	1.05–2.26	0.03
SILS-V	−0.07	0.93	0.81–1.07	0.31
SILS-A	0.05	1.05	0.96–1.15	0.28
RFFT	0.00	1.00	0.98–1.03	0.93
COWA	0.02	1.02	0.97–1.07	0.39
CAT-CV	−0.01	0.99	0.96–1.03	0.67
SDM	−0.05	0.95	0.89–1.01	0.10
TMT-B	0.01	1.01	0.99–1.02	0.24
TOL ^{DX}	0.01	1.01	0.97–1.04	0.74
SNST	0.01	1.02	0.98–1.06	0.43
DDT	−0.01	0.99	0.93–1.05	0.69
GoStop	−1.25	0.29	0.02–3.94	0.35
IVE	0.12	1.12	1.01–1.26	0.04

Note: SILS-V = Shipley Institute of Living Scale-Revised Verbal Subscale; SILS-A = Shipley Institute of Living Scale-Revised abstraction subscale; RFFT = Ruff Figural Fluency Test total unique designs; COWA = Controlled Oral Word Association total unique words; CAT-CV = 108-item Category Test Computer Version total errors; SDM = Symbol Digit Modalities Test total number correct; TMT-B = Trail Making Test Form B completion time; TOL^{DX} = Tower of London-Drexel University total moves; SNST = Stroop Neuropsychological Screening Test total score; DDT = Delay Discounting Task average *k* value; GoStop Impulsivity Paradigm total failures to inhibit response across all delays; IVE = Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire impulsiveness subscale score.

Table 4

Parameter estimates for univariate HGLMs examining self-regulation as a predictor of the day-to-day association of the occurrence of IPV and alcohol consumption controlling for drug use

Fixed Effects	Coefficient	robust S.E.	<i>t</i>	OR (CI)
Age	−0.00	0.02	−0.01	1.00 (0.96–1.04)
Head Injury	−0.27	0.13	1.99*	0.76 (0.59–1.00)
SILS-V	0.07	0.03	2.14*	1.07 (1.01–1.15)
SILS-A	0.09	0.03	3.31**	1.09 (1.04–1.15)
RFFT	0.01	0.01	2.04*	1.01 (1.00–1.03)
COWA	0.01	0.02	0.65	1.01 (0.98–1.05)
CAT-CV	−0.02	0.01	−2.18*	0.98 (0.96–1.00)
SDM	−0.00	0.02	−0.22	1.00 (0.96–1.03)
TMT-B	−0.00	0.00	1.91+	1.00 (0.99–1.00)
TOL ^{DX}	−0.05	0.01	−4.65***	0.95 (0.93–0.97)
SNST	0.02	0.01	1.87+	1.02 (1.00–1.05)
DDT	0.02	0.03	0.63	1.02 (0.97–1.07)
GoStop	0.22	2.21	0.10	1.25 (0.02–95.84)
IVE	−0.04	0.05	1.76+	0.96 (0.86–1.07)

Note: : SILS-V = Shipley Institute of Living Scale-Revised Verbal Subscale; SILS-A = Shipley Institute of Living Scale-Revised abstraction subscale; RFFT = Ruff Figural Fluency Test total unique designs; COWA = Controlled Oral Word Association total unique words; CAT-CV = 108-item Category Test Computer Version total errors; SDM = Symbol Digit Modalities Test total number correct; TMT-B = Trail Making Test Form B completion time; TOL^{DX} = Tower of London-Drexel University total moves; SNST = Stroop Neuropsychological Screening Test total score; DDT = Delay Discounting Task average *k* value; GoStop Impulsivity Paradigm total failures to inhibit response across all delays; IVE = Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire impulsiveness subscale score. All self-regulation variables were evaluated in separate models (i.e., they were not entered simultaneously). Self-regulation variables that were related to violence at $P < .25$ were eligible for inclusion in the final multivariate model.

++
 $p < .25$;

+
 $p < .10$;

*
 $p < .05$;

**
 $p < .01$;

 $p < .001$

Table 5

Parameter estimates for multivariate HGLMs examining self-regulation as a predictor of the day-to-day association of the occurrence of IPV and alcohol consumption

Fixed Effects	Coefficient	robust S.E.	<i>t</i>	OR (CI)
Head Injury	0.01	0.14	0.04	1.00 (0.78–1.30)
SILS-V	0.02	0.03	0.76	1.02 (0.97–1.09)
SILS-A	−0.03	0.02	1.44	0.97(0.93–1.01)
RFFT	−0.00	0.01	0.52	1.00 (0.99–1.01)
CAT-CV	−0.00	0.01	0.13	1.00 (0.98–1.01)
TMT-B	0.00	0.00	1.30	1.00 (1.00–1.01)
TOL ^{DX}	−0.04	0.01	3.58**	0.96(0.95–0.98)
SNST	0.01	0.01	0.49	1.01(0.98–1.03)
IVE	0.10	0.02	4.18***	1.10 (1.05–1.16)

Note: SILS-V = Shipley Institute of Living Scale-Revised Verbal Subscale; SILS-A = Shipley Institute of Living Scale-Revised abstraction subscale; RFFT = Ruff Figural Fluency Test total unique designs; CAT-CV = 108-item Category Test Computer Version total errors; SDM = Symbol Digit Modalities Test total number correct; TMT-B = Trail Making Test Form B completion time; SNST = Stroop Neuropsychological Screening Test total score; DDT = Delay Discounting Task average *k* value; GoStop Impulsivity Paradigm total failures to inhibit response across all delays; IVE = Eysenck Impulsiveness-Venturesomeness-Empathy Questionnaire impulsiveness subscale score.

**
 $p < .01$;

 $p < .001$