

## Components of Disinhibition (vs. Constraint) Differentially Predict Aggression and Alcohol Use

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*Abstract:* Disinhibition (vs. Constraint; DvC), which has been shown to represent a central aspect of the externalizing domain, consists of several correlated but distinguishable underlying traits, which may have different patterns of association with various externalizing indicators. In a sample of 18- to 19-year old undergraduate students ( $N = 430$ ; 71.1% female), we examined the specificity and generality of the association between lower order components of DvC and both aggression and alcohol use, externalizing-related behavioural constructs that have well-established links to DvC. All three components of DvC—including Disagreeableness, low Self-Control and low Accomplishment—were associated independently with Reactive Aggression, but only Disagreeableness was correlated significantly with Proactive Aggression. Also, only low Self-Control was associated with alcohol use. Thus, aggression was broadly associated with components of DvC—although much more strongly with the Disagreeableness domain—whereas alcohol use was specifically correlated with low Self-Control. These results suggest that lower order components of DvC have distinct patterns of associations with externalizing-related outcomes. Copyright © 2011 John Wiley & Sons, Ltd.

Key words: aggression; alcohol use; disinhibition; proactive aggression; reactive aggression

### INTRODUCTION

Disinhibition (versus Constraint; DvC) broadly reflects individual differences in behaving in an undercontrolled versus overcontrolled manner (Clark & Watson, 2008). Structural studies repeatedly have shown DvC to be associated with aggression and substance use, behaviours that fall under the broad dimension termed externalizing psychopathology (Sher & Trull, 1994; Krueger, Markon, Patrick, & Iacono, 2005) or disinhibitory psychopathology (Gorenstein & Newman, 1980; Krueger & Markon, 2006).

Although the association between DvC and externalizing behaviours is well established, the broad construct of DvC consists of several underlying components or facets (Roberts et al., 2004; Whiteside & Lynam, 2001; Vaidya, Latzman, Markon, & Watson, 2010), which may have different patterns of association with various indicators of externalizing. Examining these differential associations will help to clarify the nature of these relations. Specifically, understanding how various indicators of externalizing relate differentially to components of DvC may help to reveal common processes underlying normal and pathological traits and behaviours which, in turn, will inform models of the development and persistence of externalizing. In the current study, we examine the specificity and generality of the

association between underlying components of DvC and aggression and alcohol use. We specifically chose these constructs as they represent two key components of the externalizing spectrum that have been widely studied and linked both cross-sectionally as well as prospectively to externalizing pathology (Kendler et al., 2003; Krueger et al., 1998, 2005; Krueger, Markon, Patrick, Benning, & Kramer, 2007).

### COMPONENTS OF DISINHIBITION (VS. CONSTRAINT)

DvC represents one of the broad, higher order dimensions in the prominent three-factor or 'Big Three' model of personality (Eysenck, 1990; Markon, Krueger, & Watson, 2005; Tellegen, 1985; Watson, Clark, & Harkness, 1994). A number of structural models have been proposed to characterize the lower order dimensions or components within this domain. For example, Whiteside and Lynam (2001) posited four constructs associated with impulsive behaviour: Urgency, lack of Premeditation, lack of Perseverance and Sensation Seeking. Urgency and sensation seeking relate to Neuroticism and Extraversion, respectively, traits outside of the DvC domain, whereas lack of Premeditation and lack of Perseverance have been shown to be key components of DvC (Barratt, 1985; Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004; Saucier & Ostendorf, 1999; Tellegen & Waller, 2008). Another prominent model

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with extensive empirical support posits that DvC represents a higher order factor that can be decomposed into the Big Five traits of Agreeableness and Conscientiousness (Clark & Watson, 2008; Markon *et al.*, 2005; Watson *et al.*, 1994).

Consistent with the emerging consensus that DvC can be divided meaningfully into distinct dimensions (Roberts *et al.*, 2004; Whiteside & Lynam, 2001), Vaidya and colleagues (2010)—using a broad range of DvC measures—found that DvC could be decomposed into three meaningful components: Low Accomplishment, low Self-Control and Disagreeableness. In this model, which is largely consistent with previous work (e.g. Whiteside & Lynam, 2001), Accomplishment was defined by Big Five Conscientiousness facets—except for Deliberation, which loaded on the Self-Control factor, along with other impulsivity-related scales. In contrast, the Agreeableness factor was defined entirely by Big Five Agreeableness facets. These distinct DvC dimensions may have different patterns of association with various measures of externalizing and, if so, explicating these differential associations may help to elucidate the underlying processes that lead individuals to engage in these behaviours differentially.

### Disinhibitory psychopathology

An extensive, well-replicated empirical literature indicates that aggressive antisocial behaviour and substance use share a common underlying link. Moreover, their shared genetic and neurobiological diatheses are also linked to DvC, and all are components of the broad dimension of disinhibitory psychopathology or externalizing behaviours (Kendler, Prescott, Myers, & Neale, 2003; Krueger *et al.*, 2005; Krueger *et al.*, 2007). A number of empirical studies on externalizing psychopathology support the existence and functional nature of this dimension. For example, Krueger and colleagues (1998) modelled comorbidity among *DSM-III-R* disorders in a New Zealand sample assessed at ages 18 and 21 years. At both ages, diagnoses of Conduct Disorder (CD) at age 18 or antisocial personality disorder (ASPD) at age 21 and the substance use disorders (SUDs) formed a single coherent externalizing factor that was clearly distinguishable from a separate internalizing factor. This finding has been replicated subsequently in several different countries (Krueger, 1999; Krueger, McGue, & Iacono, 2001; Vollebergh *et al.*, 2001; Kendler, Prescott, Myers, & Neale, 2003; Slade & Watson, 2006).

Additionally, the extant literature is rich with studies demonstrating associations between externalizing behaviours and DvC. For example, Krueger and colleagues (2002) found support for a hierarchical model linking disinhibitory personality traits to substance dependence and antisocial behaviour, indicating an etiological association with externalizing disorders. In addition to structural studies providing evidence for the strong association between externalizing behaviours and DvC, genetic research also has provided compelling support for an externalizing spectrum that includes DvC (e.g. Krueger *et al.*, 2002; Hicks, Krueger, Iacono, McGue, & Patrick, 2004).

### Association between DvC and aggression and alcohol use

Aggression and alcohol use have been shown to be specific manifestations of the domain of externalizing (Iacono, Carlson, Taylor, Elkins, & McGue, 1999; Krueger *et al.*, 2005; Krueger *et al.*, 2007). Although extensive evidence has established the personality dimension of DvC as part of this broad spectrum, less is known regarding the associations between various components of the DvC dimension and externalizing behaviours.

With regard to aggression, both meta-analytic work (Miller & Lynam, 2001) and empirical investigations (Miller, Lynam, & Leukefeld, 2003; Miller, Lynam, & Jones, 2008) have shown that the Big Five trait of Agreeableness evidences the strongest association, followed by Conscientiousness. When lower order facets of Conscientiousness are examined, those related to poor impulse control (e.g. deliberation) are most consistently strongly related (Miller & Lynam, 2006; Miller *et al.*, 2008), suggesting that Agreeableness is the key predictor of aggression with a smaller contribution from poor impulse control.

Furthermore, because aggression has been shown to be a heterogeneous construct, researchers also have begun to examine differential associations with different forms of aggression (e.g. Poulin & Boivin, 2000; Miller & Lynam, 2006; Raine *et al.*, 2006), in particular reactive and proactive aggression (Poulin & Boivin, 2000; Fossati *et al.*, 2009; Fung, Raine, & Gao, 2009). Reactive aggression refers to behaviours, often retaliatory in nature, carried out in negative affective states such as anger or frustration. In contrast, proactive aggression represents behaviours that are motivated by the desire to achieve a specific goal; these behaviours are not generally explicitly provoked, but are implemented for personal gain (Poulin & Boivin, 2000).

Only a few studies have investigated the association of reactive and proactive aggression with DvC. Although the available evidence suggests that both are linked to this dimension (Raine *et al.*, 2006), it is not clear whether they have differential associations with the domain. For example, Raine *et al.* (2006) found stronger associations between reactive (vs. proactive) aggression and DvC, whereas Miller and Lynam (2006) reported similar relations between the different forms of aggression and Agreeableness or Conscientiousness; however, reactive aggression was more negatively associated with the Agreeableness facet of Compliance. Moreover, Ellis, Weis, and Lochman (2009) found associations between reactive—but not proactive—aggression, and cognitive measures of self-control, suggesting that the trait facet of Self-Control might also have a differential association with reactive aggression. Thus, preliminary evidence suggests that reactive aggression may have somewhat stronger associations with DvC depending on the specific DvC component examined.

With regard to alcohol use, research suggests that individuals with alcohol-related problems are characterized by both low Agreeableness and Conscientiousness, with the latter being a stronger predictor (Hopwood *et al.*, 2007; Martin & Sher, 1994; Ruiz, Pincus, & Dickinson, 2003; Sher,

Bartholow, & Wood, 2000). These findings have been confirmed meta-analytically (Hong & Paunonen, 2009). When facets of Big Five traits have been examined, the traits of high impulsiveness, low competence, low dutifulness and low deliberation have been shown to be related to alcohol use (Ruiz et al., 2003). Similar findings have emerged when participants with and without a lifetime diagnosis of alcohol abuse or dependence have been compared (Hopwood et al., 2007). Additionally, in a recent meta-analytic investigation of associations between Conscientiousness and health-related behaviours, Bogg and Roberts (2004) reported average associations between Conscientiousness facets and excessive alcohol use ranging from  $-.08$  for Industriousness to  $-.29$  for Self-Control; the strongest alcohol-use associations were with Self-Control, Virtue and Traditionalism (Bogg & Roberts, 2004). Taken together, it appears that Conscientiousness, specifically those components associated with dutiful and deliberate behaviours, is likely to be the strongest predictor of alcohol use and abuse.

### Current study

The current study examines associations between three previously explicated second-order components of DvC and aggression and alcohol use, with a factor analytically derived DvC model from a comprehensive battery of measures, and an aggression measure specifically designed to account for the heterogeneous nature of this construct (Raine et al., 2006).

We reasoned that finding specific relations between components of DvC and aggression and alcohol use would suggest that the mechanisms by which DvC relates to externalizing differ across these variables. Although previous studies have not used our specific three-component DvC scheme, the research reviewed above does provide some evidence for specificity. In particular, we hypothesized that reactive and proactive aggression both would be associated significantly with the Agreeableness component of DvC, and that reactive aggression would have a stronger association than proactive aggression with the Self-Control component. Finally, we expected alcohol use to have the strongest association with Self-Control. We did not make specific hypotheses about the associations between alcohol use and the other DvC components.

## METHODS

### Participants

Participants were 430 undergraduates between the ages of 18 and 19 years (*Mean* age =  $18.45 \pm 0.64$ ; 71.1% female) at a large Midwestern university, recruited from a departmental research participation pool. Seventeen participants did not complete the alcohol consumption instrument resulting in 413 participants with complete data. Participants received credit in partial fulfilment of a research exposure requirement for an introductory psychology course. These

participants are a subset of the undergraduate sample described in an earlier paper (Vaidya et al., 2010).

### Measures

Participants completed three measures of DvC, a measure of reactive and proactive aggression and a measure of alcohol consumption.

#### *Disinhibition (vs. Constraint)*

*Constraint.* Three primary scales make up the Constraint domain of the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008): Control (the tendency to be cautious, reflective and organized; 24 items), Harm Avoidance (the tendency to avoid risks, as well as a dislike of risky adventures and dangerous experiences; 28 items) and Traditionalism (the tendency to advocate high moral standards and strict child rearing, and an opposition to permissiveness; 27 items; see Tellegen & Waller, 2008). The items are rated using a true-false response format. The MPQ is a widely used measure of personality with extensive evidence regarding its reliability and validity. The MPQ has been shown to have good psychometric properties. Coefficient alphas for the primary scales have been found to range from  $.76$  to  $.89$  (Church, 1994) and 30-day test-retest correlations have been shown to be  $.82$ ,  $.88$  and  $.90$  for the Control, Harm Avoidance and Traditionalism scales, respectively (Tellegen, 1982). These scales also show good convergent and discriminant validity, and the higher order Constraint factor is strongly correlated with other measures of Disinhibition (Watson & Clark, 1993). Although participants completed all three Constraint scales, Traditionalism was not included in the subsequent analyses because our previous work indicated that this scale is not a clear marker of any of the DvC facets (Vaidya et al., 2010).

*Barratt Impulsiveness Scale-11 (BIS-11; Patton et al., 1995).* This measure has three subscales: Attentional Impulsiveness (8 items; e.g. 'I am restless at the theater or lectures'), Motor Impulsiveness (11 items; e.g. 'I act on impulse') and Non-planning Impulsiveness (11 items; e.g. 'I plan trips well ahead of time' [reverse-keyed]). The BIS-11 uses a 4-point response format. The BIS-11 is commonly used in clinical and non-clinical settings and demonstrates sound psychometric properties. For instance, internal consistency coefficients for the overall scale have been shown to be approximately  $.80$  across various clinical and non-clinical populations (Patton et al., 1995).

*Revised NEO Personality Inventory—Conscientiousness and Agreeableness.* Data on Conscientiousness facets (Competence, Order, Dutifulness, Achievement Striving, Self-discipline, Deliberation) and Agreeableness facets (Trust, Straightforwardness, Altruism, Compliance, Modesty, Tendermindedness) were collected using items from the revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1992). Each facet consists of 8 items; participants respond to each item using a 5-point agree-disagree response format. The reliability and validity of the NEO PI-R are well documented. Costa and McCrae (1992) reported coefficient

alphas ranging from .86 to .92. Because they contain fewer items, the facets display lower alphas, ranging between .56 and .81. Costa & McCrae (1992) also found strong convergent and discriminant validity when they examined the correlations between the NEO PI-R and other commonly used measures of relevant personality traits.

### Aggression

**Reactive–Proactive Aggression Questionnaire.** The Reactive–Proactive Aggression Questionnaire (RPQ; Raine *et al.*, 2006) is a 23-item measure that consists of two scales: Reactive Aggression and Proactive Aggression. Participants respond to items using a 3-point scale (A = *Never*; B = *Sometimes*; C = *Often*) to indicate how often they have engaged in various behaviours associated with reactive aggression (e.g. ‘Got angry or mad or hit others when teased’) and proactive aggression (e.g. ‘Hurt others to impress people’). The RPQ has been shown to demonstrate adequate reliability with internal consistencies ranging from .86 for proactive aggression to .84 for reactive aggression (Raine *et al.*, 2006). In the current sample, internal consistencies were .79 for reactive aggression and .82 for proactive aggression.

### Alcohol consumption

**Alcohol Use Disorders Identification Test—Alcohol Consumption.** The Alcohol Use Disorders Test—Alcohol Consumption Scale (AUDIT-C; Barbor, Higgins-Biddle, Saunders, & Monteiro, 2001) is a three-item measure that is widely used as an efficient and valid screen for alcohol misuse (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998; Dawson, Grant, Stinson, & Zhou, 2005; Doyle, Donovan, & Kivlahan, 2007). The AUDIT-C uses a 5-point response format related to frequency of behaviours including alcohol consumption and binge drinking. It is noteworthy that over 70% of the sample fell above the recommended clinical cut-offs on the AUDIT-C [Bush *et al.*, 1998]. Nevertheless, this result is consistent with earlier reports of excessive binge drinking on college campuses in general (Wechsler, Molnar, Davenport, & Baer, 1999), as well as from the same university as that of the current participants (Pascarella, Goodman, Seifert, Tagliapietra-Nicoli, & Park, & Whitt, 2007). In the current sample, the internal consistency of the AUDIT-C was .88.

### Analyses

The multiple imputation procedure in SAS Version 9.1 was used to impute missing items when fewer than 10% of measures’ items were missing. This approach uses maximum likelihood estimates for missing data and includes a random error component to prevent artificial inflation of item intercorrelations.

We first examined the zero-order correlations of DvC with the aggression and substance-use scales. Based on our earlier findings (Vaidya *et al.*, 2010), we then used specific scales to model DvC’s three components: Accomplishment, Self-Control and Agreeableness. Specifically, Accomplishment was reflected in the NEO Conscientiousness facets of Achievement Striving, Self-Discipline, Competence, Dutifulness and Order, plus BIS Non-planning Impulsiveness (reverse keyed). Self-Control was assessed using MPQ Control, NEO Deliberation, BIS Motor Impulsiveness (negatively keyed) and MPQ Harm Avoidance. All six NEO Agreeableness facets—Altruism, Tendermindedness, Straightforwardness, Trustworthiness, Compliance and Modesty—were included (see Vaidya *et al.*, 2010 for details).

We then employed structural equation modeling (SEM) procedures to examine associations between the three latent DvC components and latent reactive aggression, proactive aggression and substance use controlling for sex. We first analysed a single SEM model with all three externalizing behaviours examined simultaneously, which accounts for shared variance among them; however, we present figures between the DvC components and each externalizing behaviour separately for clarity. Lastly, we examined two-way interactions between each of the three DvC components in predicting the three externalizing behaviours via separate SEM models.

## RESULTS

### Preliminary analyses

Table 1 shows bivariate correlations between aggression and substance use. Consistent with previous research, reactive and proactive aggression were associated significantly. Additionally, both reactive and proactive aggression were associated moderately with alcohol use. Also shown in Table 1 are the bivariate correlations of factor analytically derived DvC scales with both aggression and substance use.

Table 1. Correlations among externalizing behaviour scales and DvC scales

	RAgg	PAgg	Alcohol	Accomplish	Control	Agreeable
Externalizing behaviours						
Reactive aggression (RAgg)						
Proactive aggression (PAgg)	.56					
Alcohol consumption	.26	.32				
DvC						
Accomplishment (Accomplish)	-.18	-.35	-.42			
Self-control (Control)	-.25	-.34	-.45	.52		
Agreeableness (Agreeable)	-.42	-.35	-.14	.35	.28	

Note:  $N = 430$  for aggression scales;  $N = 413$  for alcohol consumption. All correlations significant at  $p < .01$ .

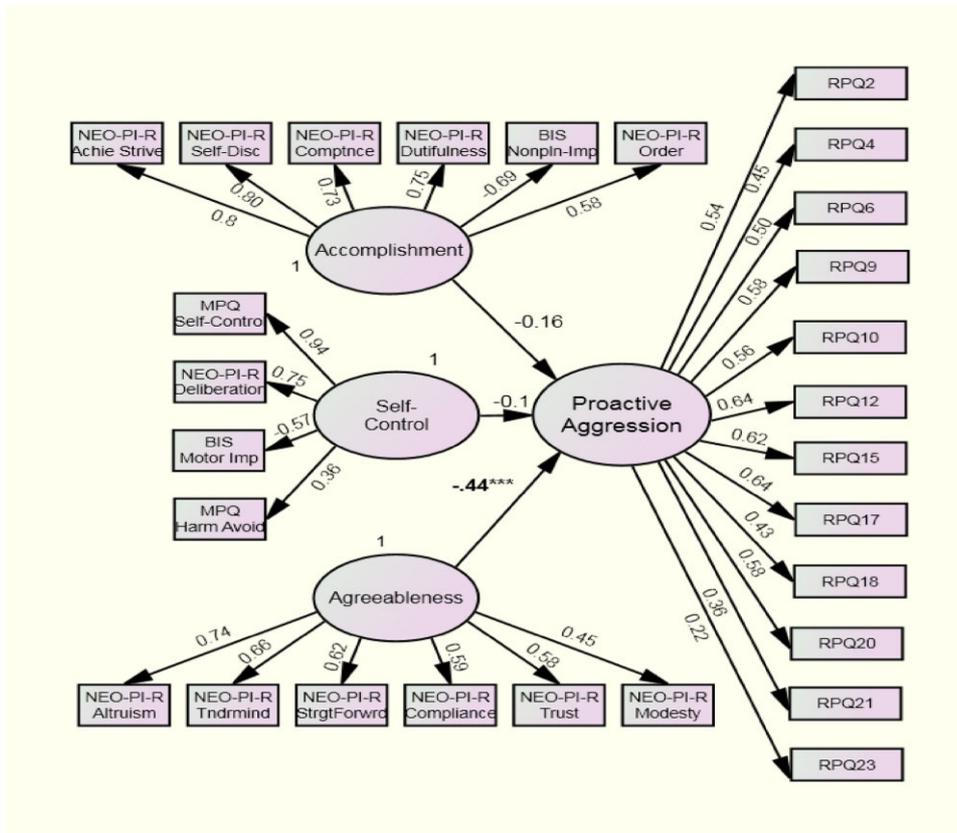


Figure 1. Components of DvC predicting proactive aggression controlling for sex. Note:  $\chi^2 = 2743.30$ ;  $\ln(L) = -32263.31$ ;  $k = 147$ ; RMSEA = .07; SRMR = .07; AIC = 64820.62. BIC = 65436.29. \*\*\* $p < .001$ . As described in text, loadings shown are from full SEM model. Latent variable indicators are all observed variables. Model controls for sex. MPQ = Multidimensional Personality Questionnaire. BIS = Barratt Impulsivity Scale. NEO-PI-R = NEO Personality Inventory-Revised. RPQ = Reactive-Proactive Aggression Questionnaire. Achieve Strive = Achievement Striving. Self-Disc = Self-Discipline. Comptnce = Competence. Nonpln-Imp = Non-planning Impulsiveness. Motor Imp = Motor Impulsivity. Harm Avoid = Harm Avoidance. Tndrmind = Tendermindedness. StrgtForwrd = Straightforwardness.

These results indicate that Agreeableness is associated with both reactive and proactive aggression, whereas Self-Control and Accomplishment are associated with alcohol use. As expected, all DvC scales were significantly interrelated, with the strongest association between Accomplishment and Self-Control.

**Predicting aggression and alcohol use from components of DvC**

To examine unique associations between components of DvC and aggression and alcohol use, the three latent DvC components were regressed on latent reactive aggression, proactive aggression and alcohol use in a single SEM model (see Figures 1–3). Loadings in each figure are from the full model; however, for clarity, as noted above, we present separate figures depicting associations between the DvC components and each of the three externalizing behaviours. As shown in Figure 1, Accomplishment, Self-Control and Agreeableness all contributed uniquely to the prediction of reactive aggression, with Agreeableness clearly evidencing the largest contribution. With regard to proactive aggression, only Agreeableness contributed when all DvC components were examined simultaneously (see Figure 2). As shown in Figure 3, only Self-Control contributed uniquely to the prediction of alcohol use.

To examine potential interactions among DvC components in the prediction of externalizing behaviours, three separate SEM models were run predicting each of the behaviours of interest. No DvC interactions contributed significantly to the prediction of either reactive or proactive aggression. In the prediction of alcohol consumption, however, all three DvC interaction terms emerged as significant. To examine the specific form of each interaction, the slope of the final equation was computed at points that corresponded to high and low levels of the predictor variables ( $\pm 1.0$  SD; see Aiken & West, 1991). Accomplishment ( $\beta = -.15$ ,  $t = -2.56$ ,  $p < .05$ ) and Agreeableness ( $\beta = .34$ ,  $t = 2.68$ ,  $p < .01$ ) moderated the association between Self-Control and alcohol consumption.

Specifically, as shown in Figure 4, for those low on Self-Control, Accomplishment was largely unrelated to alcohol consumption, but for those high on Self-Control, high Accomplishment was associated negatively with alcohol consumption. Additionally, although high Agreeableness was not associated with alcohol consumption overall, alcohol consumption was highest for those low in both Self-Control and Agreeableness (see Figure 5). Additionally, Accomplishment moderated the association between Agreeableness and alcohol consumption ( $\beta = -.15$ ,  $t = -2.56$ ,  $p < .05$ ). As shown in Figure 6, for those low on Agreeableness, high (vs. low) Accomplishment was positively (vs. negatively)

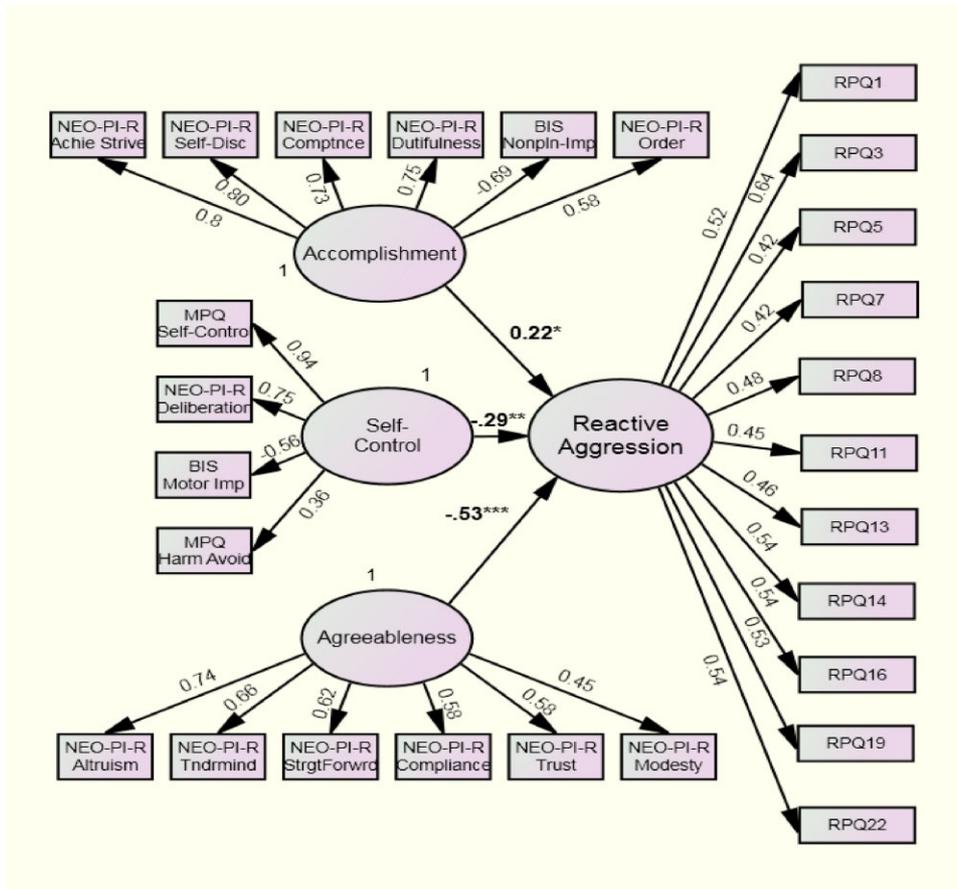


Figure 2. Components of DvC predicting reactive aggression controlling for sex. Note:  $X^2 = 2743.30$ ;  $\ln(L) = -32263.31$ ;  $k = 147$ ; RMSEA = .07; SRMR = .07; AIC = 64820.62. BIC = 65436.29.\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . As described in text, loadings shown are from full SEM model. Latent variable indicators are all observed variables. Model controls for sex. MPQ = Multidimensional Personality Questionnaire. BIS = Barratt Impulsivity Scale. NEO-PI-R = NEO Personality Inventory-Revised. RPQ = Reactive-Proactive Aggression Questionnaire. Achieve Strive = Achievement Striving. Self-Disc = Self-Discipline. Comptnce = Competence. Nonpln-Imp = Non-planning Impulsiveness. Motor Imp = Motor Impulsivity. Harm Avoid = Harm Avoidance. Tndrmdnd = Tendermindedness. StrgtForwrd = Straightforwardness.

associated with alcohol use, whereas for those high on Agreeableness, these associations were reversed.

**DISCUSSION**

The trait dimension of DvC has strong links with different forms of externalizing psychopathology (Sher & Trull, 1994; Krueger et al., 2005). However, it remains unclear whether different aspects of externalizing show common or specific patterns of associations with DvC components. In the present study, using structural equation modeling, we addressed this issue by examining the associations between two key aspects of externalizing, aggression and alcohol use, in relation to specific components of DvC—namely, Self-Control, Accomplishment and Agreeableness—identified in a recent study (see Vaidya et al., 2010). Furthermore, we used an aggression instrument designed to assess two facets of this construct.

The central question we sought to answer is whether externalizing indicators show a pattern of generality or specificity in their associations with DvC components. In the case of complete generality, the three externalizing indicators would demonstrate the same pattern of associ-

ations with DvC components; with complete specificity, each would show unique associations with the DvC dimensions. We found that the zero-order correlations, which did not control for the influence of the other DvC variables, were largely consistent with the generality perspective, whereas the SEM findings showed considerable evidence for some—though not complete—specificity: All three DvC components contributed to the prediction of reactive aggression, but Agreeableness evidenced the strongest association and was the only component associated with proactive aggression. Additionally, only Self-Control was associated significantly with alcohol consumption. The significance of these and related findings are discussed below.

**Associations between DvC and externalizing behaviours**

As noted, using SEM, we found clear evidence of specificity, once the common variance across DvC components was taken into consideration. Whereas Agreeableness had a strong loading of  $-.52$  with reactive aggression and  $-.44$  with proactive aggression, Self-Control and Accomplishment were associated only with reactive aggression; moreover, their associations were considerably weaker ( $-.29$  and

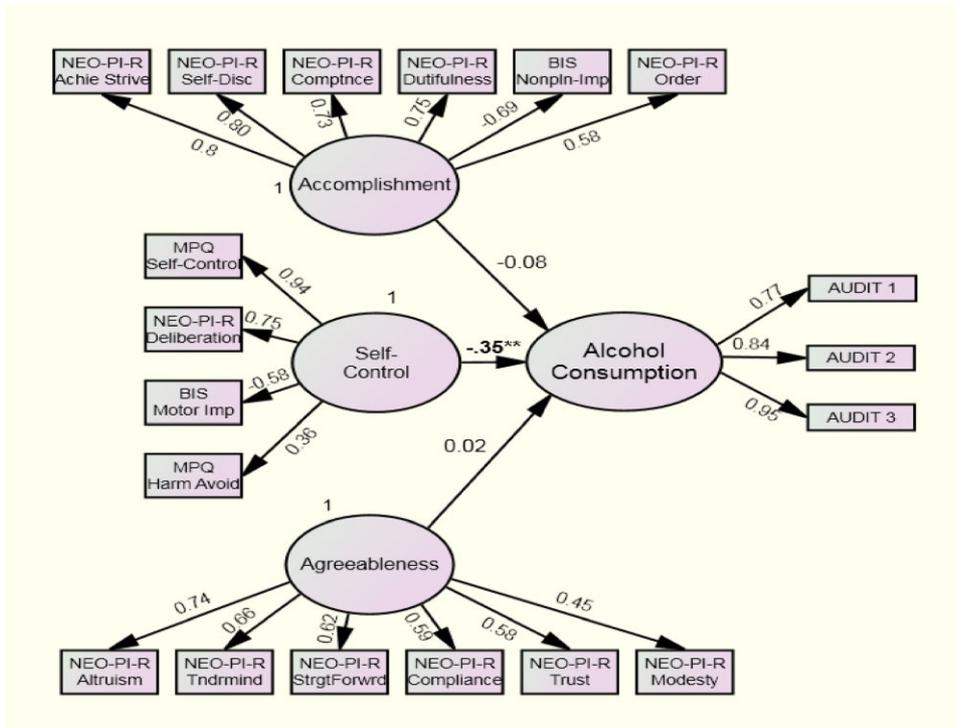


Figure 3. Components of DvC predicting alcohol consumption controlling for sex. Note:  $X^2 = 2743.30$ ;  $\ln(L) = -32263.31$ ;  $k = 147$ ; RMSEA = .07; SRMR = .07; AIC = 64820.62. BIC = 65436.29. \*\* $p < .001$ . As described in text, loadings and fit indices shown are from full SEM model. Latent variable indicators are all observed variables. Model controls for sex. MPQ = Multidimensional Personality Questionnaire. BIS = Barratt Impulsivity Scale. NEO-PI-R = NEO Personality Inventory-Revised. AUDIT = Alcohol Use Disorders Identification Test. Achieve Strive = Achievement Striving. Self-Disc = Self-Discipline. Comptnce = Competence. Nonpln-Imp = Non-planning Impulsiveness. Motor Imp = Motor Impulsivity. Harm Avoid = Harm Avoidance. Tndrmind = Tendermindedness. StrgtForwrd = Straightforwardness.

.23, respectively). The evidence for specificity was even more compelling for alcohol consumption, as only Self-Control was associated significantly with this variable. Thus, whereas there are indeed significant links between distinct forms of externalizing psychopathology (Krueger et al., 2005; Krueger et al., 2007), our results demonstrate that DvC components can help distinguish between them. Indeed, although reactive aggression was more strongly correlated with proactive aggression than with alcohol use, reactive aggression and alcohol use both were significantly associated with self-control but proactive aggression was not. These findings are largely in line with previous empirical and meta-

analytic work (Miller & Lynam, 2001; Miller et al., 2003; Miller et al., 2008), which has found significant associations between Agreeableness—and to a lesser extent Conscientiousness, specifically poor impulse control (Miller & Lynam, 2006; Miller et al., 2008)—and aggression. Additionally, our findings with regard to alcohol use are also consistent with hypotheses and extant literature (Hopwood et al., 2007; Martin & Sher, 1994; Ruiz et al., 2003; Sher et al., 2000) in that the primary DvC component associated with problematic alcohol use appears to be low Self-Control, with no contribution from the other two DvC components when examined simultaneously.

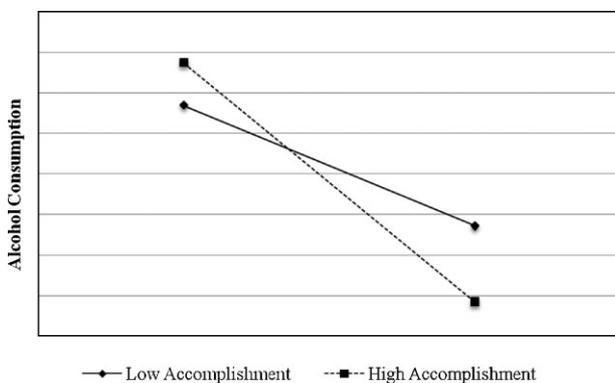


Figure 4. Interaction between Self-Control and Accomplishment: Associations with alcohol consumption. High and low values correspond to + 1.0 and -1.0 SD from the mean, respectively. Alcohol consumption scores are standardized,  $M = 0$ ,  $SD = 1$ . Error variances are not shown.

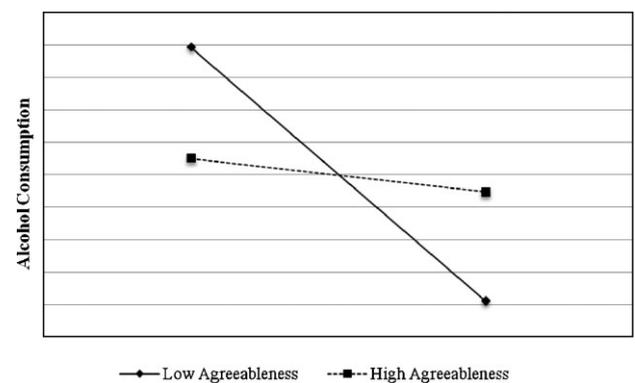


Figure 5. Interaction between Self-Control and Agreeableness: Associations with alcohol consumption. High and low values correspond to + 1.0 and -1.0 SD from the mean, respectively. Alcohol consumption scores are standardized,  $M = 0$ ,  $SD = 1$ . Error variances are not shown.

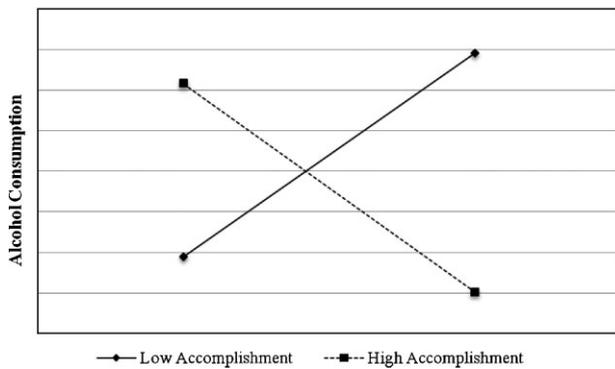


Figure 6. Interaction between Agreeableness and Accomplishment: Associations with alcohol consumption. High and low values correspond to +1.0 and -1.0 SD from the mean, respectively. Alcohol consumption scores are standardized,  $M = 0$ ,  $SD = 1$ . Error variances are not shown.

Thus, as a whole, our findings are more strongly in line with the specificity perspective, which posits specific associations between DvC components and externalizing behaviours. Given the level of specificity observed in the current study, these results underscore the importance of examining both general and specific components of DvC in association with disinhibitory psychopathology. In particular, future longitudinal investigations should examine these components prospectively in children and adolescents to investigate how changes in these components are associated with changes in externalizing behaviour patterns. Furthermore, we are aware of only one measure of DvC, the Disinhibition Inventory (DIS-I; Dindo, McDade-Montez, Sharma, Watson, & Clark, 2009), that potentially assesses all three components. Outside of using the DISI or the development of another comprehensive DvC measure, our findings point to the importance of including multiple inventories to assess DvC-related content fully.

Our findings may suggest a complex route to alcohol use and abuse even when focusing on personality variables alone. DvC components associated with Accomplishment and Agreeableness may lead to different goals and different ways of interacting with others that then mediate or moderate the impact of low self-control on drug abuse. Our results also suggest that prevention and treatment efforts will benefit from focusing on modifying self-control processes and accomplishment-related behaviours and social interactions.

The results of the present study also highlight the importance of distinguishing between structural issues (e.g. elucidating lower-order components of broad domains such as DvC) and examinations of potential mechanisms or pathways associated with externalizing behaviours (see also Whiteside & Lynam, 2001). In the current study, the main structural analyses suggested that Accomplishment had relatively weak associations with externalizing components. Yet, the Accomplishment dimension interacted with Self-Control in predicting alcohol use. Thus, it is not that Accomplishment is unrelated to alcohol use; rather, high Accomplishment appears to provide an additional buffer against alcohol use for individuals who are already high on Self-Control. It may be that, for individuals who are high on Self-Control, the hard-working, goal-oriented tendency that

is central to Accomplishment serves to steer individuals away from behaviours—such as excessive alcohol consumption—that might interfere with their goal pursuit. Furthermore, although Agreeableness was not associated directly with alcohol consumption, low Agreeableness was associated positively with alcohol consumption for those low in Self-Control, whereas low Agreeableness was associated negatively with alcohol consumption for those high on Self-Control. Finally, although neither Accomplishment nor Agreeableness was associated directly with alcohol consumption, their interaction also emerged as a significant predictor. It is important to note that only interactions between DvC components were examined in the current study. There may be other non-DvC variables that interact with DvC components to predict externalizing behaviours. It therefore will be important for future studies to examine interactions between DvC components and other personality traits (e.g. Neuroticism).

### Limitations and conclusion

Due to the cross-sectional, correlational nature of our data, causal conclusions are not possible, so it is important for future longitudinal work to examine prospectively the prediction of aggression and alcohol use from lower order components of DvC. Also, although sex was covaried in all of our multivariate analyses, the use of a predominantly female undergraduate sample may limit the generalizability of our findings to more diverse populations, including those that are less educated, more clinical and, potentially, more male. Nonetheless, it is noteworthy that our results are consistent with other studies using more representative samples. Additionally, although there was considerable variability on our dependent measures, it will be important for our findings to be replicated in future work utilizing more diverse samples, including clinical samples. Furthermore, as alcohol consumption under the age of 21 is illegal in the jurisdiction in which these data were collected, it is possible that alcohol consumption may have acted to some extent as an indicator of rule-breaking and risk-taking behaviours in our sample. However, it is important to note that the vast majority of our sample did report consuming alcohol, confirming the normative nature of this behaviour among our participants. This is consistent with the large extant literature on alcohol consumption among American university students (e.g. CASA, 2007).

We used an aggression instrument specifically designed to assess the heterogeneous nature of the aggression construct, but there may be other relevant aggression domains (e.g. relational aggression; see Tackett, Waldman, & Lahey, 2009) that we failed to assess that also may have differential relations with DvC components. It will be important, therefore, for future research to include a wider range of aggression measures. Furthermore, although the AUDIT-C has been shown to perform well as a brief measure of alcohol misuse (Bush *et al.*, 1998; Dawson *et al.*, 2005; Doyle *et al.*, 2007), it will be important for future work to include a more comprehensive assessment of substance use, including a wider range of substances. Indeed, although

Self-Control may be the most significant predictor of use/abuse of other drugs, it is possible that Agreeableness and Accomplishment may have stronger associations with other substances. For instance, Terracciano, Lockenhoff, Crum, Bienvenu, and Costa (2008) found that Agreeableness differentiated marijuana smokers—but not cigarette smokers or cocaine/heroin users—from abstainers. Furthermore, although the AUDIT-C provides an assessment of alcohol consumption, the version we used does not address problematic behaviours associated with alcohol use (e.g. unprotected sex, drinking and driving, physical altercations). These behaviours may have a different pattern of associations with DvC and other personality traits.

Additionally, our findings were based exclusively on self-report measures of DvC, aggression and alcohol use, which may inflate associations due to shared method variance. Furthermore, given that there are significant theoretical links between self-report assessments of DvC and neuropsychological measures of disinhibition (Nigg, 2000), future studies should examine how the latter relate to aggression and alcohol use variables. Along these same lines, the current study used retrospective self-report measures of aggression and alcohol use, rather than laboratory-based samples of aggressive behaviour (e.g. Seibert, Miller, Pryor, Reidy, & Zeichner, 2010) and prospective indices of alcohol use (e.g. Heeb & Gmel, 2005). It will be important for future work to examine a broader range of indicators of aggression and alcohol use.

Limitations notwithstanding, the results are consistent with our hypotheses as well as previous findings—both cross-sectional and longitudinal—in a variety of populations. Overall, our results indicate that DvC represents a general diathesis to the externalizing spectrum of behaviours, whereas second-order components present more specific risks for particular behaviours. Specifically, Agreeableness is unique to aggression, both reactive and proactive aggression, whereas Self-Control is related to alcohol consumption and reactive aggression. These findings suggest both generality and specificity with regard to associations between DvC and externalizing behaviours; consequently, focusing on lower order DvC components permits more precise assessments of specific externalizing behaviours. It will be important for future work to continue to examine both the specificity and generality of lower order components of DvC in relation to a broader range of externalizing behaviours in order to explicate differential DvC-related etiological mechanisms associated with various expressions of the externalizing domain.

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