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Age differences on measures of Disinhibition during young adulthood

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ABSTRACT

The trait of Disinhibition (versus Constraint; DvC) figures prominently in numerous personality frameworks and is linked to several psychiatric disorders. Recent findings indicate that this trait changes dramatically during young adulthood. In a cross-sectional analysis, the present study was conducted to explicate the nature of developmental shifts on general and specific components of DvC. Exploratory and confirmatory factor analyses of commonly used DvC measures revealed robust age differences between younger (18–19 years-old) and older (22–25 years-old) participants on three components of DvC: Accomplishment, Self-control, and Agreeableness. However, the Accomplishment dimension demonstrated particularly strong age differences. These results further highlight the important personality development evident during young adulthood and point to both broad and specific changes in DvC during this time period.

1. Introduction

Among the most notable changes in personality include mean-level declines in the higher order trait of Disinhibition (versus Constraint [DvC]; Roberts, Walton, & Viechtbauer, 2006). This trait broadly reflects individual differences in behaving in an undercontrolled versus overcontrolled manner (Clark & Watson, 2008). DvC is linked to poor decision making, low academic achievement, and substance abuse. Several psychiatric disorders including substance abuse disorders and antisocial personality disorder are associated with this trait (Sher & Trull, 1994). Changes in DvC related traits are associated with a reduction in alcohol consumption during young adulthood (Littlefield, Sher, & Wood, 2009).

Although genetic (McCrae et al., 1999) and environmental (Roberts & Wood, 2006) accounts have been suggested, there is still a limited understanding of what causes change on DvC; this is, in part, because earlier developmental studies have utilized a single DvC inventory, often without incorporating lower order components of this domain. A component-level analysis is essential to clarifying change on DvC and this will ultimately inform developmental theories of personality change. In a cross-sectional analysis, the present study was conducted to explicate age differences on general and specific components of DvC. In addition to examining age differences at the scale level, we also conducted structural analyses to characterize age differences on clearly defined latent variables. We focus on young adulthood (i.e., ages 18–25) because personality changes are especially robust during this time period (Roberts et al., 2006).

1.1. DvC and its components

DvC is broadly linked to individual differences in behaving in an undercontrolled versus overcontrolled manner. Individuals scoring high on DvC tend to act spontaneously without considering long term consequences of their behavior (Watson & Clark, 1993). Disinhibited individuals tend to be disorganized, careless, and have little concern for others. More constrained individuals, on the other hand, tend to have a more a planful, deliberative way of behaving; they also tend to be more disciplined and have a greater regard for others, possibly due to a stronger adherence to social norms (Clark & Watson, 2008).

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); as a consequence we conceptualize DvC as being largely independent of the other two higher dimensions of Extraversion/Positive Emotionality and Neuroticism/Negative Emotionality (see also Clark & Watson, 2008). This may differentiate DvC from the related construct of impulsivity, which has stronger links to specific aspects of Extraversion and Neuroticism (Whiteside & Lynam, 2001). Nevertheless, DvC is conceptually similar to the trait of impulsivity and measures of impulsivity and DvC are highly correlated with one another (Whiteside & Lynam, 2001). A number of different structural models have been

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proposed to characterize the lower order dimensions within this domain. Two particularly relevant models are discussed below.

1.2. Premeditation and Perseverance

Whiteside and Lynam (2001), focusing on facets of the Big Five traits, targeted four constructs relevant for disinhibited behavior: Urgency, lack of Premeditation, lack of Perseverance, and Sensation Seeking. Urgency and Sensation Seeking relate strongly to Neuroticism and Extraversion, respectively, while lack of Premeditation and lack of Perseverance have been noted by several other investigators as key components of DvC (Barratt, 1985; Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004; Saucier & Ostendorf, 1999; Tellegen & Waller, 2008). Premeditation refers to the tendency to carefully consider the consequences of one's actions, whereas Perseverance measures the ability to stay focused and complete a task even when it is difficult or boring (Whiteside & Lynam, 2001).

1.3. Agreeableness and Conscientiousness

Extensive evidence establishes that DvC represents a higher order factor that can be decomposed into the Big Five traits of Agreeableness and Conscientiousness (Clark & Watson, 2008; Eysenck, 1997; Markon et al., 2005; Watson et al., 1994). Individuals scoring high on Conscientiousness are organized, reliable, and disciplined. Thus, this trait is easily conceptualized as a component of DvC. A number of studies also link Agreeableness to DvC (Eysenck, 1997; Markon et al., 2005). Individuals who score high on Agreeableness value maintaining good relationships with others (see Graziano, Jensen-Campbell, & Hair, 1996). Given that this often requires putting others' needs in front of one's own, Agreeableness is also linked with deliberative, constrained behavior in interpersonal contexts (Graziano et al., 1996). Indeed, factor analytic studies place Agreeableness and Conscientiousness as correlated components of a broader DvC dimension (Markon et al., 2005).

These two models suggest that DvC can be meaningfully parsed into at least three distinguishable components: Premeditation, Perseverance, and Agreeableness. Further differentiation into an even smaller number of DvC dimensions may be possible (Roberts et al., 2004). Nevertheless, this tripartite scheme provides a useful and robust framework for interpreting developmental change on DvC. Below we review evidence for mean-level changes on these three components of DvC during young adulthood.

1.4. Young adulthood and change on DvC

It is becoming increasingly clear that young, or emerging adulthood, represents a distinct developmental period full of significant life changes (Arnett, 2000). To date, relatively few studies have examined change on specific components of DvC during young adulthood. Thus, while scores on DvC measures tend to decline during young adulthood (Blonigen, Carlson, Hicks, Krueger, & Iacono, 2008; Donnellan, Conger, & Burzette, 2007; McGue, Bacon, & Lykken, 1993; Neyer & Asendorpf, 2001; Roberts, Caspi, & Moffitt, 2001; Robins, Fraley, Roberts, & Trzesniewski, 2001; Vaidya, Gray, Haig, Mroczek, & Watson, 2008; Vaidya, Gray, Haig, & Watson, 2002), it is unclear if these age trends are evident on specific dimensions of DvC or if mean-level changes are present across all DvC components. Of the few studies that have utilized measures with DvC sub-scales, all have used the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008) which taps content related to Premeditation but not Perseverance. Most of these studies found declines in Premeditation during young adulthood (Blonigen et al., 2008; Donnellan et al., 2007; McGue et al., 1993; for weaker effects, see Roberts et al., 2001). There are considerably more data available on Agreeableness and Conscientiousness. Both Big Five scales tend to show increases during young adulthood (Neyer & Asendorpf, 2001; Robins et al., 2001; Vaidya et al., 2002, 2008). However, it is unclear how specific facets of Agreeableness change during this time period.

1.5. The present study

In the present study, we report cross-sectional data on 18–19 year-olds and 22–25 year-olds to characterize patterns of age differences specifically during young adulthood. Furthermore, in addition to age differences at the scale level, we utilized a combination of exploratory factor analysis (EFA) and multi-group confirmatory factor analysis (CFA) procedures to ensure that age group differences could not simply be attributed to differential measurement of these constructs in the two age groups. There were two specific goals for this study. First, while it is clear that DvC declines during young adulthood, it is less clear how specific components of this trait change. In particular, there is limited evidence on how scales related to Perseverance change during this time period. Because scores on Perseverance measures increase in later portions of the lifespan (McCrae et al., 1999), we predicted that Perseverance would also be higher for the older age group in our study. A second goal was to focus specifically on content related to Agreeableness in order to determine how Agreeableness sub-scales relate to other DvC variables and how the strength of the association predicts age differences on these measures. We hypothesized that facets of Agreeableness that have weaker associations with DvC, particularly Modesty and Tendermindedness, would show the weakest age differences.

2. Methods

2.1. Participants

Participants were 713 young adults (five of them failed to complete the Barratt Impulsiveness Scale). Six hundred and eight participants (433 females; five participants failed to provide gender ratings) were college students who were 18 or 19 years-old; 105 of the participants (82 females) were college graduates between 22 and 25 years-old and were all employed in full-time jobs. The older group was compensated $12 for their participation. The younger participants were all recruited from the University of Iowa research participation pool. They received credit in partial fulfillment of a research exposure requirement for an introductory psychology course. The older participants were either community dwelling individuals from the Iowa City and Cedar Rapids area or graduates of the University of Iowa living in various parts of the United States who responded to advertisements or postcard mailings.

2.2. Measures

2.2.1. MPQ Constraint

The three primary scales that make up the Constraint dimension of the Multidimensional Personality Questionnaire (MPQ; Tellegen & Waller, 2008) are Control (24 items reflecting a tendency to be cautious, reflective, and organized), Harm Avoidance (28 items reflecting a tendency to avoid risks, as well as a dislike of risky adventures and dangerous experiences), and Traditionalism (27 items reflecting a tendency to advocate high moral standards and strict child rearing, and an opposition to permissiveness) (see Tellegen & Waller, 2008). The items are rated using a true–false response format.

2.2.2. BIS-11

The Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995) consists of three sub-scales: 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.

2.2.3. GTS Disinhibition

The General Temperament Survey (GTS; Clark & Watson, 1990) Disinhibition scale contains two sub-scales, Carefree Orientation (13 items; e.g., "I don't pay much attention to where my money goes.") and Antisocial Behavior (9 items; e.g., "Lying comes easily to me"). The GTS has a true–false response format.

2.2.4. NEO

Data on the higher order Extraversion, Neuroticism, and Openness factors were collected using items from the NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). 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 et al., 1992). Each facet consists of 8 items and participants respond to each item using a 5-point response format.

3. Results

3.1. Age differences on DvC sub-scales

There was considerable variability in the size of the correlations among DvC sub-scales (see Table 1). Most measures showed significant age differences (see Table 2) with effect sizes for some scales (Competence and Dutifulness) approaching 1.0. The NEO Modesty facet and MPQ Traditionalism had the smallest effect sizes. A 2 (age group) × 2 (gender) ANOVA for the DvC sub-scales was conducted to examine gender effects on age differences. There were significant interaction effects for GTS Carefree Orientation [$F(1, 699) = 3.94$, $p = .05$], GTS Antisocial Behavior [$F(1, 699) = 10.72$, $p < .01$], and NEO Straightforwardness [$F(1, 699) = 5.42$, $p = .02$]. Follow-up analyses revealed that both genders showed significant age differences but the effect was more pronounced for males.

3.2. Structural analyses

Structural analyses were conducted in two phases. The goal of the first phase was to characterize the factor structure of the measures using exploratory approaches. The goal of the second phase was to characterize patterns of age-related invariance of means, verifying and extending the earlier results using confirmatory approaches.

3.2.1. Structural models

Exploratory factor models were fit to the combined data using maximum likelihood estimation. Models comprising between 1 and 8 factors were fit, with loading matrices rotated using varimax (promax rotations yielded virtually identical solutions). Eigenvalue Monte Carlo p values (i.e., parallel analysis; Horn, 1965) were derived in order to determine the optimal number of factors. These analyses suggested a three-factor solution best fit the data (Monte Carlo p values and observed eigenvalues are available from the first author). Factor loadings for the best-fitting exploratory model for the entire sample are shown in Table 3. The first factor is reflected in the NEO Conscientiousness facets of Achievement Striving, Self-Discipline, Competence, Dutifulness, Non-planning Impulsiveness (negatively keyed), and Order. GTS Carefree Orientation also loaded on this factor but evidenced prominent cross-loadings on the second factor. We termed this factor Accomplishment. The second factor was reflected in MPQ Control, NEO Deliberation, and BIS Motor Impulsiveness (negatively keyed). MPQ Harm Avoidance also solely loaded on this factor. GTS Antisocial Behavior had a negative loading on this factor but evidenced a prominent cross loading on the third factor. This factor was labeled Self-control. The

Table 1
Intercorrelations between scales.

DvC Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Atten. Imp.	(.72)																			
2. Motor Imp.	.42	(.64)																		
3. Non-plan.	.46	.46	(.70)																	
4. Carefree Or.	.43	.52	.66	(.80)																
5. Ant. Behav.	.38	.37	.34	.51	(.73)															
6. Control	−.43	−.57	−.63	−.81	−.51	(.91)														
7. Harm Av.	−.27	−.27	−.18	−.30	−.40	.35	(.85)													
8. Tradit.	−.18	−.25	−.26	−.38	−.42	.44	.33	(.76)												
9. Trust	−.29	−.01	−.16	−.12	−.32	.13	.15	.18	(.79)											
10. Straightfor.	−.22	−.27	−.20	−.30	−.54	.27	.28	.37	.39	(.69)										
11. Altruism	−.17	−.12	−.22	−.22	−.31	.21	.17	.32	.45	.46	(.76)									
12. Compl.	−.20	−.20	−.16	−.19	−.41	.23	.24	.26	.40	.42	.37	(.69)								
13. Modesty	.03	−.11	.01	−.07	−.26	.06	.10	.12	.16	.36	.32	.28	(.73)							
14. Tender.	−.10	−.07	−.11	−.12	−.26	.10	.16	.23	.38	.37	.55	.36	.38	(.59)						
15. Compet.	−.47	−.39	−.62	−.57	−.35	.57	.23	.26	.30	.23	.35	.16	.00	.19	(.67)					
16. Order	−.32	−.28	−.43	−.51	−.28	.54	.23	.29	.05	.18	.20	.15	.01	.07	.42	(.73)				
17. Dutifulness	−.32	−.35	−.50	−.57	−.42	.53	.20	.37	.25	.40	.48	.22	.17	.25	.56	.47	(.70)			
18. Ach. Strv.	−.36	−.30	−.51	−.61	−.33	.51	.18	.35	.19	.26	.34	.11	−.06	.12	.56	.49	.62	(.76)		
19. Self-Disc.	−.46	−.32	−.54	−.62	−.41	.55	.24	.29	.26	.30	.37	.19	−.01	.19	.60	.53	.61	.70	(.85)	
20. Delib.	−.38	−.60	−.61	−.67	−.45	.77	.25	.34	.11	.29	.25	.30	.09	.10	.50	.43	.52	.48	.48	(.80)
Med. Corr.	.32	.30	.43	.51	.38	.51	.24	.29	.19	.30	.32	.23	.10	.19	.39	.29	.42	.35	.41	.43

Note: $N = 708$.
Median correlation represents median of correlation coefficient values for a given scale with all the other scales after taking the absolute value of the correlation coefficient. Cronbach's alpha provided in parentheses.
Atten. Imp. = Attentional Impulsiveness; Motor Imp. = Motor Impulsiveness; Non-plan. = Non-planning Impulsiveness; Carefree Or. = Carefree Orientation; Ant. Behav. = Antisocial Behavior; Harm Av. = Harm Avoidance; Tradit. = Traditionalism; Straightfor. = Straightforwardness; Compl. = Compliance; Tender. = Tendermindedness; Compet. = Competence; Ach. Strv. = Achievement Striving; Self-Disc. = Self-Discipline; Delib. = Deliberation.

Table 2
Age differences on DvC scales.

DvC Scale	Means 18–19 year-olds[a]	Means 22–25 year-olds[b]	*t*-Value	*d*
Barratt Impulsivity Scales				
Attentional Impulsivity	17.20 (3.77)	15.27 (3.82)	4.75**	-0.51
Motor Impulsivity	22.50 (4.02)	20.82 (4.24)	3.85**	-0.41
Non-planning Impulsivity	25.69 (4.62)	21.86 (4.47)	7.73**	-0.83
GTS Disinhibition Scales				
Carefree Orientation	18.70 (3.29)	15.93 (2.46)	8.25**	-0.87
Antisocial Behavior	11.83 (2.25)	10.66 (1.60)	5.12**	-0.54
MPQ Constraint Scales				
Control	38.66 (6.37)	42.63 (5.26)	6.04**	0.64
Harm Avoidance	44.38 (5.68)	47.24 (5.31)	4.81**	0.51
Traditionalism	43.73 (4.39)	44.50 (5.04)	1.64	0.17
NEO Agreeableness Scales				
Trust	27.85 (4.74)	29.87 (4.76)	4.03**	0.43
Straightforwardness	26.87 (4.51)	29.59 (4.44)	5.72**	0.61
Altruism	31.56 (4.15)	33.27 (3.25)	4.01**	0.43
Compliance	25.54 (4.69)	26.90 (4.51)	2.74*	0.29
Modesty	27.29 (4.60)	27.49 (4.56)	0.40	0.04
Tender-Mindedness	27.91 (3.66)	28.94 (3.94)	2.64*	0.28
NEO Conscientiousness Scales				
Competence	28.35 (4.10)	32.18 (3.62)	8.88**	0.95
Order	25.41 (4.58)	28.59 (5.37)	6.39**	0.68
Dutifulness	28.09 (4.41)	31.84 (3.78)	8.19**	0.87
Achievement Striving	26.61 (4.68)	28.57 (4.24)	4.02**	0.43
Self-discipline	26.53 (5.58)	30.27 (4.81)	6.46**	0.69
Deliberation	24.80 (5.13)	26.94 (4.34)	4.04**	0.43

Standard deviations are provided in parentheses below the mean.
[a] $n = 608$ (except for Attentional Impulsivity, Motor Impulsivity, and Non-planning Impulsivity, $n = 100$).
[b] $n = 105$ (except for Attentional Impulsivity, Motor Impulsivity, and Non-planning Impulsivity, $n = 100$).
* $p < .01$.
** $p < .001$.

Table 3
Varimax rotated exploratory factor model for combined sample.

	1	2	3	h^2
NEO-PI-R Achievement Striving	.79	.16	.11	.62
NEO-PI-R Self-Discipline	.78	.20	.19	.64
NEO-PI-R Competence	.69	.26	.16	.56
NEO-PI-R Dutifulness	.66	.23	.34	.58
BIS-11 Non-planning Impulsiveness	−.64	−.42	−.02	.58
GTS Carefree Orientation	−.61	−.61	−.07	.74
NEO-PI-R Order	.53	.31	−.04	.41
BIS-11 Attentional Impulsiveness	−.42	−.34	−.12	.40
MPQ Control	.53	.74	.05	.80
NEO-PI-R Deliberation	.46	.66	.10	.68
BIS-11 Motor Impulsiveness	−.27	−.61	−.07	.46
GTS Antisocial Behavior	−.22	−.53	−.46	.52
MPQ Harm Avoidance	.12	.38	.25	.24
MPQ Traditionalism	.24	.34	.33	.35
NEO-PI-R Altruism	.35	−.05	.70	.52
NEO-PI-R Tendermindedness	.10	−.02	.65	.39
NEO-PI-R Straightforwardness	.13	.29	.64	.47
NEO-PI-R Trustworthiness	.20	−.01	.56	.38
NEO-PI-R Compliance	.03	.27	.56	.36
NEO-PI-R Modesty	−.14	.14	.49	.29

Note: $N = 708$; h^2 = communality.

third factor was defined by all six NEO Agreeableness facets: Altruism, Tendermindedness, Straightforwardness, Trustworthiness, Compliance, and Modesty. This factor was thus labeled Agreeableness.

3.2.2. Invariance models

We utilized multi-group CFA for modeling invariance of means between age groups using Mplus (Muthén & Muthén, 2004). For each factor, scales having prominent loadings in the EFA, without substantial cross-loadings, were used to identify the model; Factor 1 (Accomplishment) – Achievement Striving, Self-Discipline, Competence, Dutifulness, Non-planning Impulsiveness, and Order; Factor 2 (Self-control) – Control, Deliberation, Motor Impulsiveness, and Harm Avoidance; Factor 3 (Agreeableness) – Altruism, Tendermindedness, Straightforwardness, Trustworthiness, Compliance, and Modesty. Accomplishment was strongly correlated with Self-control ($r = .79$) and moderately correlated with Agreeableness ($r = .47$); the association between Self-control and Agreeableness was somewhat weaker ($r = .33$).

We then compared the fit of the following models to determine whether there were significant age differences on DvC. The first model assumed age-related mean invariance; both latent means and observed variable intercepts were constrained between groups, indicating invariance at both the manifest and latent levels. In the second model, latent means were constrained between groups and observed variable intercepts were allowed to vary, indicating that the age-related mean variance occurred at the manifest but not latent variable level. In the third model, observed variable intercepts were constrained while latent means were allowed to vary, indicating that the age-related mean variance occurred at the level of the latent factors and was not due to differential measurement for the younger and older groups. All other parameters were allowed to vary for all three models. As indicated by the model fit statistics (see Table 4), the third model was optimal. At the latent factor level, our two age groups, although only separated by approximately 5.5 years on average, showed an effect size of 1.17 for the Accomplishment dimension. Self-control and Agreeableness had moderate effect sizes of .65 and .68, respectively.

3.3. Correlations with other personality variables

Accomplishment had small to moderate correlations with Neuroticism ($r = -.34$, $p < .01$), Extraversion ($r = .20$, $p < .01$), and Openness ($r = -.04$, $p > .05$), respectively. Self-control had weak correlations with Neuroticism ($r = -.22$, $p < .01$), Extraversion ($r = -.12$, $p < .01$), and Openness ($r = -.08$, $p < .05$), respectively. Agreeableness was also weakly correlated with Neuroticism ($r = .02$, $p > .05$) and Openness ($r = .08$, $p > .05$) but had a strong association with Extraversion ($r = .51$, $p < .01$). However, mean-level comparisons revealed that only Neuroticism showed significant age differences. The younger age group had higher Neuroticism ratings (M = 35.62, SD = 7.69) compared to the older group (M = 33.45, SD = 7.68; $t(706) = 2.67$), $p = .008$; $d = .28$). The younger group (M = 43.67, SD = 6.46; M = 38.40; SD = 6.70) did not significantly differ from the older group (M = 43.39; SD = 6.34; M = 39.40, SD = 7.21) on Extraversion ($d = .04$) or Openness

Table 4
Fit indices for measurement models.

Model	χ^2	ln(L)	k	RMSR	RMSEA	BIC	DIC
Latent means and observed intercepts equal	925.79	−31339.02	86	0.094	0.096	63242.41	63084.96
Latent means equal, observed variable intercepts differ	850.25	−31301.25	101	0.073	0.095	63265.31	63079.68
Latent means differ, observed variable intercepts equal	878.39	−31315.32	89	0.074	0.093	63214.70	63051.12

Note: N = 708. ln(L) denotes log-likelihood; k, the number of parameters; RMSR, root mean square residual; RMSEA, root mean square error of approximation; BIC, Bayesian information criterion; DIC, Draper's information criterion.

(d = −.14), respectively. Thus, age differences on Agreeableness cannot be attributed to the overlapping variance with Extraversion, given that Extraversion did not show a significant age effect.

4. Discussion

Based on earlier findings demonstrating significant mean-level changes on DvC during young adulthood, the present study was conducted to characterize age differences on general and specific components of DvC during this developmental period. Individual scale level analyses revealed substantial variability in the size of the age differences. Effect sizes for some scales approached 1.0 (e.g., Competence); other scales failed to show significant age differences at all (e.g., MPQ Traditionalism and NEO Modesty). At the latent factor level, the Accomplishment factor demonstrated the largest age difference. Nevertheless, Self-control and Agreeableness had medium effect sizes themselves, indicating both broad developmental shifts as well as differentiation between individual DvC components in the strength of the age effects. It is possible that the particularly strong effect size for Accomplishment was a consequence of the sample—with the subjects being either college students or college graduates—included in our study.

4.1. Implications for understanding personality change and psychopathology

Age differences for Accomplishment were almost twice the size as those for the other components. In fact, different patterns of age differences on components of DvC are evident across the life course (Jackson et al., 2009). These results highlight the fact that future studies must not only explain broad DvC changes, but also the highly robust changes on Accomplishment. Previous studies have linked positive work related experiences with increases on achievement related variables but none have focused on these three components of DvC per se. We tentatively propose a model of development that links biological developmental processes—including maturation of the prefrontal cortex—to broad normative changes in DvC, whereas specific changes on Accomplishment may be linked to significant work experiences.

Furthermore, given that DvC is associated with the occurrence and persistence of psychiatric disorders and that dimensional models of psychopathology emphasize the continuity of DvC traits—ranging from normal range personality to diagnosable disorder (Watson et al., 1994)—characterizing developmental shifts in DvC has important implications for developmental psychopathology. The present findings, as well as previously reported mean-level and rank-order stability data (Vaidya et al., 2008), indicate that personality traits continue to change dramatically through young adulthood.

4.2. Implications for DvC factor structure

Although the structural analyses were primarily conducted to provide a rubric for understanding age differences on DvC, the findings also have implications for the structure of DvC. The present results clearly indicate the existence of three distinct domains: Accomplishment, Self-control, and Agreeableness. Thus, these data are consistent with an emerging consensus that DvC can be meaningfully divided into distinct components (Roberts et al., 2004; Whiteside & Lynam, 2001). Indeed, our findings are largely consistent with Whiteside and Lynam's (2001) structural analyses. NEO Conscientiousness facets load on a common factor (which we term Accomplishment)—except for Deliberation, which loads with other Self-control related scales in both studies. The BIS-11 scales also had a similar pattern of loadings in both studies.

The present findings partially support the inclusion of Agreeableness as a component of DvC (e.g., Clark & Watson, 2008; Markon et al., 2005). Agreeableness had moderately strong correlations with Accomplishment and Self-control and demonstrated significant age differences. However, Agreeableness was actually more strongly associated with Extraversion than with the other DvC variables. Also, the NEO PI-R Modesty facet had particularly weak associations with the other DvC sub-scales and failed to show significant age differences. Thus, on the whole, Agreeableness does appear to be linked to DvC and changes on Agreeableness may be linked to broader inhibitive changes. However, this may not be true of all Agreeableness content.

4.3. Limitations

The study utilized a cross-sectional design, which, strictly speaking, precludes a developmental interpretation of the data. Thus, it is possible that differences between the two groups other than age could account for the differences on DvC. In this regard, it is noteworthy that all participants in the older sample were college graduates, making the age difference comparison less confounded by educational attainment differences. Also, the basic pattern of results largely mirrors earlier longitudinal findings. However, the use of a relatively well-educated sample is itself a limitation of the study because the results may not generalize to other, more representative, samples. To the degree that changes in DvC are related to the timing of major life experiences, changes in DvC may have a very different trajectory in less educated samples. Additionally, the DvC components that demonstrate the most significant age-related effects may be different in less educated samples. Another limitation is that a majority of participants were female. In this regard, it is noteworthy that our results are largely consistent with other studies using more representative samples and there appears to be limited evidence for gender moderating the association between age and DvC (Roberts et al., 2006). Finally, the sample sizes of the two age groups were uneven, suggesting that our estimate of the population mean in the smaller, older sample was relatively imprecise. Nevertheless, the size of the sample was large enough to detect small to medium size age effects.

5. Conclusions

Although identity exploration has been discussed as a central feature of young adulthood (Arnett, 2000), normative declines in DvC appear to be a hallmark of this time period. The present find-

ings point to broad developmental shifts in DvC traits as well as domain specific changes. Future longitudinal studies should focus on the biological and life experiential factors that give rise to—and are a consequence of—these changes. We hope that the results provided here provide a clearer, more comprehensive framework for studying these developmental changes.

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