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A Behavioral Genetic Analysis of the Cooccurrence Between Psychopathic Personality Traits and Criminal Behavior

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Abstract

A developed line of research has found that psychopathic personality traits and criminal behavior are correlated with one another. Although there is little question about the association between psychopathic personality traits and criminal behavior, what remains less clear is whether psychopathic traits exert a direct effect on criminal behavior. An alternative possibility is that previously unmeasured genetic and shared environmental factors account for much of the association between the two. Understanding the extent to which genetic and environmental factors influence the covariance between psychopathic personality traits and criminal behavior can further our understanding of individual differences in propensity to engage in antisocial behavior. The current study analyzes 872 twins (MZ twins = 352, DZ twins = 520) from the National Longitudinal Study of Adolescent to Adult Health (Add Health) to examine the magnitude of genetic and environmental effects on the covariation between psychopathic personality and criminal behavior. Results from bivariate behavioral genetic analyses revealed that the correlation between psychopathic personality traits and criminal behavior was accounted for by common additive genetic (58%) and nonshared environmental (42%) influences. Fixed-effect linear regression models, however, suggested that psychopathic personality traits were not significantly associated with criminal behavior once common genetic and environmental influences were taken into account.

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Introduction

After a century of criminological research, several factors continue to emerge as correlates of criminal behavior. For example, low levels of self-control, low levels of intelligence, substance use, being male, and being an adolescent are all characteristics that have been shown to increase risk of criminal behavior (Beaver & Wright, 2011; Gordon, Kinlock, & Battjes, 2004; Lagrange & Silverman, 1999; Sweeten, Piquero, & Steinberg, 2013). Among these traits, consistently correlated with criminal behavior is also psychopathy. Compared to the general population, individuals incarcerated for serious offenses demonstrate higher levels of psychopathy and are at higher risk of recidivism than individuals with relatively lower levels of psychopathy (Harris, Rice, & Cormier, 1991). Furthermore, psychopathy has been shown to increase aggressive behavior, reactive anger, substance use, and violent outbursts, all of which are positively associated with criminal behavior (Coccaro, Lee, & McCloskey, 2014).

The term psychopath is often (and generally, incorrectly) associated with the intellectual prowess and charming dispositions embodied in well known fictitious characters, specifically Hannibal Lecter from the Silence of the Lamb series (see DeLisi, Vaughn, Beaver, & Wright, 2010). In the early seminal writing about psychopathic traits, moreover, Cleckley (1976), described the disposition of psychopaths as being a kind of "Mask of Sanity," by which he meant that psychopaths were individuals who "masked" their antisocial propensities from their peers by erecting a facade of prosociality (for additional detail, see Verona, Patrick, & Joiner, 2001). Indeed, early research on the topic suggested that psychopaths generally led successful lives, all the while hiding the secret of their darker natures through practiced socialization and learned behavior (Cleckley, 1976). Recent studies, however, have elucidated a more empirically grounded and rigorous perspective of psychopaths.

As others have mentioned, there are three components generally discussed and associated with psychopathy and psychopathic personality styles: low levels of empathy, increased impulsive behaviors, and self-destructive lifestyles (Loney, Frick, Clements, Ellis, & Kerlin, 2003). These same traits, moreover, are also correlated with criminal behavior (Loney et al., 2003). Although many scholars view psychopathy as an antecedent to criminal behavior (Leistico, Salekin, DeCoster, & Rogers, 2008), others argue that antisocial and criminal behavior are inherent components of psychopathy making psychopathy and criminal behavior complicated to tease apart (Hare & Neumann, 2005). Nonetheless, many criminological scholars view psychopathy as a necessary area of study when discussing the causes and correlates of crime. For example, DeLisi (2009) argues that psychopathy is so integral to our understanding of the etiology of criminal behavior that it could be viewed as a unified theory in the field. He explains that as a composite construct, psychopathy is made up of several different dimensional and categorical conceptualizations of antisocial behavior and suggests

that these traits culminate to create criminogenic factors, which can change throughout the life course (DeLisi, 2009).

For psychopathy in particular, and all crime correlates in general, there are two main explanations for the covariation between psychopathy and criminal behavior. First, exhibiting increased psychopathy directly affects one's tendency to commit crime. Second, there is a shared etiological pathway that increases the chances of both greater levels of psychopathy and increased criminal behavior. Indeed, both traits have been shown to be partly heritable, thus, the correlation between the two traits might exist in part, due to shared genetic influences. Ultimately, understanding the genetic and environmental contributions to this association is important because failure to account for genetic confounds makes it difficult to tease apart possible causes from correlates with crime (Barnes, Boutwell, Beaver, Gibson, & Wright, 2014). Below, we examine both of these possibilities.

Psychopathic Personalities and Criminal Behavior: Possible Causal Pathways

Psychopathy is considered an interpersonal cluster of traits generally denoted as broadly encompassing characteristics of callous unemotionality, high egocentricity, and self-detrimental behaviors (Hare, 2003). Within these broad categories, psychopathy can be delineated into more specific behaviors such as low excitability, a lack of empathy, low levels of remorse, a lack of responsibility for one's own actions, high impulsivity, low levels of guilt for hurting or wronging others, and an inability to plan for the future (Hare, 1996). Individuals who exhibit psychopathic tendencies are also more likely to respond to social stimuli with impulsive behavior and/or levels of violence and aggression (Verona et al., 2001). Traits inherent to psychopathy such as increased impulsivity and aggression in response to social stimuli are characteristics that have been well studied and which increase the odds of engaging in criminal behavior throughout the life course (Beaver, Boutwell, Barnes, Vaughn, & DeLisi, 2017; Porter, ten Brinke, & Wilson, 2009; Pratt & Cullen, 2000).

Using a large national sample of Americans (approximately 14,000 respondents from the same data set analyzed herein), Beaver and colleagues (2017) revealed a significant effect of psychopathic personality styles on various indicators of criminal justice processing (i.e., arrests), as well as self-reported crime measures (with beta coefficients hovering around .15 for criminal behavior). Moreover, a meta-analysis including 95 peer-reviewed studies seemed to clearly reveal a relationship between psychopathy and increased antisocial behavior such as violent offenses, nonviolent offenses, and other adverse outcomes (Leistico et al., 2008). Thus, prior research on the association between psychopathy and criminal behavior suggests that individuals that exhibit increased levels of psychopathic behaviors also exhibit increased propensities for aggression, delinquent behavior, and criminal offending (Marsee, Silverthorn, & Frick, 2005; Woodworth & Porter, 2002). The above literature supports the first aspect of

reasoning presented earlier, suggesting that psychopathy increases the risk of individuals to engage in criminal behavior directly.

Psychopathic Personalities and Criminal Behavior: Shared Etiological Pathway?

To help better understand the etiology of both psychopathy and criminal behavior, a developing body of research has examined the extent to which variation in psychopathy and criminal behavior is attributable to genetic differences. A burgeoning line of research has consistently revealed that variation in psychopathy is moderately heritable (Beaver, Vaughn, & DeLisi, 2013; Larsson, Andershed, & Lichtenstein, 2006; Taylor, Loney, Bobadilla, Iacono, & McGue, 2003). Overwhelmingly, as in most other cases of behavior traits, additive genetic effects and nonshared environmental effects generally capture all of the variation in measures of psychopathy (Beaver, Barnes, May, & Schwartz, 2011).

In particular, genetic effects account for between 43% and 56% of the variance in the three major components of psychopathy: callous/unemotionality, impulsive/irresponsible behaviors, and grandiose/manipulative behavior with the nonshared environment accounting for the remaining variance (Beaver, Barnes, May, & Schwartz, 2011; Boccio & Beaver, 2018; Larsson et al., 2006). Furthermore, outside of the major subcomponents, variation across other traits commonly associated with psychopathy, such fearlessness[1] and impulsivity[2] have also been found to be explained by genetic and nonshared environmental factors (Brook et al., 2010). Various indicators of crime, aggression, and violence, likewise, all demonstrate some heritable component (Beaver, 2008; Caspi et al., 2002; Polderman et al., 2015; Raine, 2008; Rhee & Waldman, 2002; Sadeh, Javdani, & Verona, 2013; Turkheimer, 2000; Widom, 1989; Yildirim & Derksen, 2013).

Most importantly, the literature discussed above highlights the need to consider both heritability and nonshared environmental factors when examining the covariation of psychopathy and criminal behavior. Indeed, Moffitt (2005) very clearly noted that "studies that cannot disentangle genetic and environmental influences cannot help" (p. 533). On this topic in particular, Boccio and Beaver (2018), recently analyzed a sample of monozygotic (MZ) twins from the same data set used in the current study to examine the relationship between various individual-level traits and criminogenic outcomes. The design of the study is important because it is *one* of the approaches capable of controlling for genetic and shared environmental confounds that tend to cluster within families. The results, interestingly, showed a small, but significant effect of psychopathic personality on violent crime, but not for any other measures of criminal behavior (such as arrest).

The Current Study

Similar to Boccio and Beaver (2018), the current study utilizes a behavioral genetic approach to extend contemporary research on the association between psychopathic personality traits and criminal behavior. The study uses a sample of adult twins from the National Longitudinal Study of Adolescent to Adult Health (Add Health).

Biometric modeling techniques are employed to evaluate the shared etiological hypothesis by examining the extent to which common and unique genetic and environmental influences explain the covariance between psychopathic personality traits and criminal behavior. After evaluating the shared etiological hypothesis, the causal hypothesis is tested by a series of fixed-effect linear regression models capable of assessing the direct effect of psychopathic personality traits on criminal behavior after controlling for genetic and shared environmental confounds.

Method

Sample

In order to assess the covariation of psychopathic traits with criminal behavior, the current study utilizes the subsample of MZ and dizygotic (DZ) twins from the Add Health (Harris, 2009). The Add Health is a very well known dataset among social scientists, and represents a nationally representative sample of American youths. Data were initially collected in 132 schools starting in 1994 when many respondents ranged from middle school to high school age ($N > 90{,}000$). To date, four waves of data from the same respondents have been collected using both computer facilitated surveys and interviews covering broad areas of students' lives. For example, respondents were asked about their behavior, relationships with others in their lives, and their experiences across a variety of domains. Subsamples of students were selected for more in-depth interviews, which were conducted in respondents' homes where both the respondents and their guardians were interviewed. If a respondent self-identified as a twin then their co-twin was also interviewed.

During Wave I in-home interviews respondents were asked about a variety of personal and sensitive information. In particular, subjects responded to questions about their substance abuse, sexual life events, antisocial behaviors, and delinquent involvement ($n = 20{,}745$). Wave II of the Add Health data were collected approximately 1 year after the initial data collection (1996) and consisted of reinterviewed respondents ($n = 14{,}738$). Furthermore, Wave III was conducted 5 years later from the years 2001 to 2002 when some of the respondents started graduating from high school and entering young adulthood ($n = 15{,}197$). Finally, Wave IV was conducted from the years of 2008 to 2009 when respondents were adults. The questionnaires issued to respondents changed somewhat from each wave to better suit the participant's stage of life. For the current study, only Wave IV data were used, as that is the wave of data that included the measure used for psychopathic personality styles. After excluding twins with missing data on key measures, the final analytic sample included 872 twins (MZ twins = 352, DZ twins = 520).

Measures

Psychopathic personality traits. Psychopathic personality traits were measured using 23 items derived from the five factor model (FFM) available in the Add Health data at Wave IV (see Beaver, Barnes, May, & Schwartz, 2011; Beaver et al., 2013;

Beaver, Vaughn, DeLisi, Barnes, & Boutwell, 2012; Boccio & Beaver, 2018; Wu & Barnes, 2013). To construct the scale, respondents answered several questions concerning behaviors generally associated with three broad components of psychopathy: callous-unemotionality, egocentricity, and detrimental lifestyle behaviors. Specifically, respondents answered questions such as "I live my life without much thought for the future," "I sympathize with others' feelings," and "I am not really interested in others." Each response was coded as 1 = *strongly agree*, 2 = *agree*, 3 = *neither agree nor disagree*, 4 = *disagree*, or 5 = *strongly disagree*, with some items reverse coded for consistency. Responses were summed together to create a scale of psychopathic personality traits where higher scores reflect higher levels of psychopathic personality traits (Cronbach's $\alpha = .80$).

Criminal behavior. Criminal behavior was also measured at Wave IV using a 14-item scale reflecting respondents' involvement with criminal offending in the past 12 months (see also Beaver et al., 2017). Specifically, respondents were asked about the frequency of various antisocial behaviors they had engaged in ranging from violent (e.g., "get into a serious physical fight," "shot or stabbed someone") to nonviolent forms of offending (e.g., "steal something worth more than $50," "sell marijuana or other drugs"). Responses were coded as 1 = *1 or 2 times*, 2 = *3 or 4 times*, and 3 = *5 or more times*. Responses were summed together to create a variety scale of offending where higher scores reflect higher levels of criminal behavior (Cronbach's $\alpha = .67$). As is common with measures of criminal behavior in nonincarcerated populations, the distribution of the scale was over dispersed thus making it inappropriate to use maximum likelihood estimation techniques to generate reliable estimates. To address this issue, confirmatory factor analysis (CFA) was conducted in M*plus* Version 8 (Muthén & Muthén, 1998-2012) and resulting factor scores were retained for subsequent behavioral genetic analyses. Although this approach does not fully address the issue of overdispersion in the employed measure, using this approach helps to transform the distribution of scores to more closely approximate a normal distribution.

Demographics. Age was measured continuously by number of years, while sex (0 = *female*, 1 = *male*) and race (0 = non-*White*, 1 = *White*) were measured dichotomously. Table 1 reports descriptive statistics for the full twin sample, MZ sample, and DZ sample.

Plan of Analysis

The first step in the analysis focused on testing the shared etiological hypothesis and involved estimating a series of univariate and bivariate behavioral genetic models to examine the additive genetic, shared environmental, and nonshared environmental influences on psychopathic personality traits and criminal behavior (Neale & Cardon, 1992). Data from both MZ and DZ twin pairs were analyzed to directly partition components of behavior via ACE modeling into the three aforementioned groups: additive genetic influences (symbolized as A), shared/common environment (symbolized as

Table 1. Descriptive Statistics for Psychopathic Personality Traits and Criminal Behavior.

	M (*SD*)	Minimum-maximum	*n*
MZ and DZ twins			872
Psychopathic personality traits	56.46 (9.31)	23-86	
Criminal behavior	.35 (.89)	0-4	
Age	16.50 (1.65)	13-20	
Race	.63 (.48)	0-1	
Sex	.50 (.50)	0-1	
MZ twins			352
Psychopathic personality traits	56.14 (9.02)	31-81	
Criminal behavior	.20 (.69)	0-4	
DZ twins			520
Psychopathic personality traits	56.68 (9.51)	23-86	
Criminal behavior	.45 (.99)	0-4	

Note. MZ = monozygotic; DZ = dizygotic.

C), and nonshared/unique environment (symbolized as E), which also includes measurement error (Neale & Cardon, 1992; Polderman et al., 2015). All univariate and bivariate behavioral genetic models were estimated using M*plus* Version 8 (Muthén & Muthén, 1998-2012) with full information maximum likelihood estimation. Model fit was evaluated by changes in chi-square ($\Delta\chi^2$; nonsignificant changes indicating a more parsimonious model), values from the comparative fit index (CFI; values above .95 indicting good fit), and values from the root mean square error of approximation (RMSEA; (values at or below .05 indicating good fit; Hu & Bentler, 1999).

The second step in the analysis focused on testing the causal association hypothesis between psychopathic personality traits and criminal behavior. As such, fixed-effect linear regression models were used to evaluate this hypothesis. Fixed-effect regression models are focused on examining within-group differences and allow researchers to examine the impact of an independent variable (i.e., psychopathic personality traits) on deviations from the group mean of a dependent variable (i.e., criminal behavior; Allison, 2009). With regard to the current study, a genetically informed fixed-effect linear regression model was used to examine if within-twin pair differences in levels of psychopathic personality traits were associated with differences in criminal behavior. This approach helps to control for genetic and shared environmental influences that may confound an association. The utility of this approach is strengthened, however, when only MZ twins are examined, as they share 100% of their DNA and many of the same environments. Specifically, when examining only MZ twins in this modeling framework, any significant differences between MZ twins from the same twin-pair can *only* be the product of nonshared environmental experiences (including measurement error) as genetic and shared environmental influences are controlled for in the model (Barnes, Beaver, Connolly, & Schwartz, 2016).

Table 2. Twin and Cross-Twin-Cross-Trait Correlations for Psychopathic Personality Traits and Criminal Behavior.

	Twin correlations	
	Psychopathic personality traits	Criminal behavior
MZ twins	.42**	.48**
DZ twins	.12**	.29**
	Cross-twin-cross-trait correlations	
MZ twins	—	.15**
DZ twins	—	.09**

Note. MZ = monozygotic; DZ = dizygotic.
**$p < .01$.

Results

Before univariate and bivariate biometric models were estimated, within-pair and cross-twin-cross-trait correlations were calculated to acquire an initial impression of the extent to which genetic factors influence variance in each trait and the covariance between the two. Table 2 presents these estimates. Both the within-pair and cross-twin-cross-trait correlations were higher for MZ twins than DZ twins, suggesting the presence of genetic influences on psychopathic personality traits and criminal behavior as well as the association between the two.

Table 3 presents parameter estimates from univariate ACE models decomposing the variance in psychopathic personality traits and criminal behavior into A, C, and E components. With respect to psychopathic personality traits, model fit indices suggested that constraining the shared environment parameter (C) to zero did not result in a statistically significant change in chi-square or detriment to model fit ($\Delta\chi^2 = .76$, $\Delta df = 1$, $p = .89$). As a result, estimates from a model including only the additive genetic component (A) and nonshared environment (E) component was selected as the best-fitting model. Results from this model revealed that 39% of the variance in psychopathic personality traits was attributable to additive genetic influences, while the remaining 61% of the variance was attributable to nonshared environment. Model fit indices also suggested that an AE model, where the *C* parameter was constrained to zero, provided the best fit to the data for criminal behavior ($\Delta\chi^2 = .91$, $\Delta df = 1$, $p = .80$). Estimates from this model revealed that 53% of the variance in criminal behavior was attributable to additive genetic influence, while 47% of the variance was attributable to nonshared environment.

The next step in the analysis was focused on testing whether and to what extent the association between psychopathic personality traits and criminal behavior was explained by a shared etiological pathway. To examine this possibility, a Cholesky decomposition model was fit to the data. As the *C* parameter was not found to significantly influence variance in either psychopathic personality traits or riminal behavior,

Table 3. Parameter Estimates From Univariate *ACE* Models.

	A	*C*	*E*	$\Delta\chi^2$	Δdf	*p*	CFI	RMSEA
Psychopathic personality traits								
ACE	.39***	.00	.61***	—	—	—	1.00	.00
	[.29, .49]	[.00, .00]	[.51, .70]					
AE	**.39*** **	**.00**	**.61*** **	**.76**	**1**	**.89**	**1.00**	**.00**
	[.29, .49]	**[.00, .00]**	**[.51, .70]**					
CE	.00	.23***	.77***	45.23	1	<.001	.67	.06
	[.00, .00]	[.15, .31]	[.69, .85]					
E	.00	.00	1.00***	46.21	2	<.001	.01	.09
	[.00, .00]	[.00, .00]	[.00, 1.00]					
Criminal behavior								
ACE	.51***	.00	.49***	—	—	—	0.99	.01
	[.40, .78]	[.00, .00]	[.21, .60]					
AE	**.53*** **	**.00**	**.47*** **	**.91**	**1**	**.80**	**.99**	**.01**
	[.38, .81]	**[.00, .00]**	**[.19, .62]**					
CE	.00	.19**	.81***	47.52	1	<.001	0.71	.06
	[.00, .00]	[.14, .31]	[.69, .86]					
E	.00	.00	1.00***	49.29	2	<.001	.02	.10
	[.00, .00]	[.00, .00]	[1.00, 1.00]					

Note. Standardized parameter estimates presented. 95% confidence intervals shown in brackets. CFI = comparative fit index; RMSEA = root mean square error of approximation.
Bold face indicates best fitting model.
**$p < .01$. ***$p < .001$.

Table 4. Parameter Estimates From Cholesky Decomposition Models.

	A	*C*	*E*	$\Delta\chi^2$	Δdf	*p*	CFI	RMSEA
Psychopathic personality traits and criminal behavior								
AE	**.58*** **	**.00**	**.42*** **	**—**	**—**	**—**	**.96**	**.05**
	[.34, .80]	**[.00, .00]**	**[.20, .66]**					
E	.00	.00	1.00***	103.71	2	<.001	.43	.10
	[.00, .00]	[.00, .00]	[1.00, 1.00]					

Note. Standardized parameter estimates presented. 95% confidence intervals shown in brackets.
CFI = comparative fit index; RMSEA = root mean square error of approximation.
Bold face indicates best fitting model.
***$p < .001$.

it was constrained to zero for bivariate analyses. Table 4 presents standardized parameter estimates from each Cholesky decomposition model. As can be seen, an AE model fit the data well (CFI = .96, RMSEA = .05) with estimates suggesting that 58% of the covariance between psychopathic personality traits and criminal behavior was attributable to common additive genetic influences ($r_g = .29$) and 42% of the covariance was attributable to nonshared environmental influences ($r_e = .25$).

Table 5. Fixed-Effect Linear Regression Models Predicting Criminal Behavior.

	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Psychopathic personality traits	.03	.01	.01	.02
Age	−.13	.07	−.20	.15
Sex	.52*	.25	1.17*	.18
Race	−.26	.26	−.58	.32
n	874		352	

Note. Unstandardized coefficients presented. Model 1 includes MZ and DZ twin pairs, whereas Model 2 includes MZ twin pairs only. MZ = monozygotic; DZ = dizygotic.
*$p < .05$.

Based on the results from the bivariate models suggesting a shared genetic etiological pathway between psychopathic personality traits and criminal behavior, the last step in the analysis was focused on testing the alternative hypothesis that psychopathic personality traits exert a causal effect on criminal behavior. Table 5 presents unstandardized coefficient estimates from two fixed-effect linear regression models. Model 1 includes both MZ and DZ twins along with controls for age, race, and sex. As presented, differences in psychopathic personality traits did not predict differences in criminal behavior ($b = .03$, $p = .15$). Model 2 includes only MZ twins and shows that the effect of psychopathic personality traits on criminal behavior was slightly attenuated and still nonsignificant after genetic and shared environmental confounds were fully controlled ($b = .01$, $p = .24$).

Discussion

There are two main findings from the current study. First, the association between psychopathic personality traits and criminal behavior was explained by common additive genetic and nonshared environmental factors. Specifically, genetic influences explained 39% of the variance in psychopathic personality traits and 53% of the variance in criminal behavior with the remaining variance being attributable to the nonshared environment. These findings align with previous psychological and criminological research (Bezdjian, Raine, Baker, & Lynam, 2011; Hudziak et al., 2003). Our findings showed expected proportions of explained variance due to genetic and nonshared environment influence on antisocial behavior (Polderman et al., 2015; Rhee & Waldman, 2002; Turkheimer, 2000). When meta-analyzing antisocial behaviors more broadly ($n = 51$ twin and adoption studies), Rhee and Waldman (2002) found that genetic factors explained 41% of the variance in antisocial behaviors, whereas shared environments explained 16% and nonshared environments explained 43%. Thus, our findings now add to a clear and convincing body of research that points to the need to include genetic components into the study of crime and its correlates (Barnes et al., 2014).

Next and central to the primary goal of the current study, our analysis revealed that similar genetic and nonshared environmental components overlap when examining the phenotypic correlation between psychopathy and criminal behavior. Specifically, the genetic and nonshared environment correlations between the two variables were .29 and .25, respectively. Calculations revealed that the overlap between psychopathic personality traits and criminal behavior were explained by common additive genetic (58%) and nonshared environmental (42%) components. Equally important, results from fixed-effect linear regression models also demonstrated that psychopathic personality traits were not significantly associated with criminal behavior after controlling for genetic and shared environmental confounds; a finding that supports the shared etiological pathway hypothesis for the association between both constructs and aligns closely with the very recent work of Boccio and Beaver (2018).

Indeed, it is the second key finding of the current study that speaks directly to the primary question posed herein: Do psychopathic traits affect criminal behavior in a direct (possibly causal) manner, or is the association better explained by the presence of a third variable, which affects both traits? In this case, our results seemed to suggest that a third variable—shared genetic influences—best explain the covariance of psychopathic personality traits and crime in the current data. Stated in another way, there seems to be a similar developmental pathway in which predisposition for both psychopathic personality styles and criminal behavior are responsible for the emergence, and covariation, of the traits later in life. What should not be discounted, however, are the limitations inherent in the current study, which we discuss in some detail below.

Limitations

The primary limitation of this study is the lack of a more conventional measure of psychopathy in the Add Health data, such as the Levenson Self-Report Psychopathy Scale or the Psychopathy Check Lists-Revised. Although the lack of a direct psychopathy scale may not be ideal, the Add Health does offer a unique opportunity for using questions within the FFM of personality that can be utilized to measure traits also inherent of psychopathy such as callous unemotionality and impulsive tendencies (Beaver et al., 2013). Furthermore, from a theoretical vantage point, if the traits inherent of psychopathy are found within the FFM recorded in a nationally representative data set it would behoove researchers to take advantage of such data (see Derefinko & Lynam, 2007; Lynam & Miller, 2015; Vachon et al., 2013).

Another potential limitation of the current study concerns the cross-sectional nature of the study design. Both criminal behavior and psychopathic personality styles were measured during Wave IV of the Add Health data collection. One might make the case that psychopathic personality styles emerge relatively early in life (prior to criminal involvement), and thus a plausible time order would be preserved. However, this would be somewhat speculative, and the best way to resolve the issue would be for future studies to employ longitudinal designs to examine both traits over long stretches of the life course. Finally, the generalizability of the findings is also

something that merits consideration. To at least partly test the ability to generalize findings from twins to nontwin singletons, Barnes and Boutwell (2013) compared twin sets to nontwins from the Add Health across a large number of behaviors ranging from, but not limited to, self-control, drug use, victimization, and antisocial behavior. Their results suggested that twins rarely differed significantly than nontwins for many important measures of individual differences (Barnes & Boutwell, 2013). However, research has yet to directly examine the generalizability of the psychopathic personality traits scale used in the current study to the nontwin sample in the Add Health, an important goal for studies in the future. Nonetheless, while it is possible that twins are systematically more (or less) psychopathic, or more (or less) criminally prone than other members of the population, the findings of Barnes and Boutwell (2013) do not provide strong rationale for suspecting as much.

Despite the limitations mentioned above, our findings suggest that psychopathic personality traits are strongly associated with criminal outcomes, not because of a direct causal effect, but rather because of similar underlying genetic and environmental sources of influence cutting across both traits. Moving forward, there remains a need to examine our findings using alternative measures of psychopathic personality traits, and data sets beyond the Add Health. The extent to which our findings replicate in a larger sample with more statistical power remains an open empirical question. However, if our findings are to be replicated, they suggest that caution is warranted when making causal assertions regarding the impact of psychopathy on criminal behavior.

Appendix

Items Included in the Measure of Psychopathic Personality Traits (Beaver et al., 2011)

1. I sympathize with others' feelings
2. I get angry easily (reverse coded)
3. I am not interested in other people's problems (reverse coded)
4. I often forget to put things back in their proper place (reverse coded)
5. I am relaxed most of the time
6. I am not easily bothered by things
7. I rarely get irritated
8. I talk to a lot of different people at parties
9. I feel others' emotions
10. I get upset easily (reverse coded)
11. I get stressed out easily (reverse coded)
12. I lose my temper (reverse coded)
13. I keep in the background (reverse coded)
14. I am not really interested in others (reverse coded)
15. I seldom feel blue
16. I don't worry about things that have already happened

17. I keep my cool
18. I go out of my way to avoid having to deal with problems in my life (reverse coded)
19. When making a decision, I go with my "gut feeling" and don't think much about the consequences of each alternative (reverse coded)
20. I live my life without much thought for the future (reverse coded)
21. Other people determine most of what I can and cannot do (reverse coded)
22. There are many things that interfere with what I want to do (reverse coded)
23. There is really no way I can solve the problems I have (reverse coded)

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Authors' Note

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Notes

1. Genetic factors = 51% and nonshared environment = 49%
2. Genetic factors = 32% and nonshared environment = 68%

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