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Does IQ Moderate the Relation between Psychopathy and Juvenile Offending?

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Abstract

Although evidence indicates that both psychopathy and intelligence independently predict juvenile offending, relations among IQ, psychopathy, and offending are inconsistent. We investigated whether intelligence moderates the relation between psychopathy and aggressive and income offending concurrently and over time among 1,354 juvenile offenders enrolled in Pathways to Desistance, a prospective study of serious juvenile offenders in Philadelphia and Phoenix. Participants were assessed on intelligence, psychopathy, and self-reported offending both at their initial interview (ages 14–18 years old), and 36 and 84 months later. Results indicate that intelligence moderates the concurrent relation between both aggressive and income offending and total psychopathy, as well as scores on Factor 1 (interpersonal/affective) and Factor 2 (social deviance); the 36-month prospective relation between all aspects of psychopathy and income offending; and the 84-month prospective relation between Factor 2 psychopathy and aggressive offending. As expected, higher levels of psychopathy are associated with higher levels of offending, but the highest levels of offending are evinced among youth with relatively higher levels of psychopathy and relatively higher IQ.

Keywords

psychopathy; intelligence; adolescence; juvenile offenders; offending

The consequence of committing a crime as an adolescent largely depends on court decisions that are increasingly based on a putative predictor of future criminal behavior that may be unreliable in juvenile populations—the assessment of psychopathy (Viljoen, MacDougall, Gagnon, Douglas, & Crosby, 2010). Psychopathy traditionally has been defined by an antisocial factor, involving impulsivity, sensation seeking, and irresponsibility, which leads to socially deviant and risk-taking behaviors, as well as the violation of social and legal norms (Cleckley, 1976; Hare, 1991, 2003). Additionally, psychopathy historically has been conceptualized as having an interpersonal and affective factor that includes lacking guilt and empathy, having shallow and labile emotions, being grandiose and manipulative, and having difficulties forming close relationships. If an adolescent is deemed “psychopathic” following an assessment, inaccurate conclusions regarding the juvenile's limited amenability to rehabilitation may be drawn, which could have potentially devastating consequences for the juvenile, including a decision to focus sentencing on punishment instead of treatment (Petrila & Skeem, 2003; Seagrave & Grisso, 2002). Additionally, a designation as psychopathic may lead to the juvenile's being tried and sentenced as an adult, which could result in harsher consequences, including longer prison sentences (Seagrave & Grisso, 2002). As court decisions have the potential to greatly influence the adjudicated adolescent's future, the use of measures of psychopathy in court decisions involving juveniles is worrisome.

Despite the growing use of measures of psychopathy in assessing juvenile offenders, little research has investigated whether adolescents who receive elevated scores on measures of

psychopathy actually become life-course offenders (Cauffman, Kimonis, Dmitrieva, & Monahan, 2009). Although psychopathy is a robust predictor of various types of offending among adults (e.g., Glover, Nicholson, Hemmati, Bernfeld, & Quinsey, 2002; Hare, Clark, Grann, & Thornton, 2000), findings regarding its predictive utility in assessments of juveniles are inconsistent. One 10-year longitudinal study found that adolescent male offenders with high scores on the Psychopathy Checklist: Youth Version (PCL:YV; Forth, Kosson, & Hare, 2003) had a significantly higher risk for violence in early adulthood, compared to those with lower scores (Gretton, Hare, & Catchpole, 2004). Similarly, elevated psychopathy scores are associated with greater reoffending among male juvenile offenders (Gretton, McBride, Hare, O'Shaughnessy, & Kumka, 2001). Psychopathy also predicts antisocial behavior among nonincarcerated adolescent males (Kosson, Cyterski, Steuerwald, Naumann, & Walker-Matthews, 2002). However, another study found that psychopathy (indexed by the PCL:YV) did not predict reconviction for general or violent offenses among male juvenile offenders over a 10-year follow-up period (Edens & Cahill, 2007).

Inconsistency in the literature regarding prediction of adolescents' future offending based on assessments of psychopathy suggests that at least some adolescents designated as psychopathic will age out of criminal activity by early adulthood, referred to by Moffitt (1993) as adolescence-limited offenders. Their juvenile offending may be a transient phenomenon that shares some common characteristics with psychopathy (e.g., impulsivity and irresponsibility) but may be better conceptualized as part of the normative, but temporary, increase in antisocial behavior that occurs during adolescence (Cleckley, 1976; Moffitt, 1993; Seagrave & Grisso, 2002; Steinberg, 2002).

The overlap between features of psychopathy and characteristics of normative adolescent development includes (a) the appearance of grandiosity and egocentrism, (b) limitations in perspective-taking, (c) excessive concern with impression management, (d) challenges to authority, (e) "trying on" different personalities, and (f) experimenting with adult-like behaviors (e.g., substance use, sexual activity) (Piquero et al., 2012; Seagrave & Grisso, 2002). The increase in defiance during adolescence is compounded by the temporary heightening of sensation seeking, risk taking, irresponsibility, and impulsivity (Edens, Skeem, Cruise, & Cauffman, 2001; Seagrave & Grisso, 2002; Skeem & Cauffman, 2003; Steinberg et al., 2008), which furthers the likelihood of engagement in antisocial behavior. As such, adolescence also shares commonalities with the social deviance factor of psychopathy, furthering the likelihood that transient traits typical of adolescent normative development may be incorrectly characterized as indicative of psychopathy.

The overlap between the construct of psychopathy and characteristics of typical adolescent development may be partially due to the method by which the construct of adolescent psychopathy was developed. The conceptualization of psychopathy in adults was directly extended downward to adolescents, and, as a result, several researchers have argued for the need for further longitudinal research to ensure that the traits considered to constitute psychopathy in adolescence are stable personality features, rather than transient traits (see Skeem & Cauffman, 2003). The PCL:YV assesses the same traits, considered to be indicative of psychopathy, as its adult counterpart, the Revised Psychopathy Checklist (PCL-R; Hare, 1991, 2003), with some items minimally adapted to more accurately describe the experiences of adolescents (Forth et al., 2003; see Skeem & Cauffman, 2003). Both the PCL-R and the PCL:YV conceptualize psychopathy as comprising two factors: "Factor 1" involves interpersonal and affective features, and "Factor 2" is characterized by behaviors associated with a socially deviant lifestyle (Forth et al., 2003), though other factor structures have been suggested for adolescent psychopathy (e.g., Cooke & Michie, 2001; Jones, Cauffman, Miller, & Mulvey, 2006; Neumann, Kosson, Forth, & Hare, 2006).

Although psychopathic traits are relatively stable from childhood to adolescence (e.g., Lynam et al., 2009; Obradović, Pardini, Long, & Loeber, 2007) and from adolescence to adulthood (e.g., Blonigen, Hicks, Krueger, Patrick, & Iacono, 2006; Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007), this stability is not the case for all individuals. Evidence of individual variability in psychopathy trajectories (e.g., Fontaine, Rijdsdijk, McCrory, & Viding, 2010; Pardini & Loeber, 2008; as reviewed in Salekin, Rosenbaum, Lee, & Lester, 2009) has been demonstrated in numerous studies. The existence of multiple trajectories for psychopathy highlights the need for further investigation of the link between psychopathy and offending, as they suggest that psychopathy assessed in adolescence may be differentially useful as a predictor of later antisocial behavior. Given this variability, it is important to identify factors that may moderate the predictive utility of measures of juvenile psychopathy (Walsh, Swogger, & Kosson, 2004), and prospective research is particularly well-suited to addressing these issues.

Intelligence is one factor that potentially may interact with psychopathy to predict future offending among juveniles. Although initial theories regarding psychopathy and intelligence hypothesized that psychopathic adults would possess high intelligence (Cleckley, 1976), the relation between psychopathy and intelligence among juveniles is unclear. In studies of specific aspects of psychopathy, narcissism has been found to be positively associated with both verbal and nonverbal abilities among children (Fontaine, Barker, Salekin, & Viding, 2008). Another study found that juvenile delinquents who are high on certain psychopathic traits (i.e., having a superficial and deceitful interpersonal style) have better verbal intellectual skills (Salekin, Neumann, Leistico, & Zalot, 2004), but in the same study, another dimension of psychopathy, disturbances in affective processing, was negatively associated with verbal abilities. Moreover, IQ is well-established as having an inverse relation with delinquency (Lynam, Moffitt, & Stouthamer-Loeber, 1993), as well as self-reported and court violence among adolescents (Farrington & Loeber, 2000). Additionally, having a high IQ may serve as a protective factor against delinquency among high-risk males (White, Moffitt, & Silva, 1989). Although meta-analytic results (Gendreau, Little, & Goggin, 1996) also have demonstrated a significant inverse relation between intelligence and recidivism among adult offenders ($N = 21,369$), the effect size ($r = .07$) is relatively low, which suggests that this inverse association between IQ and offending likely holds for some, but not all, individuals.

Consistent with this possibility, although many studies suggest that offending is associated with lower intelligence, not all research supports this conclusion. For example, higher IQ prospectively predicted more severe and persistent conduct problems among boys, but only among those whose biological parent had a history of antisocial personality disorder (Lahey et al., 1995). Moreover, the heterogeneity of cognitive and executive functioning observed among youth who engage in antisocial behavior has led researchers to propose a subtype of antisocial youth with relatively intact (and perhaps even good) cognitive functioning and who engage in higher levels of proactive aggression and delinquency than youth with lower levels of cognitive functioning (e.g., Blair, 2004, 2007; Drabick, Bubier, Chen, Price, & Lanza, 2011; Drabick, Price, Lanza, & Chen, 2010). Having better cognitive skills may actually facilitate engaging in some delinquent activities, as these individuals may be better able to recruit others for conspiring in delinquent acts or escape detection by adults or authorities following offending (Deater-Deckard, 2001; Drabick et al., 2011). Thus, evidence regarding the directionality of the relation between IQ and offending is mixed, suggesting that IQ may interact with other risk factors (e.g., psychopathy) to differentially predict offending.

Research examining the interaction between intelligence and psychopathy among adults also has yielded inconsistent findings. Earlier research among adult offenders led Heilbrun

(1979, 1982, 1990) to conclude that IQ moderates the relation between psychopathy and violent offending, such that individuals who are high in psychopathy and exhibit low IQ are at the greatest risk for engaging in violent behavior, compared to individuals high in psychopathy and with high IQ, as well as individuals low in psychopathy, regardless of IQ. Similarly, Beggs and Grace (2008) demonstrated a significant interaction in a sample of sex offenders, where those with relatively low intelligence and high psychopathy scores were more than four times as likely to re-offend as sex offenders who differed in these characteristics. Not all studies find this interactive effect, however. Holland, Beckett, and Levi (1981) reported that, rather than interacting, low intelligence and high psychopathy acted additively to increase the likelihood of violent behavior. In addition, Walsh and colleagues did not find a significant interaction of psychopathy and IQ in the prediction of violent offending (Walsh, Swogger, & Kosson, 2004).

To our knowledge, only two studies have examined the interaction between aspects of psychopathy and IQ in predicting various aspects of offending among detained adolescent offenders. One study examined callous-unemotional traits as a moderator of the relation between verbal ability and violent delinquency in a sample of 100 detained adolescent boys (Muñoz, Frick, Kimonis, & Aucoin, 2008). Interestingly, and in contrast to the aforementioned studies of adults, boys who were high on callous-unemotional traits and who had *higher* verbal ability scores reported the greatest amount of violent delinquency. Muñoz and colleagues speculated that juvenile offenders who are high in psychopathy exhibit fewer deficits in verbal abilities, compared to juvenile offenders who are low in psychopathy. This possibility is consistent with findings in a previous investigation of levels of intelligence among incarcerated adult offenders who were high in psychopathy (Johansson & Kerr, 2005). However, when examining the role of intelligence as a protective factor in the relation between psychopathy and general and violent offending among detained child and adolescent offenders, Salekin and colleagues (Salekin, Lee, Schrum Dillard, & Kubak, 2010) found that, though psychopathy was correlated with verbal IQ and psychopathy predicted both types of offending longitudinally, neither IQ nor the interaction between IQ and psychopathy predicted offending at the three year follow-up. Although the results of these initial studies are noteworthy, examining the roles of psychopathy and IQ in predicting different varieties of offending both during adolescence and young adulthood is essential for furthering the field's knowledge of how, and under what conditions, psychopathy predicts adolescents' future aggressive and income offending.

The current study investigated whether IQ moderates the relation between total, Factor 1, and Factor 2 psychopathy scores and both income and aggressive offending among a large, diverse sample of adjudicated adolescents cross-sectionally and longitudinally. First, as both low intelligence and high psychopathy have been found to predict offending individually, we hypothesized that these variables would independently predict both aggressive and income offending cross-sectionally in the present sample. Based on the findings of Salekin and colleagues (2010), we hypothesized that only psychopathy (but not IQ) would predict both types of offending longitudinally. With respect to moderation, we hypothesized that there would be a significant interaction between intelligence and all measures of psychopathy in the prediction of all indices of offending at baseline. It was hypothesized that psychopathy would be predictive of offending for individuals of both low and high intelligence, but that, based on the findings of Muñoz and colleagues (2008), the relation between psychopathy and offending would be greatest among individuals with relatively higher IQ. At the 36- and 84-month longitudinal follow-up, it was hypothesized that, based on the findings of Salekin and colleagues (2010) and the decline in offending during adulthood, there would not be a significant interaction between psychopathy and intelligence in predicting all measures of longitudinal offending.

Method

Participants

Participants were enrolled in Pathways to Desistance (Mulvey et al., 2004), a prospective study of 1,354 serious juvenile offenders in Philadelphia, PA ($n = 700$) and Phoenix, AZ ($n = 654$). (For a more detailed description of the study methodology, see Schubert et al., 2004). Adjudicated adolescents were eligible for participation if they were between the ages of 14 and 17 when arrested for any felony, excluding less serious property crimes, or similarly serious non-felony offenses, but including misdemeanor weapons offenses or misdemeanor sexual assault. Because a large proportion of the offenses committed by this age group are drug offenses, the proportion of males with drug offenses was capped at 15% of the sample at each site to ensure sufficient heterogeneity in offenses committed. Table 1 presents a summary of descriptive statistics for the demographic, independent, and dependent variables of interest for the participants.

Procedure

Each participating university's Institutional Review Board approved the study procedures. All participants provided informed assent or consent, with parental consent obtained for all participants under age 18 at the time of enrollment in the study (a few offenders had been arrested when they were younger than 18, but were not enrolled until after their 18th birthday), which occurred between November, 2000, and January, 2003. Participant data were obtained via computer-assisted interviews. All measures were programmed onto laptop computers and read aloud by extensively trained interviewers, with participants given the option to respond on a key pad to maximize privacy. These interviews occurred in participants' homes, public locations, or in correctional facilities. Participants were encouraged to report honestly, and confidentiality was assured through a certificate provided by the U.S. Department of Justice. The information provided by participants in this interview was supplemented and validated through interviews with collateral reporters and official records, including FBI arrest records and juvenile and adult court records from each jurisdiction. Baseline analyses included data obtained during the baseline interview, which was conducted following adjudication, a decertification hearing, or arraignment, and administered over two days with two-hour sessions each day. Participants were compensated \$50 for participation when allowed (in some correctional facilities, compensation of inmates for research participation was prohibited).

Follow-up interviews were administered in a single two-hour session, with participants compensated for each follow-up interview using a graduated payment schedule ranging from \$50 to \$115, depending on the follow-up period. Timing of the follow-up interviews was based on the date of the baseline interview, and follow-up interviews were completed within a time frame of six weeks prior to and eight weeks after the interview target date. Because of the steep decline in delinquent behavior that occurs following age 17 and lasts until the late 20s (Moffitt, 1993), the present study includes data obtained during the 36-month follow-up interview, when participants were between 17 and 21, and during the final, 84-month follow-up interview, when participants were between 21 and 25. We expected that this timing would capture the developmental period where some adolescence-limited offenders have decreased or ceased offending, but life-course persistent offenders have continued to offend.

Measures

Psychopathy—Psychopathy was assessed at baseline using the Psychopathy Checklist: Youth Version (PCL:YV; Forth et al., 2003), which consists of 20 items measuring interpersonal, affective, and behavioral dimensions of psychopathy. Following a review of

official court documents, interview with a parent or guardian, and a semistructured interview with the youth, the youth is evaluated by the interviewer. The interviewer evaluates interpersonal style and attitudes; functioning in the psychological, educational, occupational, family, and peer domains; and credibility (comparing official records or collateral reports). Based on this information, the youth is rated depending on how well each of the 20 items apply to him or her using a 3-point ordinal scale, which includes 0 (*Item does not apply to the youth*), 1 (*Item applies to a certain extent*), and 2 (*Item applies to the youth*). Items were summed to create a total psychopathy score. Additionally, two factor scores were created. Factor 1, involving interpersonal and affective features (e.g., “the selfish, remorseless, and exploitative use of others”), was created by summing the 8 items included in that factor, and Factor 2, involving social deviance features (e.g., “chronically unstable and antisocial lifestyle”), was created by summing the 9 items included in the factor (see Harpur, Hare, & Hakistan, 1989). Intraclass correlation coefficients (ICC) were computed to assess interrater reliability during training, with analyses indicating excellent rates of agreement for total scores (ICC Total = .92; ICC Factor 1 = .79; ICC Factor 2 = .93). Additionally, the scale was found to have good internal consistency (α : Total = .87; Factor 1 = .76; Factor 2 = .78).

The total psychopathy mean for the PCL:YV in the present sample ($M = 15.91 \pm 7.73$) is slightly lower than has been reported in other studies; however, it is within the expected range based on a recent meta-analysis of psychopathy among juvenile offenders, where mean scores ranged from 9 to 28, with an overall weighted mean of 20.5 (Edens, Campbell, & Weir, 2007).

IQ—General intellectual ability was assessed at baseline using the Vocabulary and Matrix reasoning subtests of the Wechsler Abbreviated Scale of Intelligence (WASI; Psychological Corporation, 1999). The WASI has been normed for individuals from ages 6 to 89 years. It is correlated with both the Wechsler Intelligence Scale for Children ($r = .81$) and the Wechsler Adult Intelligence Scale ($r = .87$) (Psychological Corporation, 1999). Standardized scores were used, and the range of IQ scores in the present sample was 55 to 128. Higher scores on the WASI are consistent with higher intelligence levels.

Offending—Offending was assessed using an adapted version of the Self-Report of Offending (SRO; Huizinga, Esbensen, & Weiher, 1991), which was administered at baseline and at the 36- and 84-month follow-up. At baseline, participants were asked (yes/no) if they had ever engaged in any of 11 aggressive crimes or 11 income-generating crimes. Participants were asked if they had engaged in any of these 22 crimes within the past six months for the 36-month follow-up and within the past year for the 84-month follow-up. Aggressive crimes involve personal interaction with a victim (e.g., armed robbery, assault), whereas income-generating crimes involve financial gain (e.g., stealing, using checks or credit cards illegally). There is some overlap between the “aggressive” and “income” distinction, specifically with the following two items included on both scales: “took something by force with a weapon” and “took something by force without a weapon.” Following participants' endorsement of engagement in any of these 22 crimes, variety scores were computed. They are computed using the proportion of the number of different types of crimes that a participant has endorsed, regardless of when it was committed, divided by the number of items to which the participant responds (i.e., a maximum of 22 items). Items that the participant refused to answer or replied “don't know” were not included in this denominator. The closer this variety score is to 1, the greater the variety of offenses the participant committed. Variety scores have been used frequently to index criminal activity (Hindelang, Hirschi, & Weis, 1981) and have been found to have good predictive and construct validity in studying delinquent behavior (Thornberry & Krohn, 2000). Previous work in the current sample has also demonstrated good construct validity for variety scores (Knight, Little, Losoya, & Mulvey, 2004).

Although SRO has been demonstrated to be significantly correlated with official records of arrests, official records likely provide underestimates of engagement in antisocial behavior, as the majority of crimes are undetected (Brame, Fagan, Piquero, Schubert, & Steinberg, 2004). Thus, SRO allowed for more heterogeneity and variability in the offending variable. Additionally, participants' self-reports of their offending were the focus of the current study to minimize the potential spurious association between IQ and offending, as some researchers suggest that individuals with lower IQs may have higher arrest records because of their greater tendency to be caught compared to individuals with higher IQs (e.g., Rutter & Giller, 1984).

Analysis Plan

Multiple imputation (MI) was used to address missing data because other strategies for managing missing data (e.g., listwise or pairwise deletion, mean imputation) may result in biased analyses (Bodner, 2008; Graham, 2009; Little & Rubin, 2002; Rubin, 1987). MI entails filling in missing data by computing predicted values based on available data, and then averaging these results across multiple imputed datasets to obtain final estimates for the missing data (Rubin, 1987; Schafer, 1997). Because MI imputes *multiple* values for each missing value, variability due to both sampling error and model uncertainty is still allowed for, which is an advantage of MI compared to other types of imputation (e.g., single imputation). In addition to the study variables of interest, it is recommended that auxiliary variables that are expected to predict attrition should be included in the MI (e.g., Graham, 2009; Schafer, 1997). Thus, in the MI for the current study, we included sex, age at baseline, study location, ethnicity, self-reported offending variety scores for both aggressive and income offending at all available follow-up time points, and measures derived from official records (e.g., total number of court petitions prior to and including baseline, total number of arrests during the seven year follow-up, number of arrests between 30 and 36 months after baseline, and number of arrests between 72 and 84 months after baseline). Following recommendations by Bodner (2008), 20 datasets were imputed using SAS Proc MI (SAS Institute Inc., 2006). SPSS/PASW was used to compute descriptive statistics and Mplus version 6.11 (Muthén & Muthén, 1998–2011), which averaged results across the 20 imputed datasets, was employed to conduct the remaining analyses.

Following MI, bivariate correlations were conducted to examine the relations among study variables. Separate hierarchical ordinary least squares (OLS) regressions were conducted to examine the relations between psychopathy scores (total, Factor 1, and Factor 2) with offending, and to determine whether this relation was moderated by IQ. Aggressive and income offending variety scores at three time points (baseline, and 36- and 84-month follow-up) were the dependent variables. In these OLS regressions, youth sex, age, and site location were entered in Step 1, the psychopathy and IQ variables were entered in Step 2, and the psychopathy $\times$ IQ interaction term was entered in Step 3. IQ and psychopathy were mean-centered prior to the computation of the interaction term to aid in interpretation of regression coefficients. Moderation was tested by examining the significance of the interaction of psychopathy and IQ when predicting offending.

A significant psychopathy $\times$ IQ interaction was probed post-hoc using methods described by Aiken and West (1991) and Holmbeck (2002) to determine the directionality and significance of the interaction. For this procedure, two new conditional moderator variables (± 1 SD from the mean IQ) and new interactions that incorporated these conditional variables were computed. Two post-hoc regressions were then conducted, each including psychopathy, one of the conditional IQ variables, and the psychopathy $\times$ conditional IQ variable (Holmbeck, 2002). Following these analyses, unstandardized betas (slopes) for the psychopathy variable and constants (intercepts) were derived. The interactions were then

graphed by including the slopes and intercepts in regression equations that included scores that were 1 *SD* above and 1 *SD* below the mean IQ.

Results

Bivariate correlations between study variables are presented in Table 2. Psychopathy was positively correlated with all offending variety variables. IQ was also positively correlated with all measures of offending variety scores, excluding 36-month aggressive and 84-month aggressive and income offending variety scores, with which it was not significantly correlated. Finally, all offending variety scores were significantly positively correlated with one another.

Prediction of baseline aggressive offending

The total psychopathy $\times$ IQ, Factor 1 psychopathy $\times$ IQ, and Factor 2 psychopathy $\times$ IQ interactions predicted baseline aggressive offending (Table 3). Figure 1 illustrates the directionality of the interaction for the total psychopathy $\times$ IQ, and patterns for the factor scores were identical. Although higher scores on all measures of psychopathy are associated with greater offending in both IQ groups, the relation between psychopathy and baseline aggressive offending is higher among offenders who have relatively higher IQ scores. More specifically, the highest levels of baseline aggressive offending were found among youth with higher levels of IQ and higher levels of psychopathy.

Prediction of baseline income offending

The total psychopathy $\times$ IQ, Factor 1 psychopathy $\times$ IQ, and Factor 2 psychopathy $\times$ IQ interactions predicted baseline income offending (Table 4). Post-hoc probing is consistent with the prediction to baseline aggressive offending depicted in Figure 1. Although higher scores on all measures of psychopathy are associated with greater offending in both IQ groups, the relation between psychopathy and baseline income offending is stronger among offenders who have relatively higher IQ scores. More specifically, the highest levels of baseline income offending were found among youth with higher levels of IQ and higher levels of psychopathy.

Prediction of 36-month follow-up aggressive offending

Total psychopathy, Factor 1 psychopathy, and Factor 2 psychopathy conditionally predicted 36-month follow-up aggressive offending (Table 5). IQ did not conditionally predict aggressive offending variety scores at this follow-up. Additionally, none of the psychopathy $\times$ IQ interactions predicted 36-month follow-up aggressive offending, indicating that there was not significant moderation. Thus, post-hoc probing was not conducted.

Prediction of 36-month follow-up income offending

The total psychopathy $\times$ IQ, Factor 1 psychopathy $\times$ IQ, and Factor 2 psychopathy $\times$ IQ interactions predicted 36-month follow-up income offending variety scores (Table 6). Figure 2 illustrates the directionality of the interaction for the total psychopathy $\times$ IQ, and patterns for the factor scores were identical. Although higher scores on all measures of psychopathy are associated with greater levels of offending in both IQ groups, the relation between psychopathy and 36-month follow-up income offending is stronger among offenders who have relatively higher IQ scores. Among juvenile offenders assessed as high in psychopathy, high IQ was associated with the highest levels of 36-month follow-up income offending variety scores.

Prediction of 84-month follow-up aggressive offending

Total psychopathy, Factor 1 psychopathy, and Factor 2 psychopathy conditionally predicted 84-month follow-up aggressive offending variety scores (Table 7). IQ did not conditionally predict aggressive offending variety scores at this follow-up. The total psychopathy $\times$ IQ and Factor 1 $\times$ IQ interactions did not predict 84-month follow-up aggressive offending variety scores. However, the Factor 2 psychopathy $\times$ IQ interaction did predict 84-month follow-up aggressive offending variety scores. As Figure 3 indicates, although higher Factor 2 psychopathy scores are significantly associated with greater offending in both IQ groups, the relation between psychopathy and 84-month follow-up aggressive offending is stronger among offenders who have relatively higher IQ scores. Among juvenile offenders assessed as high in psychopathy, high IQ was associated with the highest levels of 84-month follow-up aggressive offending variety scores.

Prediction of 84-month follow-up income offending

Total psychopathy, Factor 1 psychopathy, and Factor 2 psychopathy conditionally predicted 36-month follow-up aggressive offending variety scores in Step 2 of the regression. IQ did not conditionally predict aggressive offending variety scores at this follow-up. Additionally, none of the psychopathy $\times$ IQ interactions predicted 84-month follow-up income offending variety scores, indicating that there was not significant moderation. Thus, post-hoc probing was not conducted.

Discussion

Although IQ is generally a protective factor against delinquency (as reviewed in Lynam et al., 1993), in certain subpopulations, better cognitive functioning may not diminish offending and may even facilitate or exacerbate it (Blair, 2004, 2007; Deater-Deckard, 2001; Drabick et al., 2011). The current results indicate that, among adolescents adjudicated delinquent for serious offenses, higher IQ is associated with higher levels of offending, both concurrently and over time, and especially so among juveniles who are high in psychopathy. Though the current study illustrates that higher total, Factor 1, and Factor 2 psychopathy scores are associated with higher levels of income and aggressive offending concurrently and prospectively, the offenders with higher psychopathy scores who evidenced the highest levels of offending during adolescence were those who are relatively more intelligent than their comparably psychopathic peers. This pattern is consistent with that reported by Muñoz et al. (2008), who found that higher verbal ability scores amplified the cross-sectional relation between callous-unemotional traits and violent juvenile offending.

The present findings expand upon earlier work (e.g., Gretton et al., 2001; Kosson et al., 2002) and suggest that psychopathy predicts short-term, prospective income-related offending among juveniles. In addition, the current study highlights the important role of IQ in moderating the strength of the concurrent relation between psychopathy and juvenile offending, illustrating how multiple variables interact to increase the likelihood of antisocial activity (Walsh et al., 2004). Although IQ moderated the relation between psychopathy and changes in income offending three years later in the present sample, IQ did not moderate the prospective relation between psychopathy and aggressive offending at either follow-up, or between psychopathy and income offending seven years later. With the exception of the moderation by IQ of the relation between psychopathy and income offending observed at 36-month follow-up, this pattern of findings is consistent with that reported by Salekin et al. (2010), who found that, controlling for psychopathy, IQ did not predict offending and IQ did not moderate the relation between psychopathy and offending.

One possible explanation for this pattern is that high intelligence exacerbates the impact of psychopathy on aggressive offending during adolescence, but not adulthood. With age, individuals higher in both psychopathy and IQ may use their reasoning and verbal skills to develop non-aggressive methods of offending or of achieving their goals, as seen at 36-month follow-up, and then expand their repertoires to include legal methods of achieving their goals, as observed at 84-month follow-up. This gradual decline of the importance of IQ in both predicting offending and influencing the relation between psychopathy and offending also may be related to the decline in offending overall that occurs following adolescence. Perhaps individuals who are relatively higher on both psychopathy and IQ may be more likely to exhibit adolescence-limited offending.

The observed interaction between psychopathy and IQ in predicting juvenile offending supports earlier findings by Muñoz and colleagues (2008) that the highest amount of self-reported violent delinquency among detained adolescent boys was reported by those with both high callous-unemotional traits and high verbal ability. Furthermore, the current study expands on this work by demonstrating that having both higher levels of psychopathy in general, as based on a diagnostic interview (PCL:YV), and higher levels of intelligence, as indexed by standardized tests of both reasoning and verbal abilities, is associated with the greatest levels of self-reported aggressive and income offending. It additionally supports previous evidence from Salekin and colleagues (2010) that psychopathy is predictive of longitudinal offending, whereas intelligence and the interaction of psychopathy and intelligence are not. Although low IQ is well-established as placing adolescents at risk for delinquency (e.g., Hirschi & Hindelang, 1977; as reviewed in Farrington & Loeber, 2000), the current results suggest that it is actually relatively higher IQ that is a risk factor when adjudicated adolescents are also higher in psychopathy and that having higher IQ relative to other adjudicated adolescents is positively associated with offending.

One inconsistent finding in the present study is the significant interaction of IQ and Factor 2 psychopathy (socially deviant behavior) in predicting 84-month follow-up aggressive offending. The other 84-month follow-up results suggest that IQ and all aspects of psychopathy do not significantly interact in predicting either aggressive or income offending. One possible interpretation of this association is that the relation between socially deviant behavior and aggression is a result of measuring the similar construct of antisocial activity (Kennealy, Skeem, Walters, & Camp, 2010), but future research will be necessary to address and replicate this finding.

There are several strengths of this study. First, the sample was both racially and ethnically diverse. The sample was also heterogeneous regarding the offenses committed, suggesting that the findings hold true across different types of offending patterns among adjudicated youth. Another important strength of the study was its assessment of psychopathy. Psychopathy was assessed using the PCL:YV, which involves a diagnostic interview and review of information from collateral sources and institutional files, which increases confidence in the accuracy of the assessment of psychopathy. Additionally, the analyses examined multiple aspects of psychopathy, which enabled an examination of whether a single factor was driving the results. The use of both cross-sectional and prospective data derived from multiple time points also adds to the evidence that the PCL:YV predicts juvenile offending concurrently and prospectively (Gretton et al., 2001, 2004; Kosson et al., 2002).

Despite these strengths, there are several factors that may limit the generalizability of the findings. The sample consisted of serious juvenile offenders, and thus findings may not apply to community- or clinic-based samples of adolescents, or juveniles convicted of more minor crimes. The sample was diverse, and, as a result, it may be difficult to determine any

discrepancies between separate racial/ethnic groups that may exist, given the relation between race/ethnicity and offending. Furthermore, the average IQ in the sample was 84.52, which is lower than the nationwide normed average of 100 (but typical of offender populations). Thus, although our findings indicate that having a high IQ *relative to other offenders* exacerbates the impact of psychopathy on offending, we do not know whether this is the case among individuals who are high in intelligence relative to the general population. Finally, it should be noted that offending was measured by self-report and thus results could differ when predicting offending as measured by official report, although prior analyses of data from this sample show a positive correlation between participants' self-reports of offending and official arrest records (Brame, Fagan, Piquero, Schubert, & Steinberg, 2004). Future research might address issues relating to generalizability by examining these variables in community-based adolescent samples; considering the relations among psychopathy, intelligence, and offending among adolescents with average or above average intelligences; and using official records to measure offending. Finally, we note that IQ is only one of many potential moderators of the relation between psychopathy and juvenile offending, and that future research should examine whether and to what extent other individual or contextual factors strengthen or weaken this relation.

The most important finding from this study is that intelligence and psychopathy interact in their contemporaneous influence on juvenile offending, with higher levels of psychopathy and intelligence conferring the greatest risk among adolescents adjudicated delinquent. There are significant policy implications of this finding. Psychopathy was found to have a significant main effect in predicting juvenile offending both cross-sectionally and longitudinally, and thus may be a valid component in the assessment of risk in juvenile offender populations. However, courts must be cautious to not over-rely on assessments of psychopathy in decision making about juvenile sentencing and instead consider multiple variables. For example, when making court decisions regarding sentencing or treatment options, intelligence should also be assessed in conjunction with measures of psychopathy in determining outcomes for adolescents. As adolescents with higher psychopathy and IQ may be at particularly elevated risk for offending, specialized interventions could be tailored to this at-risk group (e.g., programs that place a greater emphasis on teaching problem solving and perspective-taking skills). Adolescents in this at-risk group are also more likely to reduce their offending gradually over time; thus, it may be beneficial to retain them in supportive, therapeutic services until they reach adulthood to increase their likelihood of ceasing to offend following adolescence. Future research will be necessary to test the utility of these interventions and alternative approaches to determine whether IQ moderates treatment outcomes, as well as the psychopathy-offending relation as illustrated in the present study.

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Figure 1. Total psychopathy predicting baseline aggressive offending as moderated by IQ. At each level of IQ, the slope of the line is significantly different from zero.

Figure 2. Total psychopathy predicting 36-month follow-up income offending as moderated by IQ. At each level of IQ, the slope of the line is significantly different from zero.

Figure 3. Factor 2 psychopathy predicting 84-month follow-up income offending as moderated by IQ. At each level of IQ, the slope of the line is significantly different from zero.

Table 1

Descriptive Statistics for the Demographic, Independent, and Dependent Variables

Age at Baseline (Mean (S.D.))	16.54 (1.10)
Gender (% male)	86.4%
Race (%)	
White	20.2%
Black	41.4%
Asian	0.1%
Native American	2.0%
Hispanic	33.5%
Other	2.7%
Site Location (%)	
Philadelphia	48.3%
Phoenix	51.7%
Total Psychopathy (Mean (S.D.))	15.91 (7.73)
Factor 1 Psychopathy (Mean (S.D.))	5.03 (3.48)
Factor 2 Psychopathy (Mean (S.D.))	8.32 (3.87)
IQ (Mean (S.D.))	84.52 (13.03)
Baseline Aggressive Offending Variety (Mean (S.D.))	0.31 (0.20)
Baseline Income Offending Variety (Mean (S.D.))	0.35 (0.25)
36-month Follow-up Aggressive Offending Variety (Mean (S.D.))	0.04 (0.09)
36-month Follow-up Income Offending Variety (Mean (S.D.))	0.04 (0.12)
84-month Follow-up Aggressive Offending Variety (Mean (S.D.))	0.04 (0.08)
84-month Follow-up Income Offending Variety (Mean (S.D.))	0.04 (0.10)

Table 2

Bivariate Correlations among Study Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Total Psychopathy	-	.86*	.91*	.01	.50*	.54*	.17*	.19*	.17*	.19*
2. Factor 1 Psychopathy		-	.61*	.01	.32*	.34*	.10*	.11*	.12*	.16*
3. Factor 2 Psychopathy			-	.01	.49*	.54*	.19*	.21*	.17*	.19*
4. IQ				-	.10*	.15*	.06	.11*	.05	.06
5. Baseline Aggressive Offending Variety					-	.78*	.21*	.23*	.22*	.22*
6. Baseline Income Offending Variety						-	.19*	.26*	.19*	.20*
7. 36-month Aggressive Offending Variety							-	.69*	.26*	.23*
8. 36-month Income Offending Variety								-	.22*	.21*
9. 84-month Aggressive Offending Variety									-	.60*
10. 84-month Income Offending Variety										-

*
 $p < .001$.

Table 3

OLS Regression for Psychopathy by Intelligence Moderation Models Predicting Baseline Aggressive Offending Variety (N = 1,354)

Predictor	Total B	Factor 1 B	Factor 2 B
Step 2			
Male	.123***	.147***	.122***
Age	.063**	.106***	.067**
Philadelphia	-.077**	-.082**	-.076**
Psychopathy Variable	.474***	.301***	.471***
IQ	.074**	.073**	.076**
Step 3			
Male	.123***	.147***	.122***
Age	.065**	.107***	.069**
Philadelphia	-.081**	-.085**	-.079**
Psychopathy Variable	.474***	.302***	.470***
IQ	.070**	.068*	.075**
Psychopathy Variable × IQ	.077**	.062*	.066**

Note: Step 1 bs for all psychopathy scores: male (.155***), age (.122***), Philadelphia (.129***). For Total Psychopathy: $R^2 = .054$, for Step 1 ($p < .05$); $\Delta R^2 = .224$, for Step 2 ($p < .05$); $\Delta R^2 = .006$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .054$, for Step 1 ($p < .05$); $\Delta R^2 = .094$, for Step 2 ($p < .05$); $\Delta R^2 = .004$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .054$, for Step 1 ($p < .05$); $\Delta R^2 = .221$, for Step 2 ($p < .05$); $\Delta R^2 = .005$, for Step 3 ($p < .05$).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 4

OLS Regression for Psychopathy by Intelligence Moderation Models Predicting Baseline Income Offending Variety (N = 1,354)

Predictor	Total β	Factor 1 β	Factor 2 β
Step 2			
Male	.105***	.131***	.104***
Age	.140***	.186***	.144***
Philadelphia	-.100***	-.106***	-.098***
Psychopathy Variable	.505***	.311***	.504***
IQ	.118***	.116***	.120***
Step 3			
Male	.105***	.105***	.103***
Age	.142***	.142***	.146***
Philadelphia	-.104***	-.104***	-.102***
Psychopathy Variable	.505***	.505***	.503***
IQ	.113***	.113***	.119***
Psychopathy Variable $\times$ IQ	.091***	.091**	.083***

Note: Step 1 β s for all psychopathy scores: male (.139***), age (.204***), Philadelphia (.167***). For Total Psychopathy: $R^2 = .085$, for Step 1 ($p < .05$); $\Delta R^2 = .261$, for Step 2 ($p < .05$); $\Delta R^2 = .008$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .085$, for Step 1 ($p < .05$); $\Delta R^2 = .107$, for Step 2 ($p < .05$); $\Delta R^2 = .008$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .085$, for Step 1 ($p < .05$); $\Delta R^2 = .260$, for Step 2 ($p < .05$); $\Delta R^2 = .007$, for Step 3 ($p < .05$).

*
 $p < .05$,

**
 $p < .01$,

 $p < .001$.

Table 5

OLS Regression for Psychopathy by Intelligence Moderation Models Predicting 36-month Follow-up Aggressive Offending Variety (N = 1,354)

Predictor	Total B	Factor 1 B	Factor 2 B
Step 2			
Male	.074**	.083**	.072**
Age	-.064*	-.048	-.065*
Philadelphia	-.058*	-.061*	-.056
Psychopathy Variable	.170***	.094**	.189***
IQ	.035	.034	.036
Step 3			
Male	.074**	.083**	.072**
Age	-.063*	-.047	-.064*
Philadelphia	-.060*	-.063*	-.058*
Psychopathy Variable	.170***	.095**	.189***
IQ	.032	.030	.035
Psychopathy Variable × IQ	.048	.048	.036

Note: Step 1 Bs for all psychopathy scores: male (.086***), age (.043), Philadelphia (.079***). For Total Psychopathy: $R^2 = .016$, for Step 1 ($p < .05$); $\Delta R^2 = .029$, for Step 2 ($p < .05$); $\Delta R^2 = .002$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .016$, for Step 1 ($p < .05$); $\Delta R^2 = .010$, for Step 2 ($p < .05$); $\Delta R^2 = .002$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .016$, for Step 1 ($p < .05$); $\Delta R^2 = .036$, for Step 2 ($p < .05$); $\Delta R^2 = .001$, for Step 3 ($p < .05$).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 6

OLS Regression for Psychopathy by Intelligence Moderation Models Predicting 36-month Follow-up Income Offending Variety (N = 1,354)

Predictor	Total B	Factor 1 B	Factor 2 B
Step 2			
Male	.068*	.078**	.067*
Age	-.018	<.001	-.018
Philadelphia	-.038	-.041	-.036
Psychopathy Variable	.196***	.109***	.210***
IQ	.089**	.089**	.091**
Step 3			
Male	.068*	.078**	.066*
Age	-.016	.001	-.016
Philadelphia	-.042	-.044	-.039
Psychopathy Variable	.197***	.109***	.209***
IQ	.086**	.083**	.090**
Psychopathy Variable × IQ	.082**	.071**	.066*

Note: Step 1 Bs for all psychopathy scores: male (.081***), age (.008), Philadelphia (.077***). For Total Psychopathy: $R^2 = .013$, for Step 1 ($p < .05$); $\Delta R^2 = .044$, for Step 2 ($p < .05$); $\Delta R^2 = .007$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .013$, for Step 1 ($p < .05$); $\Delta R^2 = .018$, for Step 2 ($p < .05$); $\Delta R^2 = .005$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .013$, for Step 1 ($p < .05$); $\Delta R^2 = .050$, for Step 2 ($p < .05$); $\Delta R^2 = .004$, for Step 3 ($p < .05$).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 7

OLS Regression for Psychopathy by Intelligence Moderation Models Predicting 84-month Follow-up Aggressive Offending Variety (N = 1,354)

Predictor	Total β	Factor 1 β	Factor 2 β
Step 2			
Male	.062 *	.070 *	.061 *
Age	-.091 **	-.076 **	-.090 **
Philadelphia	-.031	-.032	-.031
Psychopathy Variable	.173 ***	.130 ***	.174 ***
IQ	.043	.043	.043
Step 3			
Male	.062 *	.070 *	.061 *
Age	-.090 **	-.076 **	-.088 **
Philadelphia	-.033	-.032	-.034
Psychopathy Variable	.173 ***	.130 ***	.173 ***
IQ	.041	.041	.043
Psychopathy Variable $\times$ IQ	.044	.022	.059 *

Note: Step 1 β s for all psychopathy scores: male (.073 ***), age (.069 *), Philadelphia (.055). For Total Psychopathy: $R^2 = .014$, for Step 1 ($p < .05$); $\Delta R^2 = .031$, for Step 2 ($p < .05$); $\Delta R^2 = .002$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .014$, for Step 1 ($p < .05$); $\Delta R^2 = .018$, for Step 2 ($p < .05$); $\Delta R^2 = .001$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .014$, for Step 1 ($p < .05$); $\Delta R^2 = .031$, for Step 2 ($p < .05$); $\Delta R^2 = .004$, for Step 3 ($p < .05$).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 8

OLS Regression for Total Psychopathy by Intelligence Moderation Model Predicting 84-month Follow-up Income Offending Variety (N = 1,354)

Predictor	Total B	Factor 1 B	Factor 2 B
Step 2			
Male	.043	.051	.043
Age	-.049	-.034	-.047
Philadelphia	-.012	-.010	-.012
Psychopathy Variable	.193***	.162***	.183***
IQ	.055	.055	.056
Step 3			
Male	.043	.052	.043
Age	-.050	-.034	-.047
Philadelphia	-.011	-.010	-.012
Psychopathy Variable	.193***	.162***	.183***
IQ	.055	.056	.056
Psychopathy Variable × IQ	-.005	-.013	<.001

Note: Step 1 Bs for all psychopathy scores: male (.056*), age (.025), Philadelphia (.040). For Total Psychopathy: $R^2 = .006$, for Step 1 ($p > .05$); $\Delta R^2 = .039$, for Step 2 ($p < .05$); $\Delta R^2 = <.001$, for Step 3 ($p < .05$). For Factor 1: $R^2 = .006$, for Step 1 ($p > .05$); $\Delta R^2 = .028$, for Step 2 ($p < .05$); $\Delta R^2 = .001$, for Step 3 ($p < .05$). For Factor 2: $R^2 = .006$, for Step 1 ($p > .05$); $\Delta R^2 = .035$, for Step 2 ($p < .05$); $\Delta R^2 = <.001$, for Step 3 ($p < .05$).

* $p < .05$,

** $p < .01$,

*** $p < .001$.