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Adolescent psychopathic traits and adverse environments: Associations with socially adaptive outcomes

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Abstract

Researchers have suggested that psychopathic traits among adults may be, at least in part, an adaptive and/or a learned response for securing socially adaptive outcomes in adverse environments, but there is a lack of developmental evidence supporting this hypothesis among adolescents. Therefore, we examined the indirect links from self-perceived adverse environments (parental neglect, socioeconomic status, school competition, neighborhood violence) to evolutionarily relevant social outcomes (social power, dating behavior) through psychopathic traits. A community sample of 396 adolescents completed measures for the study (M_{age} = 14.64, SD = 1.52). As predicted, there were significant indirect effects from higher levels of parental neglect, school competition, and neighborhood violence to both forms of socially adaptive outcomes through psychopathic traits, but unexpectedly, there were no indirect effects with socioeconomic status. There were also direct effects between environment and socially adaptive outcomes. Results support the hypothesis that psychopathic traits may be, in part, an adaptive and/or learned response to cues from adverse social environments as a means to acquire evolutionarily relevant social outcomes. Interventions could be designed to target the adverse social issues that might be facilitating the development of psychopathy and should be sensitive to the social outcomes adolescents may acquire from these traits.

Keywords: adolescence; adverse environments; dating behavior; psychopathic traits; social power

Environments characterized by negative social relationships (e.g., hostility, neglect, competition) capture antisocial or adverse contexts of development. These antisocial or adverse environments in the home, school, and community can serve as stressors that challenge adolescents and impact their social development (McBride Murry et al., 2011). Adolescents may learn to adapt their behavior to match that seen in their broader environment in order to obtain desirable resources (Leventhal & Brooks-Gunn, 2000). In particular, stressors related to socially adaptive outcomes such as popularity, social power, and access to dating partners within the peer group appear to be important for most adolescents as they become increasingly motivated to interact with their peer group (LaFontana & Cillessen, 2010; Volk et al., 2015). Adolescents may employ various strategies to obtain these social outcomes, with some youth using prosocial strategies and other youth using coercive or antisocial strategies whose success may depend on perceptions of broader environmental contexts (Bronfenbrenner & Morris, 1998; Hawley, 2003; Lenzi et al., 2012). The conscious and nonconscious developmental "decision" of which strategy to use under adverse conditions may depend, at least in part, on individual differences such as personality (Ellis et al., 2012; Volk et al., 2021).

More specifically, some researchers have hypothesized that psychopathy may be, at least in part, an evolved adaptive and/or learned response for coercively and deceptively securing socially adaptive outcomes – which may consist of evolutionarily relevant resources – in antisocial or adverse environments (Book et al., 2019; Patch & Figueredo, 2017; Ribeiro da Silva et al., 2015). Such a possibility does not require that psychopathic traits are accompanied by psychological well-being or that they be culturally valued (Jurjako, 2019). Instead, psychopathic traits can include both harmful societal costs and individual benefits as youth tradeoff the various strategies available to them (Ellis et al., 2012). To date, however, there is no evidence specifically linking adverse environments, psychopathic traits, and adaptive outcomes among adolescents, although there is some evidence that such links might exist in adults (e.g., Međedović, 2019). If psychopathy is indeed associated with coercive strategies to obtain resources during adulthood, then such associations are likely evident earlier in development during adolescence, a heightened time for social competition. Therefore, our goal is to examine whether adolescent psychopathic traits are linked with both perceptions of adverse enviroments and socially adaptive outcomes such as social power and dating outcomes.

Psychopathic traits

Psychopathic traits are characterized by interpersonal (e.g., manipulation, grandiosity), affective (e.g., callousness, unemotionality), and behavioral (e.g., impulsivity, sensation seeking)

dimensions or facets that collectively form a cohesive super-ordinate construct that resembles prototypical psychopathy (Ivanova-Serokhvostova et al., 2022; Neumann et al., 2007). Studies often find that the facets differentially correlate with outcomes (Neumann et al., 2007; Ojanen & Findley-Van Nostrand, 2019), although youth who score higher on all facets (i.e., more closely resembling prototypical overall psychopathy) may also present unique societal and mental health challenges (e.g., Andershed et al., 2018; Bégin et al., 2023; Salekin, 2017). Thus, it is important to examine the facets of psychopathy in addition to overall scores (Salekin et al., 2018). Differences in overall or facet-level psychopathic traits, however, are likely dimensional rather than categorical in nature in both youth and adults as well as community and justice-involved populations (Edens et al., 2011; Murrie et al., 2007), suggesting that differences are a matter of degree rather than kind. Because of the dimensional nature of psychopathy, examining the construct in different populations can be important for delineating how it is associated with criterion variables. In line with this, psychopathic traits have been shown to be associated with several criterion-related outcomes including violence, antisociality, and unethical behavior in non-justice-involved settings of youth and adults (Andershed et al., 2018; Coid et al., 2009; Pardini & Byrd, 2012).

Adverse environments and adolescent social competition

We define adverse environments as those environments that capture a general negative or antisocial quality to the social relationships in one's local and broader context, including relationships and climates marked by hostility, neglect, and competition (Merçon-Vargas et al., 2020). Adverse environments can offer a different set of rewards and punishments for social behavior than do average environments. For example, hostile competition for resources may reward more selfish, antisocial behavior (Daly, 2016). Adolescence is a time when individuals are increasingly competing with peers for social resources (Volk et al., 2015), making the environment an important factor in whether that competition is pro- or antisocial in nature. To gain a comprehensive understanding of adolescent competition, it is important to understand the interplay between both broad and local environments (Bronfenbrenner & Morris, 1998; Bronfenbrenner, 1979). Social learning theories suggest that individuals match their behavior to their perceived broad and local environments through a combination of observation, imitation, and external rewards and punishments (Bandura & Walters, 1977; Fox, 2017). Evolutionary perspectives of human development propose a similar process of development where what is learned, and what influences learning, is biased by the importance of evolutionarily-relevant goals and outcomes such as social power and mating success (Ellis et al., 2012).

To obtain these goals, individuals can learn to respond to adverse environments by engaging in risky or antisocial behavior themselves as a means of meeting the evolutionary goal of surviving and reproducing (Daly, 2016; Del Giudice et al., 2011; Ellis et al., 2012). For example, researchers have found that individuals who experienced harsher and more unpredictable environments during childhood report higher adolescent risk-taking and lower sexual restrictedness (Brumbach et al., 2009; Patch & Figueredo, 2017). Further, rates of bullying increase when there are few prosocial neighborhood resources and/or adolescents perceive their futures as compromised (Schmidt et al., 2016). Bullying itself can then lead to a greater number of offspring in the

long-term (Kretschmer et al., 2022). At the most extreme end, rates of homicide and violence have been found to be the highest among males from late adolescence to early adulthood in cities with higher levels of income inequality (Daly, 2016). Thus, antisocial traits like psychopathy, although presenting a simultaneous risk to self and society, can contribute to adolescents' learning to behave in a way that maximizes their success in environments that potentially reward antisocial behavior.

Adolescent psychopathic traits and adverse environments

Psychopathy may be one specific collection of antisocial traits that, in part, could be a response to adverse environments to acquire socially adaptive outcomes (Gao et al., 2010; Kerig et al., 2012; Ribeiro da Silva et al., 2015). However, the literature examining links between psychopathy and adversity is mixed, with some studies suggesting greater adversity (Baglivio et al., 2020; de Ruiter et al., 2022) while others show no relation to adversity (Bedwell & Hickman, 2022; Zwaanswijk et al., 2018). There are also some conflicting results of the directionality of effects. Although a growing number of studies show that environmental adversity may precede psychopathic traits (Backman et al., 2021; Brummelman et al., 2015; Zara et al., 2024), some findings also suggest psychopathic traits may initiate adverse environmental responses as well (Salihovic et al., 2012). Many longitudinal studies also suggest there are bidirectional effects (Miron et al., 2020; Trentacosta et al., 2019; Waller et al., 2014). There may also be population differences where the psychopathy–adversity link may not be as strong in non-justice-involved compared to justice-involved populations (Bedwell & Hickman, 2022; but see also de Ruiter et al., 2022). This warrants further research into which, if any, levels of environmental adversity may be linked with psychopathy in non-justice-involved adolescents. We examine four levels of perceived environment, including parenting, schools, neighborhood, and family socioeconomic status (SES).

Parenting captures one of the most proximate environmental contexts that may be associated with adolescent psychopathy. Higher parental neglect and lower parental warmth have been shown to be associated with psychopathic traits among different adolescent populations (Backman et al., 2021; Gao et al., 2010). Neglectful and abusive parenting also appear to be associated with psychopathic traits across both non-justice-involved and justice-involved settings (de Ruiter et al., 2022). One possibility is that adverse home environments set the precedent for negative expectations in social relationships that influence adolescents adopting similar patterns of behavior themselves. In contexts such as schools, youth psychopathic traits have been concurrently associated with adverse school climates (Fisher & Brown, 2018) and lower school connectedness (Fanti et al., 2017), as well as longitudinally associated with lower student–teacher affiliation (Baroncelli & Ciucci, 2019). Although these findings may suggest a more negative and possibly competitive broader school environment, other studies suggest that adolescents higher in psychopathic traits may not suffer adverse peer relations within those school environments (Muñoz et al., 2008; Van Zalk & Van Zalk, 2015). Homes and schools represent the inner layers of one's social environment (Bronfenbrenner & Morris, 1998), whereas neighborhoods and SES may capture adolescents' broader environmental contexts.

When considering broader environments, higher levels of neighborhood violence have been linked with psychopathic traits in justice-involved youth (Schraft et al., 2013), but other studies

examining community youth show the relation may be more complex (Markowitz et al., 2015; Meier et al., 2008). Some researchers have also found that lower SES was associated with adolescent psychopathic traits, including as a factor affecting the stability of psychopathy (Bégin et al., 2023; Frick et al., 2003). In research examining community youth, however, the links between SES and psychopathic traits again appear to be quite mixed, including null, negative, and positive relations with SES (Zwaanswijk et al., 2018). Overall, our brief review suggests that there may be an association between different levels of environmental adversity and psychopathic traits, but the links have mostly been found in justice-involved settings, which calls for more research in non-justice-involved settings. It has also yet to be found – like in adults (Međedović, 2019) – whether psychopathic traits may be an evolved and/or learned response in adolescents that may be associated with acquiring socially adaptive outcomes in adverse contexts.

Adolescent psychopathic traits as an adaptive strategy

Some researchers have argued that psychopathic traits may have evolved to allow individuals to engage in deceit, manipulation, and intentionally harmful behavior for self-gain at the expense of others (Book et al., 2019; Harris et al., 2007; Međedović, 2019; Mealey, 1995; Ribeiro da Silva et al., 2015). This selfish approach can lead to the aggressive and coercive pursuit of socially valued outcomes that may represent evolutionarily relevant resources such as social power and dating. In support of possible evolutionary roots of psychopathic traits, and unlike general antisocial traits, psychopathy does not appear to be correlated with prenatal problems or obstetric complications (Bégin et al., 2023; Lalumière et al., 2001; Zara et al., 2024). Further, individual differences in psychopathy are associated with genetic differences (Schermer & Jones, 2020) and offenders higher in psychopathy appear to be relatively less likely to violently target genetic kin (Krupp et al., 2012). Combined, these findings offer some support that psychopathy may not be the result of perturbed developmental processes, but rather the result of an evolved developmental response to adverse environments (Glenn, 2019; Ribeiro da Silva et al., 2015). A remaining question, however, is whether psychopathic traits may help adolescents obtain evolutionarily relevant resources such as social power and dating opportunities in adverse environments.

Some evidence suggests that psychopathic traits correlate with evolutionarily relevant outcomes such as increased fecundity, notably, when adults came from adverse environments (Međedović et al., 2017). Psychopathic traits may allow individuals to engage in deception and/or self-promotion as a means to obtain desired social power, material resources, and/or sexual partners (Glenn et al., 2017; Monteiro et al., 2017; Steininger & Pietschnig, 2022). For example, in one study, after observing video clips of dating interactions, undergraduate men higher in psychopathy were rated higher in dating desirability by undergraduate women, despite the women not knowing the men's ratings of psychopathy (Brazil & Forth, 2020). On the more antisocial side, individuals higher in psychopathy may also resort to coercive sexual tactics when deception or self-promotion fail (Harris et al., 2007). Outside of reproductive opportunities, adolescents higher in psychopathic traits may also be adept at securing socially adaptive outcomes via displays of social power (Ometto et al., 2016; Van Zalk & Van Zalk, 2015). Bullying is a form of proactive and harmful behavior that is associated with the pursuit, and achievement, of higher levels of

social dominance and power (Pouwels et al., 2016; Volk et al., 2021). As with reproductive goals, psychopathy has been associated with bullying (Ojanen & Findley-Van Nostrand, 2019; van Geel et al., 2017). Accordingly, as adolescents place increasing value on peer relationships and begin to engage in dating behavior, dominance over peers and dating behavior may become important proxies for adaptive social outcomes sought by adolescents higher in psychopathic traits. It is critical then to examine whether psychopathy could be an adaptive response to adverse environments in adolescents specifically.

Current study

The goal of our study is to examine whether psychopathic traits indirectly linked self-perceived adverse environments (i.e., family SES, parental neglect, school competition, and neighborhood violence) to evolutionarily relevant social outcomes (i.e., social power, dating behavior). Given developmental and evolutionary explanations of psychopathic traits (Ribeiro da Silva et al., 2015), we expect that self-perceptions of higher parental neglect, higher school social competition, higher neighborhood violence, and lower SES would be indirectly associated with self-perceptions of higher social power and dating behavior through higher levels of psychopathic traits in adolescents. We examine two models: one using overall psychopathy scores and the other using the psychopathy facet scores. Given the holistic nature of environmental influences (Bronfenbrenner, 1979), we also do not have any a priori predictions about the strength of the relationship for different levels (i.e., local versus broad) of environmental factors. Finally, we do not have any a priori predictions regarding age or gender differences as we expected indirect mechanisms would work similarly for most adolescents, although we do control for these factors.

Method

Participants

Adolescent participants ($N = 396$; 230 girls, $M_{age} = 14.64$, $SD = 1.52$) were recruited from various extracurricular activities, including sports teams, youth groups, and dance groups across several medium-sized cities in Southern Ontario, Canada. Recruitment also took place in a diversity of locations, including those that may capture more at-risk youth experiences such as community centers, youth shelters, and homeless youth. The majority of participants were Caucasian (73.7%) and fewer were Asian (6.1%), African-Canadian (1.0%), Indigenous-Canadian (0.5%), Multi-ethnic (4.3%), or Other (4.8%). The remainder of participants did not report ethnicity (9.6%). The majority of youth (64.6%) reported their perceived family SES to be "about the same" as the average Canadian.

Procedure

After receiving consent from supervisors of the extracurricular activities, adolescents were invited during a group meeting to participate in a study on adolescent peer relationships. Interested individuals were provided with an envelope that included a parental consent form, an adolescent assent form, an identification number, and an online link to questionnaires. Both the consent and assent forms were required to be completed and returned for data to be used. Questionnaires were presented in random order online. At a prearranged date approximately one week later, completed consent and assent forms were collected, participation

was verified using identification numbers, and participants were compensated with $15.

Measures

Psychopathic traits

To assess psychopathic traits, participants completed the 20-item self-report version of the Antisocial Process Screening Device (APSD; Frick & Hare, 2001), which provides an assessment of the multifaceted psychopathy construct (Salekin, 2017), including impulsivity/daring-impulsive (e.g., "You act without thinking of the consequences"), callous-unemotional (e.g., "You are concerned about the feelings of others" [reverse-coded]), and narcissism/ grandiose-manipulative traits (e.g., "You think you are better or more important than other people"). We computed both the mean overall score and facet scores. Items were rated on a three-point scale ($0 = $ *not at all true* to $2 = $ *definitely true*). Higher scores reflected higher psychopathic traits. The scales showed acceptable internal consistency (overall: $\alpha = .76$, impulsivity: $\alpha = .67$, callous-unemotional: $\alpha = .50$, narcissism: $\alpha = .70$).

Socially adaptive outcomes

Social power

To assess the socially adaptive outcome of social power, six items adapted from various papers on social and material resource control were used (Hawley et al., 2008). The items included: "I am good at being able to get what I want from others." (Item 1), "I usually get what I need, even if others don't." (Item 2), "I am able to get others to do what I say." (Item 3), "I have a lot of power over others." (Item 4), "In groups I am usually in charge or in control." (Item 5), and "I usually get my way when I deal with others." (Item 6). Each item was rated on a five-point scale ($1 = $ *never true* to $5 = $ *almost always true*).

Dating behavior

To assess developmentally appropriate dating resources, items assessing dating frequency, dating partners, and sexual partners were used to assess dating behavior. Participants answered the following questions: "How often do you go on dates with a girl/boy, just the two of you?", "How many different people have you gone on dates with, just the two of you?", and "How many sexual partners have you had a voluntary sexual experience with (i.e., more than kissing or making out) since the age of 12?" Participants responded to the first question on a five-pont scale ($1 = $ *never* to $5 = $ *very often*) and responded with a numeric value for the remaining questions.

Self-perceived adverse environmental factors

Perceived family SES

To assess perceived family SES, participants were asked, "Compared to the average Canadian, do you think your family is . . ." The item was rated on a five-point scale ($1 = $ *a lot less rich*, $2 = $ *less rich*, $3 = $ *about the same*, $4 = $ *more rich*, and $5 = $ *a lot more rich*).

Parental neglect

To assess parental neglect, participants completed 15 items for each parent (i.e., mothers and fathers) from the parental neglect subscale of the Parental Acceptance-Rejection Questionnaire (Rohner, 1984, 2004). A sample item includes, "Pays no attention to me as long as I do nothing to bother him/her." Each item was

rated on a four-point scale ($1 = $ *almost never true* to $4 = $ *almost always true*). An average was computed for mothers ($\alpha = .86$) and fathers ($\alpha = .85$) separately, and then an average of the two ($r = .72$) was computed for a final neglect score. Higher scores reflected higher perceived parental neglect.

School social competition

To assess school social competition, participants completed six items on the Desire for Social Success subscale of the Social and Academic Competition Scale (SACS; Sutton & Keogh, 2000). An example item is, "I don't try hard in class because people won't like me if I do." Each item was rated on a four-point scale ($1 = $ *strongly disagree* and $4 = $ *strongly agree*). An average of all items was used, and higher scores reflected higher perceived school social competition ($\alpha = .63$).

Neighborhood violence

To assess neighborhood violence, participants completed five items on the Children's Exposure to Community Violence Scale (Richters & Martinez, 1993 used by Low & Espelage, 2014). An example of an item is, "I have seen somebody arrested." Each item was rated on a four-point scale ($1 = $ *never* and $4 = $ *often*). An average of all items was used, and higher scores reflected higher perceived neighborhood violence ($\alpha = .74$).

Results

Preliminary analyses

SPSS 24 was used for preliminary analyses. The maximum number of missing values for the key variables of interest was 2.0% or less, except for the number of sexual partners variable which had 12.9% missing and the number of dating partners which had 8.8% missing. This was expected given that some adolescents may not have begun dating and could have left the question blank although they had the option to indicate zero or skip this question. However, Little's MCAR test indicated no significant differences in the pattern of results between participants who were missing and not missing data on study variables (χ^2 (323) = 362.563, $p = .064$). Therefore, Full Information Maximum Likelihood estimation was used to deal with missing cases. All variables met the assumptions of normality, except for the number of dating partners and number of sexual partners. These two variables also had extreme univariate outliers. Six outliers beyond 3.30 standard deviations were winsorized for each variable to maintain rank ordering but reduce impact on the variables. Winsorizing outliers also reduced skewness and kurtosis values for both variables and were within limits for structural equation modeling (< 10; Kline, 2016). The significant correlations ranged from small to moderate in size (see Table 1 for correlations, means, and standard deviations).

Primary analyses with overall psychopathy scores

Structural equation modeling (SEM) was conducted on *Mplus* version 8.7 (Muthén & Muthén, 2020) to assess whether perceived adverse environmental factors were significantly associated with psychopathic traits, and in turn, whether psychopathic traits were significantly associated with social power and dating behavior, as two indicators reflecting socially adaptive outcomes. First, measurement models were conducted on the dependent variables (i.e., social power and dating behavior) using confirmatory factor analysis. For each latent variable, one indicator path intercept was set to zero and the factor loading was set to 1.0 to allow the means

Table 1. Correlations, means, and standard deviations for environments, psychopathic traits, and socially adaptive outcomes

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	—	−.05	−.04	.15**	.01	.20**	.20**	.14**	.09	.11*	.06	.01	.20*	.38**	.41**	.36**
2. Gender^a		—	−.06	−.11*	−.08	−.11*	−.16**	−.04	.02	.01	−.06	.03	−.05	−.15**	−.16**	−.04
3. Perceived family SES			—	−.10	.10	−.10*	.02	.26**	.17**	.17**	.21*	.10*	.17**	.02	−.05	−.17**
4. Perceived parental neglect				—	.20**	.26**	.32**	.02	−.05	.11*	.13*	.02	.02	.18**	.20**	.18**
5. Perceived school competition					—	.14**	.33**	.20**	.13*	.27**	.32**	.14**	.16**	.15**	.17**	.01
6. Perceived neighborhood violence						—	.34**	.07	−.06	.05	.04	−.04	.04	.21**	.30**	.21**
7. Psychopathic traits							—	.32**	.07	.34**	.31**	.08	.20**	.24**	.28**	.24**
8. Good at getting what I want								—	.42**	.59**	.55**	.36**	.49**	.27**	.24**	.09
9. Get what I need, even if others don't									—	.39**	.42**	.28**	.43**	.14**	.06	.05
10. Get others to do as I say										—	.64**	.47**	.49**	.10*	.14**	.05
11. Have power over others											—	.45**	.50**	.19**	.24**	.05
12. In charge in groups												—	.41**	.09	.07	.06
13. Get what I want dealing with others													—	.14**	.17**	.06
14. Dating frequency														—	.60**	.43**
15. Dating partners															—	.63**
16. Sexual partners																—
Mean (SD)	14.64 (1.52)		3.09 (.65)	1.77 (.46)	2.12 (.46)	1.38 (.48)	0.54 (.25)	2.73 (1.04)	2.93 (.97)	2.55 (1.00)	2.37 (1.03)	2.90 (1.11)	2.76 (1.00)	1.94 (1.26)	1.12 (1.68)	0.63 (1.43)

Note. $N = 396$. SES = Socioeconomic Status. *$p < .05$, **$p < .01$.
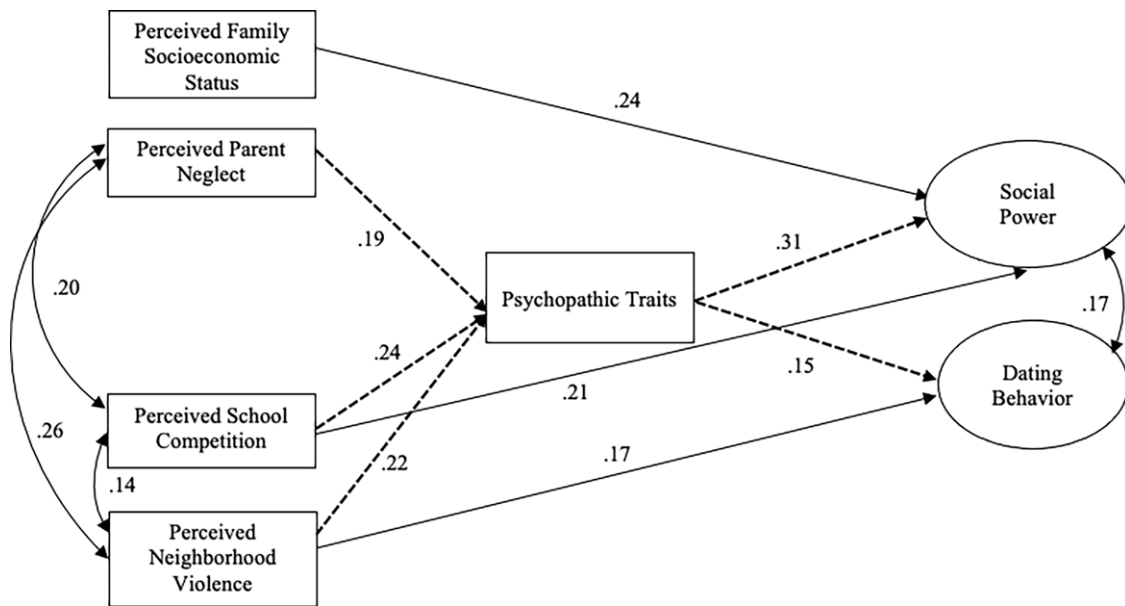^aGender coded as 1 = Boy, 2 = Girl.

Figure 1. Significant direct and indirect paths for perceived environments, psychopathic traits, and socially adaptive outcomes. Note. Solid line reflects significant direct paths whereas dashed line reflects significant direct and indirect paths; control variables (age, gender), disturbances, and errors are not shown for simplicity of presentation. Values represent correlations or standardized path coefficients.

and variances of latent factors to be estimated. Second, a structural model was conducted by estimating paths from the four adverse environmental variables (i.e., family SES, parental neglect, school social competition, neighborhood violence) to psychopathic traits, and the paths from psychopathic traits to the two socially adaptive outcomes. Given that the adverse environmental variables could have associations with the two outcomes independent from psychopathic traits, we also estimated the direct paths from the environment variables to the two outcomes. We controlled for gender and age by allowing these variables to be correlated with one another and the four environment variables, and by estimating paths from age and gender to psychopathic traits and the two outcomes. Finally, the two outcomes were allowed to covary. We estimated the model using maximum likelihood estimation with robust standard errors (MLR) to account for non-normal distribution of the variables. Once determining the significant direct paths, we tested for significant indirect effects from the environmental variables to the socially adaptive outcomes through psychopathic traits using bootstrapping with 5,000 samples and maximum likelihood estimator. We used 95% confidence intervals that did not cross zero to determine significant indirect effects (Biesanz et al., 2010). Model fit was assessed with the following criteria: root mean square error of approximation (RMSEA) with values of less than .06, the comparative fit index (CFI; Hu & Bentler, 1999) with values greater than .95, and a standardized root mean square residual (SRMR) value less than .08 (Kline, 2016). Non-significant chi-square values can also be indicative of good model fit, but this test is sensitive to sample sizes.

The confirmatory factor analysis for social power revealed a good fit to the model, $\chi^2(9) = 14.233$, $p = .114$; CFI = .990; RMSEA = .038, 90% CI [.000,.074]; SRMR = .025. Standardized factor loadings ranged from .547 to .790. As the latent dating behavior variable had three indicators the model was saturated and indicators of model fit were not informative. Standardized factor loadings ranged from .643 to .941. The overall structural model seen in Figure 1 had adequate fit, $\chi^2(75) = 160.182$, $p < .001$;

CFI = .934; RMSEA = .054, 90% CI [.042, .065]; SRMR = .041. Although the CFI value was slightly below the cut off, this indicator is likely due to the number of parameters estimated, and the RMSEA and SRMR values demonstrated acceptable fit (Hu & Bentler, 1999).

Direct effects

Results of the SEM indicated that parental neglect, school social competition, and neighborhood violence were each significantly positively associated with psychopathic traits (see unstandardized and standardized regression coefficients in Table 2). Parental neglect, school social competition, and neighborhood violence were also significantly positively associated with one another. Hence, three of the four perceived environmental variables showed unique associations with psychopathic traits beyond their shared variance. Psychopathic traits, school social competition, and family SES were significantly positively associated with social power. Psychopathic traits and neighborhood violence were also positively associated with dating behavior. Thus, psychopathic traits were uniquely associated with social power and dating behavior beyond the variance accounted for by the perceived environmental variables. With respect to covariates, being older was significantly positively associated with neighborhood violence, parental neglect, psychopathic traits, and both outcomes. Being a boy was significantly positively associated with neighborhood violence, parental neglect, and psychopathic traits.

Indirect effects

Given the significant paths from three of the environmental variables to psychopathic traits and the significant paths from psychopathic traits to the two outcomes, we examined whether there were significant indirect effects from these three environmental variables to the socially adaptive outcomes through psychopathic traits. For social power, there were significant indirect effects through psychopathic traits from parental neglect ($b = .097$, $se = .038$, $\beta = .059$, 95% CI [.039, .186]), school social

Table 2. Direct paths between environments, psychopathic traits, and socially adaptive outcomes

	Dependent variables					
	Psychopathic traits		Social power		Dating behavior	
Independent variables	B(SE)	β	B(SE)	β	B(SE)	β
Age	.02(.01)**	.12	.06(.03)*	.12	.41(.05)***	.41
Gender[a]	−.04(.02)*	−.09	.07(.08)	.04	−.28(.16)	−.09
Perceived family SES	.01(.02)	.04	.28(.06)***	.24	−.07(.13)	−.03
Perceived parental neglect	.10(.03)**	.19	−.04(.10)	−.02	.19(.20)	.06
Perceived school competition	.13(.03)***	.24	.35(.10)**	.21	.26(.20)	.08
Perceived neighborhood Violence	.12(.03)***	.22	−.11(.08)	−.07	.54(.19)**	.17
Psychopathic traits	–	–	.93(.19)***	.31	.88(.36)*	.15
R^2	.26		.26		.35	
N	396					

Note. Values represent unstandardized regression coefficients (*B*), unstandardized coefficient standard errors (*SE*), and standardized regression coefficients (*β*). SES = Socioeconomic Status.
*$p < .05$, **$p < .01$, ***$p < .001$.
[a]Gender coded as 1 = Boy, 2 = Girl.

Table 3. Direct paths between environments, facets of psychopathy, and socially adaptive outcomes

	Dependent variables									
	Impulsivity		Callous−unemotional		Narcissism		Social power		Dating behavior	
Independent variables	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β	B(SE)	β
Age	.03(.01)*	.11	−.01(.01)	−.01	.02(.01)	.09	.06(.03)*	.11	.41(.05)***	.41
Gender[a]	−.03(.04)	−.05	−.10(.03)**	−.15	−.02(.03)	−.03	.02(.08)	.01	−.33(.16)*	−.10
Perceived family SES	−.02(.03)	−.04	−.01(.02)	−.02	.07(.02)**	.14	.24(.06)***	.20	−.09(.13)	−.04
Perceived parental neglect	.02(.05)	.02	.23(.04)***	.32	.06(.04)	.08	.07(.10)	.04	.29(.20)	.09
Perceived school competition	.06(.04)	.07	.11(.04)**	.16	.21(.04)***	.29	.32(.09)**	.20	.28(.20)	.09
Perceived neighborhood violence	.17(.04)***	.22	.07(.03)	.10	.10(.04)**	.14	−.08(.07)	−.05	.57(.19)**	.18
Impulsivity	–	–	–	–	–	–	.10(.12)	.05	.23(.26)	.06
Callous−Unemotional	–	–	–	–	–	–	−.28(.15)	−.12	−.25(.25)	−.05
Narcissism	–	–	–	–	–	–	.81(.15)***	.36	.52(.27)	.12
R^2	.09		.22		.17		.30		.35	
N	396									

Note. Values represent unstandardized regression coefficients (*B*), unstandardized coefficient standard errors (*SE*), and standardized regression coefficients (*β*). SES = Socioeconomic Status.
*$p < .05$, **$p < .01$, ***$p < .001$.
[a]Gender coded as 1 = Boy, 2 = Girl.

competition ($b = .123$, $se = .036$, $β = .076$, 95% CI [.064, .207]), and neighborhood violence ($b = .109$, $se = .032$, $β = .069$, 95% CI [.058, .186]). For dating behavior, there were also significant indirect effects through psychopathic traits from parental neglect ($b = .092$, $se = .050$, $β = .028$, 95% CI [.020, .214]), school social competition ($b = .117$, $se = .054$, $β = .036$, 95% CI [.030, .247]), and neighborhood violence ($b = .103$, $se = .052$, $β = .032$, 95% CI [.023, .230]). Thus, unique indirect paths were observed from each of the three perceived environmental variables (parental neglect, school social competition, and neighborhood violence) to both outcomes of social power and dating behavior through higher levels of psychopathic traits.

Secondary analyses with psychopathy facet scores

The same model structure was repeated but replacing overall psychopathy scores with the three psychopathy facet scores

(e.g., impulsivity, callous-unemotional, and narcissism). The overall structural model had adequate fit, $χ^2(89) = 172.48$, $p < .001$; CFI = .934; RMSEA = .049, 90% CI [.038, .059]; SRMR = .040, which resembled the fit for the model using overall scores.

Direct effects

The overall SEM showed that different environments were uniquely associated with different psychopathy facets (Table 3; see also Supplemental Table S1 for bivariate correlations). When controlling for shared variance among the environments, family SES was only significantly positively associated with narcissism, whereas parental neglect was only significantly positively associated with callous-unemotionality. School social competition was significantly positively associated with both callous-unemotionality and narcissism, but neighborhood violence was positively

linked with impulsivity and narcissism. For the outcome variables of social power and dating behavior, only narcissism was significantly positively associated with social power.

Indirect effects

We examined the possible indirect effects between perceived environments and socially adaptive outcomes via the facets of psychopathy (see Supplemental Figure S1). The results showed that for social power, there were significant indirect effects through the narcissism facet from family SES ($b = .061$, $se = .024$, $\beta = .052$, 95% CI [.020, .117]), school social competition ($b = .170$, $se = .044$, $\beta = .104$, 95% CI [.095, .266]), and neighborhood violence ($b = .082$, $se = .036$, $\beta = .051$, 95% CI [.022, .164]). Thus, when modeling the facets separately, we found that perceived environmental variables (family SES, school social competition, and neighborhood violence) were significantly and indirectly linked to social power through the effects of the narcissism facet specifically.

We performed post hoc power analyses to examine our sample size adequacy using the Monte Carlo approach (Muthén & Muthén, 2002). The estimates from the present structural equation models were used as population parameter values for data generation and coverage in the Monte Carlo simulation using 1000 replications. For the key direct paths of interest, all power in our models were greater than .79.

Discussion

Our data suggest that adolescent psychopathic traits may be associated, at least in part, with acquiring socially adaptive outcomes in adverse environments. More specifically, adolescent psychopathic traits significantly indirectly linked self-perceived adverse environments to the evolutionarily relevant social outcomes of social power and dating behavior. This means that youth perceiving adverse conditions at home, in school, and in their neighborhood may have higher levels of psychopathic traits, potentially as an adaptive, learned response to these environments and as a means to acquire socially valued outcomes that can be classified as evolutionarily relevant (i.e., dating, social power). Thus, in adolescence, psychopathic traits may be adaptive within adverse environments for acquiring socially adaptive outcomes, even despite their societal costs and eventual individual costs into adulthood (Auty et al., 2015). In contrast, warmer and less hostile environments may inhibit the learning and/or expression of psychopathic traits as their emergence may be less adaptive in environments that evince more prosocial values, or their expression in such environments may not as readily translate into acquiring socially valued outcomes. We first discuss our findings with overall psychopathic traits and then discuss our findings on the facets of psychopathy.

Overall psychopathy, adverse environments, and socially adaptive outcomes

Beginning with our direct paths (see Table 2), psychopathic traits were positively and uniquely related to self-perceptions of parental neglect, school competiton, and neighborhood violence. These findings are consistent with existing literature that shows links between multiple layers of adverse environments and psychopathy (e.g., Fisher & Brown, 2018; Schraft et al., 2013; de Ruiter et al., 2022). Importantly, our path model controlled for the shared variance among the environmental variables, which suggests that each of the three levels of perceived environmental adversity were incrementally associated with psychopathic traits over and above

the effects of each other. Psychopathic traits, however, were not related to self-reported family SES which also fits with the mixed evidence regarding SES and psychopathy presented in the literature (Markowitz et al., 2015; Zwaanswijk et al., 2018). Adolescent psychopathic traits were positively related to social power and dating behavior, both of which are consistent with previous adult research (Glenn et al., 2017; Međedović et al., 2017). As mentioned above, our path model also suggested that psychopathic traits may be uniquely associated with both of these outcomes after accounting for the other predictors in the model (e.g., environments, demographics).

Social power was also related to higher SES and school competition. This suggests that adolescents who had access to greater financial resources may be better able and/or more willing to exert social power. In this case, coming from a financially supportive environment could serve as a predictor of social power. The relationship between greater school competition and higher social power could suggest that social power may be most associated with wealthy adolescents who experience competitive schooling. On the other hand, the only environment variable that was associated with more dating behavior was neighborhood violence. These data suggest that a hostile and volatile neighborhood environment might facilitate an advanced dating experience in adolescents, which is consistent with some prior work (Wilson & Daly, 1997). Overall, our findings suggest that different types of evolutionarily relevant outcomes (e.g., social power and dating behavior) can be differentially associated with higher and lower levels of adverse environments as well as psychopathic traits.

Although only neighborhood violence was directly linked to dating behavior and family SES and school competition were directly associated with social power, we found several indirect links between three of the four environmental variables and socially adaptive outcomes through psychopathic traits. Parental neglect, school social competition, and neighborhood violence were each indirectly linked to both social power and dating behavior through higher psychopathic traits. The findings suggest psychopathic traits may provide a link between perceiving multiple independent adverse environments – including parental, school, and neighborhood levels – and socially adaptive outcomes such as social power and dating behavior. The paths were modeled with their shared variance taken into account, meaning parental neglect (as well as school competition and neighborhood violence) was uniquely associated with higher social power and dating behavior via higher psychopathic traits after accounting for the other environmental variables. Thus, each environmental factor may have a unique and independent influence on socially adaptive outcomes in adolescence via psychopathic traits. In addition to these unique paths, however, it would be informative to examine cumulative or interactive risk among multiple negative environments, psychopathic traits, and socially adaptive outcomes (e.g., Baglivio et al., 2020).

The indirect paths are consistent with the hypothesis that psychopathic traits may serve as a response linking adverse environments to social resources (Book et al., 2019; Patch & Figueredo, 2017; Ribeiro da Silva et al., 2015). Our data replicate the indirect pathway between adverse environments, psychopathy, and sexual partners found in adults (Međedović, 2019) and extend those results to include social power and adolescent data. The fact that these indirect relationships existed for adverse social cues involving parents, school, and neighborhood but not adverse financial/SES cues suggests that cues from social or relational environments could be more relevant for psychopathic traits than

cues from adverse financial or material environments and/or that cues from the latter might be mixed with respect to psychopathic traits and adaptive outcomes (Zwaanswijk et al., 2018). Further research is necessary to understand whether and how SES might be linked with psychopathy (Bégin et al., 2023; see also discussion below).

What do these data suggest about the developmental factors underlying psychopathic traits? Researchers have previously suggested that environmental factors, particularly family factors, may play a role in the development of psychopathic traits (Farrington & Bergström, 2018). Building off this perspective with our results, youth who develop psychopathic traits could be influenced by negative social relationships that discourage prosocial behavior and instead facilitate the learning and/or expression of selfish, antisocial behavior, including obtaining power over peers and acquiring multiple dating partners. By adopting an evolutionary perspective, we suggest that this process could represent an example of how individuals (with their strengths and propensities) become matched to their surrounding environments, whether adverse or supportive, to maximize the probability of surviving and reproducing in those environments (Brazil, 2024; Ellis et al., 2012).

Although this perspective can help appreciate some of the logic that links psychopathy to adverse environments, it does not excuse any antisocial behavior associated with psychopathy. We strongly emphasize that an adaptive or learned response is not necessarily morally and socially desirable (Ellis et al., 2012). Thus, while our focus in this paper has been on the potential adaptive and functional benefits of youth psychopathic traits to understand why it exists, we stress that this observation must be viewed in light of the negative outcomes associated with psychopathic traits. Moreover, socially adaptive outcomes such as social power and dating behavior, while ultimately adaptive, can have more immediate costs if social power is a result of coercive, aggressive, or violent interpersonal relationships, or if dating behavior coincides with risky sexual behavior and/or coercive and violent dating relationships (Taquette & Monteiro, 2019). We emphasize the importance of interpretation and perspective. Taking an evolutionary view of psychopathic traits can inform *why* youth may be developing these traits in specific environments (i.e., for their adaptive benefits), but we recognize that other important perspectives focus on the reality of adverse psychological and social outcomes that arise from developing the traits as well. Both perspectives may be necessary to understand why such traits exist and how to successfully prevent them as early in development as possible.

We also stress that the developmental pathways implied in the indirect effects do not leave out the importance of genetics in the development of psychopathic traits (e.g., Schermer & Jones, 2020). Rather, our data argue that both genes and environments matter, with the latter possibly "unlocking" the expression of the former to lead to the developmental expression of psychopathic traits (e.g., Fox, 2017; Glenn, 2019; Mealey, 1995). Further, social learning processes and adopting the antisocial practices of adults in one's environment could co-facilitate this development along with individual differences in genetic background (i.e., social facultative adaptations; Rutherford, 2016), suggesting a need to understand both the social learning and genetic components involved both independently and interactively. We also note that our findings may generalize only to community adolescents and further research should examine similar models in justice-involved adolescents, where rates of psychopathic traits, antisocial behavior, and adversity tend to be higher (Baglivio et al., 2020; Forth et al., 2003).

Psychopathy facets, adverse environments, and socially adaptive outcomes

To facilitate comparison with research on the multiple dimensions of psychopathy, we refer to the APSD facets here with the more commonly used terms of daring-impulsive (DI) for the impulsivity facet, grandiose-manipulative (GM) for the narcissism facet, and callous-unemotional (CU; see Salekin, 2017). When controlling for the shared variance among environmental variables, we found unique associations to each of the psychopathy facets. Although overall psychopathy was unrelated to family SES, the single-item SES measure was associated positively with GM, which is consistent with some research showing a similar positive link between GM and SES in community populations of youth (Zwaanswijk et al., 2018). Building on theories of adolescents' abuse of power (Volk et al., 2022), this may indicate how excess wealth can facilitate the adoption of selfish or antisocial strategies as wealthier individuals have less need to maintain cooperation with others to get desired resources. When controlling for other environmental variables, parental neglect was uniquely associated with CU traits, but not the other dimensions. Higher neglect has been found to correlate with CU traits through the mediating pathway of lower maternal warmth (Bisby et al., 2017). Relatedly, lower maternal warmth is a risk factor for increasing levels of CU traits across adolescence and into adulthood (Ray, 2018). The directionality is difficult to decipher with our cross-sectional data though. Higher-CU youth may have compromised social affiliation (Viding & McCrory, 2019), which may affect how these youth interpret their social relationships – including as more neglectful – compared to lower-scoring youth.

School social competition was uniquely positively associated with both CU and GM traits after controlling for other environments' variance. Because CU traits have been found to correlate with negative school climate (Fisher & Brown, 2018) and negative academic performance (Frick & Hare, 2001), one possibility is that higher-CU youth may be compensating for a negative school climate by electing to invest in their social standing, which could snowball into (1) decreased academic interest and performance and (2) increased antisocial behavior toward peers to obtain status (van Geel et al., 2017). It is also not surprising that GM traits correlated with school social competition as GM is strongly associated with motivations for social status and holding socially competitive attitudes (Stellwagen & Kerig, 2013). The last environment variable, neighborhood violence, was uniquely associated with GM and DI traits, which corresponds to previous research using justice-involved youth (Schraft et al., 2013). The link with GM is also consistent with research showing GM tends to increase across adolescence and young adulthood when youth witness violence in their communities (Ray, 2018).

Regarding our socially adaptive outcomes, the facet findings were more limited. GM was uniquely associated with higher social power beyond the effects of the environment and the other psychopathy facets. This accords with research showing GM traits may be linked to leadership, social poise, and persuasiveness (Stellwagen & Kerig, 2013; Weiss et al., 2018). In contrast, none of the facets alone uniquely associated with dating behavior. The bivariate correlations, however, showed that each of the facets were positively linked with the items that formed the dating behavior latent variable (see Supplemental Table S1). Thus, when

controlling for shared variance among the facets, no unique relation remained between the facets and dating. It may therefore be the case that any adaptive benefits of dating associated with adolescent psychopathy require input from all three of the facets in order to be expressed (Brazil & Forth, 2020).

The final analysis using facets showed that only GM traits significantly mediated any unique links between the environment variables and socially adaptive outcomes. Specifically, higher SES, school social competition, and neighborhood violence were linked to higher social power via higher-GM traits. The findings with the latter two environment variables – school social competition and neighborhood violence – is in line with our social learning/adaptive hypotheses that adverse conditions may facilitate the acquisition of socially adaptive outcomes through the use of more psychopathic traits (GM traits specifically here). However, the indirect link with higher SES is counter to this hypothesis. Instead, this finding seems to suggest that *less* adversity (i.e., higher SES) was linked to higher social power via higher-GM traits. Because of the subjective nature of our SES item, one possibility is that higher-GM youth artificially inflated their SES because they perceive themselves as better than others. It may also be the case that higher SES is genuinely linked with higher-GM traits, which in turn impacts social power. Power facilitates aggressive acquisition of adolescents' status and resource goals (Andrews et al., 2023; Volk et al., 2022). In our case, it appears that a decision to use one's wealth (i.e., SES) in order to pursue those goals may be related to a desire to possess those resources (i.e., having higher of GM traits). Modest, honest individuals (lower GM) may be less interested in pursuing those goals and thus do not abuse their economic priviledge for their own gains. This suggests that environmental adversity per se might not fully explain higher psychopathic traits, but rather those traits could be the result of the right mixture of hostile and competitive environments that foster selfish and individualistic motives (e.g., GM) alongside environmental affordances that increase the ability of individuals to successfully employ selfish and individualistic (versus cooperative) strategies in those environments. In this way the environment can be seen as increasing both the motivation and the reward for developing and employing psychopathic traits.

Limitations and future directions

Our data largely support the hypothesis that adolescent psychopathic traits may represent an adaptive response to adverse social environments. However, our current data cannot demonstrate a causal direction or linkage, leaving the possibility that adolescents with more psychopathic traits may either elicit or seek adverse environments as well. We also used self-report measures for each construct, including perceptions of the different levels of the environment, suggesting the possibility that our results could have been influenced by shared method variance and/or common dispositional characteristics that may have influenced how participants responded to the three sets of variables in our model. It could also be the case that youth with psychopathic traits have a general negative perception of their environment (Altikriti & Nedelec, 2020). Although youth perceptions are important to examine, future research could also examine aspects of the environment and social outcomes using measures beyond youth perceptions, including neighborhood crime rates, parental employment, observations at school and home, and peer nominations of social power and dating outcomes. Our measure of school social competition, in particular, may be limited in how it directly captured adversity in the youth's school independent of the

youth's perceptions of or motivations for school. The items at least indirectly capture a more competitive and adverse social climate (e.g., "I don't always try hard in class because *people won't like me if I do*" [emphasis added]), but future research should aim to examine more direct and objective measures of school climate (e.g., number of student suspensions). It may also be important to extend the research using a clinical measure of adolescent psychopathy (Forth et al., 2003).

Another limitation of our study was that we used a general sample of adolescents from a predominantly White, middle-class Canadian region. We thus lack the full range of environmental stressors and psychopathic traits that may be found in more adverse contexts (e.g., juvenile detention centers), which may have reduced our ability to detect effects. Indeed, effect sizes for our direct and indirect effects were small. Although we expect that such extra variance would strengthen our findings (Ometto et al., 2016), it remains possible that greater variation may end up causing other patterns to emerge. Further, although we controlled for age and gender, our data do not cover childhood, pre-adolescence, or late adolescence, and therefore do not present an overall picture of development across time or across genders. Lastly, although our indirect effects imply a developmental path, our cross-sectional data precludes such a conclusion, and we again call for longitudinal and/or experimental research across childhood and adolescence to test multiple theoretically based hypotheses more directly, including the use of cross-lagged models (Davis et al., 2022). Moreover, we recognize there are alternative, statistically equivalent models possible with our cross-sectional data (e.g., socially adaptive outcomes indirectly linking social environments to psychopathic traits). Although we selected our model based on theory and prior evidence, longitudinal and/or experimental data may be helpful in further testing these alternative and equivalent models. We were also limited in modeling only some measures as latent variables because of poor model fit and our moderate sample size, so we encourage future work to examine all measures as latent variables with larger sample sizes.

As mentioned above, our findings are consistent with both social learning and evolutionary perspectives. Further research that takes into consideration both perspectives could help tease apart predictions made by each. For example, although our study considered desirable and/or adaptive outcomes (i.e., social power, dating), other outcomes could be assessed as well, including those that are undesirable and/or maladaptive (e.g., disease prevalence, injuries, social rejection). Future work could also consider how these perspectives might be combined to create a comprehensive developmental model of psychopathy and other antisocial traits (Ellis et al., 2012; Frick & Viding, 2009).

Conclusion

Overall, our data suggest that psychopathic traits may serve as an indirect link between adverse environments and adaptive outcomes such as social power and dating behavior. Our data may suggest an explanation for why it can be difficult to treat or alter psychopathic traits (Salekin, 2017); because adolescents may gradually learn that those traits may provide individual benefits for them in environments characterized by negative social relationships. If adolescents are benefiting from psychopathic traits when they are in these adverse environments, interventions will need to consider addressing and reducing those benefits alongside treatments aimed at promoting prosocial behavior and relationships.

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