Published in final edited form as:

J Child Psychol Psychiatry. 2018 December ; 59(12): 1252–1260. doi:10.1111/jcpp.12914.

Police contacts, arrests and decreasing self-control and personal responsibility among female adolescents

Alison E. Hipwell^{1,2}, Joseph Beeney¹, Feifei Ye³, Sabrina H. Gebresellassie², Madeline R. Stalter², Dyuti Ganesh², Kate Keenan⁴, and Stephanie D. Stepp^{1,2}

¹Department of Psychiatry, University of Pittsburgh, USA

²Department of Psychology, University of Pittsburgh, USA

³RAND Corporation, Pittsburgh, USA

⁴Department of Psychiatry and Behavioral Neuroscience, University of Chicago, USA

Abstract

Background—Female involvement in the juvenile justice system (JJS) has increased rapidly in recent years. Although deficits in self-control and responsibility are associated with delinquency and higher rates of police contacts and arrests, much of this research has focused on males and/or selected samples of youth who already have a history of JJS involvement. Furthermore, little is known about the extent to which police contacts and arrests may disrupt normative psychosocial maturation.

Methods—Police contacts, arrests, levels of self-control and personal responsibility were assessed annually between 12 and 17 years in a population-based sample of 2,450 adolescent females. Fixed-effects regression models, which control for stable individual characteristics, were used to examine whether within-adolescent changes in self-control and responsibility were associated concurrently and prospectively with police contacts and arrests, and *vice versa*.

Results—Across adolescence, 5-12% participants reported police contacts and 1-4% were arrested. After adjusting for covariates, within-person increases in self-control and responsibility were associated concurrently with decreased odds of police contact. Increasing responsibility also predicted lower likelihood of police contact in the following year. When testing reverse causation, results showed that police contact predicted next year decreases in personal responsibility, and that being arrested predicted decreasing levels of self-control and responsibility in the following year.

Conclusions—The study shows more clearly than previous work that increasing levels of responsibility precede decreased police contact in non-selected adolescent females, and that contacts with the justice system during adolescence may delay or undermine normative psychosocial maturation, highlighting important targets for intervention.

Correspondence: Alison Hipwell, University of Pittsburgh Medical Center – Western Psychiatric Institute & Clinic, 3811 O'Hara Street, Pittsburgh, Pennsylvania 15213, United States; hipwae@upmc.edu.

The authors have declared that they have no competing or potential conflicts of interest.

Keywords

Females; adolescents; police contacts; arrest; self-control; responsibility

Introduction

Female delinquency is a major social and public policy issue in the United States (Chesney-Lind & Pasko, 2012; Zahn et al., 2010). Although rates of adolescent delinquency are generally lower among females than males (Hanes, 2010; Loeber & Farrington, 2012), the severity of delinquency across genders is similar in mid-adolescence (Moffitt, Caspi, Rutter, & Silva, 2001), and by late adolescence, female adolescents who show persistent patterns of delinquency are as criminally active as their male peers (Blokland & Palmen, 2012).

National statistics indicate that girls account for nearly 30% of juvenile arrests (Puzzanchera, Adams, & Hockenberry, 2012); a rate that has almost doubled in the past 30 years (Sickmund & Puzzanchera, 2014). Research has also shown that girls' experience of the JJS differs in substantive ways from boys (Sickmund, Sladky, Kang, & Puzzanchera, 2015), and that the stigma and social costs associated with these contacts may be greater (Estrada & Nilsson, 2012). Despite these concerning trends, little is known about the ways in which justice system contacts intersect with girls' development.

Several criminological and psychological theories highlight a critical role for low self-control in the development of delinquency (Gottfredson & Hirschi, 1990; Steinberg & Cauffman, 1996). From a psychological perspective, self-control is conceived as a normative maturational process that increases with development; a view that is largely consistent with decreasing prevalence of antisocial behavior from mid- to late-adolescence (Piquero, 2008; Steinberg & Cauffman, 1996). Likewise, research has demonstrated that low self-control in late childhood predicts persistent and increasing delinquent behavior (Loeber et al., 2012; Longshore, Chang, & Messina, 2005; Moffitt et al., 2011; Schoepfer & Piquero, 2006), and that improvements in self-control precede delinquency desistance (Monahan, Steinberg, Cauffman, & Mulvey, 2009; Steinberg, 2009). Studies have also shown associations between impaired self-control and encounters with the justice system, over and above the shared links with delinquency (Beaver, DeLisi, Mears, & Stewart, 2009). Thus, individuals with low self-control may be more likely to engage in impulsive, reactive and defiant behaviors that antagonize law enforcement and influence policing decisions (e.g., whether to stop, arrest or target individuals for formal or tougher processing) (DeLisi & Berg, 2006; J. M. Miller, Miller, & Barnes, 2007). These maturational factors may be especially critical for determining outcomes among adolescents, given that the JJS is mandated to be more lenient in cases where the individual seems amenable to rehabilitation (Leiber & Mack, 2003). However, because most extant research has focused on male samples, and the development of self-control is known to vary by gender (Chapple, Vaske, & Hope, 2010; Gibson, Ward, Wright, Beaver, & DeLisi, 2010), the extent to which poor self-control in female adolescents predicts justice system contacts is not known.

Theories of delinquency also converge on personal responsibility as an important predictor of antisocial behavior. Social Control theory purports that individuals who adopt socially

approved attitudes and values, are less likely to engage in criminality (Sampson & Laub, 2003). The psychological view describes attributes of personal responsibility (e.g. the ability to act independently, be aware of personal strengths and weaknesses) as components of psychosocial maturation that reduce the likelihood of delinquency (Steinberg & Cauffman, 1996). Indeed, research on serious juvenile offenders has shown that low levels of personal responsibility are inversely related to antisocial behavior (Cauffman & Steinberg, 2000), and that deficits in the development of responsibility in the years following adjudication are linked to more persistent offending into adulthood (Monahan, Steinberg, Cauffman, & Mulvey, 2013). Although there is also some evidence for an association between levels of responsibility and delinquency among adolescent girls (Gaffney & McFall, 1981), we are not aware of any prospective studies that have examined developmental change in personal responsibility as a risk factor for female adolescent contact with the justice system.

There has long been interest in the extent to which JJS contacts influence later outcomes and social adaptation. For some adolescents, law enforcement contact is a deterrent that reduces re-offending and encourages psychosocial maturity (Welsh et al., 2012). However, other adolescents show persistent or escalating delinquency, and contacts with the justice system that continue into adulthood (Petrosino, Turpin-Petrosino, & Guckenburg, 2013; Wiley & Esbensen, 2016). Given evidence of protracted development across adolescence of brain systems responsible for self-regulation (Steinberg, 2010), and behavioral data showing the malleability of self-control (Baumeister, Vohs, & Tice, 2007), it is possible that the type and timing of justice system contacts could negatively impact normative maturation in ways that set the stage for further problems (National Research Council, 2013). A few studies of serious juvenile offenders suggest that JJS involvement may impair or slow the development of psychosocial maturation. For example, Schaefer & Erickson (2016) reported that adolescents who were arrested and confined prior to age 18, had lower levels of personal responsibility in early adulthood than arrested, but not confined individuals. Their results also showed that young adults who had been arrested in adolescence had lower levels of self-control compared with adults with no history of arrest. However, the same group differences in psychosocial maturity were evident in the prior (adolescent) assessment wave, suggesting that the observed effects may have simply reflected continuities in pre-existing differences, and did not necessarily reflect negative effects of justice system involvement. Nevertheless, other longitudinal research with serious juvenile offenders has shown that time spent in a correctional facility is associated with short-term declines in self-control and personal responsibility (Dmitrieva, Monahan, Cauffman, & Steinberg, 2012).

The links between self-control and responsibility and contacts with the justice system have predominantly been supported by research in samples of males who are known offenders. However, selection factors in such samples (e.g., greater likelihood of future delinquency) may influence these findings (Mulvey et al., 2010). Such selection biases make it difficult to determine: a) whether impaired psychosocial maturation is a unique predictor of justice system contacts; and b) whether justice system contacts lead to subsequent impairments in self-control and responsibility. In community samples, the police are usually the first, and only, criminal justice officials with whom adolescents have contact. In recent years, the frequency of these contacts has increased as zero-tolerance policies and collaborations between schools and law enforcement have become common in the U.S. (Petteruti, 2011;

Wright, McMahon, Daly, & Haney, 2012). Despite this trend, it remains unclear whether low self-control and personal responsibility predict police contacts and arrests among female adolescents in the population-at-large, and whether these contacts could negatively impact normative psychosocial maturation.

Finally, most research examining associations between justice system contact and adolescent development has focused on between-individual differences, to address questions such as: ‘on average, are adolescents with low self-control more likely to be arrested at the next time-point?’ Such an analytic approach leaves open the possibility that changes in both development and justice system contact are explained by unmeasured third variables such as severity of delinquent behavior, involvement with deviant peers, positive parenting and academic ability (Burt, Simons, & Simons, 2006; Chapple, 2005; Duckworth & Seligman, 2005; McGloin & Shermer, 2009). Traditional between-person approaches (e.g. regression models) also run the risk of obscuring meaningful fluctuations in maturational development *within* individuals over time (Collins, 2006) that could predict future police contact or arrest. In contrast, fixed effects models provide a more stringent test of the prospective effects of psychosocial maturity on justice system contacts and *vice versa*, because subjects serve as their own controls across multiple data points and therefore *all* stable characteristics of the individual are controlled, even if those characteristics cannot be measured (Allison, 2009; Halaby, 2004).

The current study examines the prospective associations between maturation in self-control and personal responsibility and justice system contact in a population-based sample of females followed across adolescence. We hypothesized that within-individual increases in self-control and responsibility would reduce the probability of police contact and arrest among females from 12 to 17 years of age. We also hypothesized that police contact and arrest would negatively impact adolescent development of self-control and responsibility. We tested these hypotheses with fixed-effects models to examine within-individual associations between maturational changes and the probability of justice system contacts. This approach enabled all time invariant, pre-existing differences between individuals to be accounted for, while also controlling for the time-varying effects of low SES, delinquency severity, affiliation with deviant peers and positive parenting to increase the specificity of our conclusions.

Method

Participants

Data were drawn from the Pittsburgh Girls Study (PGS; $N=2,450$), a population-based longitudinal study of the development of disruptive behavior problems in girls that began in childhood (ages 5-8 years in wave 1). The sample was formed in 2000-2001 following enumeration of 103,238 households in the City of Pittsburgh in the prior year: every household in low-income neighborhoods, and 50% of households in all other neighborhoods were contacted to determine study eligibility (see Hipwell et al., 2002; Keenan et al., 2010). Approximately half of the wave 1 sample was African American (53%), 41% was European American, and 6% of girls were described as multiracial or another race. More than one-

third (39%) of households received public assistance (e.g., WIC, food stamps, welfare), 41% girls lived with a single parent, and 17% of caregivers had fewer than 12 years of education.

Annual face-to-face interviews were conducted with the primary caregiver (>90% biological mother) until the girl participants were age 17. Separate interviews with the girls began at age 7, and continue into adulthood. Here we focus on the adolescent period (ages 12-17, assessment waves 5-13) when juvenile arrests began, and when caregiver and girl reports were available. Sample retention across assessment waves 5 to 13 ranged from 93.1% to 86.1%.

Approval for all study procedures was obtained from the University of Pittsburgh Human Research Protection Office. Written informed consent from the caregiver and verbal assent from the girl/adolescent were obtained through age 17.

Measures

Demographic data—Demographic data were collected via caregiver report using questions about household structure (0=dual parent, 1=single parent headed household), minority race (0=European American, 1=African American and other race), and household poverty (0=none, 1=receipt of public assistance).

Self-control and personal responsibility—Self-control and personal responsibility was assessed via caregiver report using the Social Skills Rating Scale (SSRS; Gresham & Elliott, 1990) each year. The self-control and responsibility subscales each comprised 10 items (e.g. ‘controls temper in conflict situations with adults’, ‘reports accidents to appropriate persons’) assessing frequency of behaviors on 3-point scales of never (0), sometimes (1) and very often (3). The SSRS is a widely used, norm-referenced measure with good psychometric properties (Crowe, Beauchamp, Catroppa, & Anderson, 2011; Gresham & Elliott, 1990). Internal consistency of the items in the current study was good: Cronbach’s α ranged from .81 to .84 for both self-control and responsibility.

Arrests and police contacts—Each year, caregivers and adolescents reported on the type and frequency of police contacts and arrests during the past year using the Child Police Contacts scale (CPC, (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998). For the current analyses, data were drawn from two screening questions: ‘How many times in the past year, have you been arrested by the police for an illegal or delinquent offence’ and ‘Not counting any arrests, during the past year, how many times were you questioned by the police about your possible involvement in any illegal activity?’ A best-estimate score for both variables was first derived by taking the maximum score reported by the girl or caregiver. Because both variables were positively skewed, each was reduced to a binary variable indicating none (0) and one or more times (1) at each age. The CPC has demonstrated construct validity with official records of arrest in a community sample of boys (Loeber & Farrington, 2012).

Delinquent behavior—Delinquent behavior was measured each year using the Self-Reported Delinquency Scale (SRD; Elliott, Huizinga, & Ageton, 1985; Loeber et al., 1998). The SRD assesses frequency of engagement in 34 delinquent behaviors, including theft,

violence, property damage (e.g. ‘In the past year, how many times have you taken something from a store without paying for it?’). Items were summed to create a total delinquency score as in prior work (e.g. Henneberger, Tolan, Hipwell, & Keenan, 2014).

Peer delinquency—Peer delinquency was measured using adolescent perceptions of their friends’ involvement in antisocial behavior at each age. The Peer Delinquency Scale (PDS; Loeber et al., 1998) consists of 11 items assessing the presence/absence of different types of delinquent behavior engaged in by one or more peers (e.g., ‘Has/have your friend(s) hit someone with the idea of hurting them’). Responses were scored as no/none (0) and yes/one or more friends (1) for adolescents reporting single/multiple close friends. Endorsed items were counted to create a total score with good internal consistency across waves ($\alpha = .84$ to .87).

Positive parenting—Each year, adolescent participants completed the 7-item Positive Parenting Scale (PPS; Loeber et al., 1998), which asks about the frequency of affirming, approving and encouraging caregiver behaviors. Items were rated on 4-point scales ranging from never (0) to a lot (3) with high scores indicating perceptions of more positive parenting. The reliability of the scale ranged from $\alpha = .79$ to .89.

Reading level—As a proxy for academic ability at age 12, caregivers reported on the girls’ reading level (‘In the past year, how did your daughter do in Reading or English?’) using a 5-point scale of: far above average (1) to failing (5).

Data analytic plan

We used fixed effects regression and logistic regression models in SAS 9.4 (Allison, 2005) to examine within-individual associations between changes in 1) police contacts and self-control; 2) arrests and self-control; 3) police contacts and responsibility; and 4) arrests and responsibility. For each pair of variables (e.g., arrests and self-control), we conducted two sets of models. The first set used self-control to predict the probability of arrest with fixed effect logistic regression, and the second set used arrest occurrence to predict level of self-control with fixed effect regression. In this way, we examined reciprocal causation between each pair of variables. Because these models focus exclusively on modeling within-individual change, all time-stable factors that may vary between individuals are ruled out as potential confounds. We included minority race, cohort age and reading level at age 12 as time-invariant covariates, and household poverty, single parent household, delinquency severity, peer delinquency and positive parenting as time-varying covariates. Participants with no variation in the dependent variable (i.e., no within-individual change) are excluded by default from fixed-effects models (Allison, 2009).

Missing Data

The models were run with full-information maximum likelihood estimation, which uses all available information in a time series to generate model parameters as opposed to complete case analysis. The parameters are unbiased when data in a time series are missing at random.

Of the original 2,450 PGS participants, 73.5% ($n=1,800$) had no missing data between ages 12-17, 9.5% ($n=232$) were missing on at least one variable for 1 year of data, 4.3% for 2 years ($n=105$), 2.7% for 3 years ($n=67$), 1.5% for 4 years ($n=36$), 1.6% for 5 years ($n=38$), and 7% were missing at least one variable for all 6 years ($n=172$). To contribute change data to the analyses, girls needed to have at least two of the six consecutive data points to be included in the lagged models ($n=2,240$, 91%). Compared with included participants, individuals with missing data for 5 or 6 years had a lower reading level and were less likely to be African American or living in poverty. However, these variables were only weakly associated with missingness (r values from 0.06 to 0.08), suggesting that any deviation from the missing-at-random assumption was likely minor.

Results

Descriptive statistics for the sample are shown in Table 1. At age 12, 117 (5.3%) girls had contact with the police for involvement in illegal activity. These rates peaked at ages 15 and 16, with 254 and 243 girls (12.3% and 12.2%) having police contact. In addition, a proportion of girls were arrested at each age: approximately 1% ($n=21$) at age 12 to a peak of 4.6% ($n=91$) at age 16. Of the 242 girls (9.9%) who had been arrested at some time between ages 12 and 17, 163 (67.4%) reported being arrested (at least once) in one assessment wave, 56 (23.1%) in two waves, and 23 (9.5%) in three, four or five assessment waves. Mean self-control and responsibility scores were comparable to SSRS sample norms (Crowe et al., 2011). Self-control at age 12 was lower for girls with police contact ($M=9.78$, $SD=3.24$) or arrest ($M=8.89$, $SD=3.93$) compared with those without police contact ($M=12.64$, $SD=3.43$) or arrest ($M=12.53$, $SD=3.45$) respectively, $p<.001$). Similarly, girls with police contact ($M=14.49$, $SD=3.17$) or arrest ($M=14.16$, $SD=3.47$) had lower levels of personal responsibility than those without police contact ($M=16.39$, $SD=2.92$) or arrest ($M=16.31$, $SD=2.95$) respectively, $p<.01$) at age 12.

Predicting current and future change in the probability of police contacts and arrest

Table 2 presents findings from the fixed effects logistic regression models predicting the probability of police contacts with both concurrent and lagged predictors. The results showed that after adjusting for covariates (poverty, single parent household, race, age, delinquency, peer delinquency, positive parenting and reading level), within-individual increases in adolescent self-control were associated with a reduced likelihood of police contact in the same year ($OR=.923$, 95% $CI=.889, .958$, $p<.001$). Similarly, within-individual increases in personal responsibility were associated concurrently with a lower risk of police contact ($OR=.931$, 95% $CI=.889, .967$, $p<.001$). In the lagged, adjusted models, within-individual increases in personal responsibility predicted reduced probability of future police contact the following year, although the association was only marginally significant ($OR=.962$, 95% $CI=.925, .999$, $p<.05$). Within-individual changes in self-control were unrelated to police contact one year later.

In adjusted fixed effects regression models with arrest as the dependent variable, there were no associations between changes in self-control and personal responsibility and the probability of being arrested in the same, or in the following, year.

Predicting current and future changes in self-control and personal responsibility

When testing reverse causation, results showed that after adjusting for covariates, instances of police contact (i.e. police contact in any given year following no contact in the prior year) were associated with within-individual decreases in self-control in the same year ($B = -.45$, $SE = .09$, $p < .001$, see Table 3). Similarly, instances of arrest were associated concurrently with decreasing levels of self-control ($B = -.30$, $SE = .15$, $p < .05$). In the lagged, adjusted models, change in police contact in the prior year did not predict future within-individual change in self-control, whereas being arrested predicted within-individual reductions in self-control in the following year ($B = -.43$, $SE = .16$, $p < .01$).

In adjusted models, instances of police contact were associated with decreasing levels of responsibility in the same year ($B = -.39$, $SE = .08$, $p < .001$). In contrast, being arrested in any given year was unrelated to concurrent changes in responsibility. However, in the lagged, adjusted models, new instances of police contact and arrest in the prior year each predicted within-individual decreases in personal responsibility ($B = -.28$, $SE = .08$, $p < .001$ and $B = -.39$, $SE = .15$, $p < .01$ respectively).

Discussion

The current study advances knowledge of the associations between psychosocial maturation and justice system contacts in a population-based sample of girls followed across the adolescent period. We hypothesized that year-to-year increases in individuals' self-control and personal responsibility would reduce the likelihood of police contacts and arrests, both concurrently, and in the following year. Furthermore, in response to growing concerns about putative negative effects of justice system contact on normative adolescent development (National Research Council, 2013), we also tested the hypothesis that experiences of police contact and arrest would lead to reductions in self-control and responsibility. Results support both sets of hypotheses, with more consistent evidence that justice system contacts have a detrimental effect on psychosocial maturation than *vice versa*.

As far as we are aware, our findings provide the first evidence of adverse effects of police contact and arrest on normative development in a community sample. In addition, our use of fixed effects modeling of multiple repeated measures across the adolescent period provides a particularly robust test of the associations between psychosocial maturity and justice system contacts. This state-of-the-art analytic approach enabled us to control for stable individual heterogeneity and unobserved time-invariant confounders that is not otherwise possible. Our models also controlled for fluctuations in several time-varying variables (e.g. peer delinquency, parenting) that are known to shape trajectories of self-control and personal responsibility during adolescence (e.g., Burt et al., 2006; McGloin & Shermer, 2009). These advances allow greater confidence in the findings compared to previous research.

Maturation factors predicting justice system contacts

Year-to-year increases in self-control and personal responsibility were associated with a reduced likelihood of police contact consistent with criminological and psychological theory as well as prior research with male samples and known offenders (e.g. Loeber et al., 2012;

Longshore et al., 2005; Schoepfer & Piquero, 2006). Although these relationships were robust when examined concurrently, prospective associations in the lagged models were weak (when predicted by responsibility) or absent (when predicted by self-control) indicating no clear evidence that developing maturity reduced the likelihood of police contacts in the future.

Counter to our hypothesis, there was no association between increasing psychosocial maturation and the probability of being arrested. This finding contrasts with prior studies of males that have used between-group analyses (Beaver et al., 2009), and does not support the notion that behaviors characteristic of low self-control and responsibility (e.g. impulsivity, disrespect for authority) can antagonize law enforcement in ways that heighten the risk of arrest (DeLisi & Berg, 2006; J. M. Miller et al., 2007). This null finding, however, may be a function of the low base rate of arrest among community-based adolescent females generally. In the current sample, the arrest rate was comparable to, or marginally higher than, the 1.6% rate reported nationally (Office of Juvenile Justice and Delinquency Prevention, 2017). Importantly, there was sufficient change in the occurrence of arrest over time to allow a within-person analytic approach to be used. Thus, in the PGS sample 2,208 girls (90.1%) were never arrested between 12 and 17 years, and two girls (0.1%) were arrested in every year. However, of the remaining 240 arrestees, 97% were arrested in one, two or three of the six assessment waves indicating substantial year-to-year variability in the dependent variable (Allison, 2009). While the current results suggest that developing self-control and personal responsibility are not critical predictors of arrest among adolescent girls, these findings need to be replicated in other large community samples of female adolescents.

Justice system contacts predicting psychosocial maturation

Police contacts were associated with reductions in self-control and responsibility in the same year, and with future decreases in responsibility. Together with the prior results, this latter finding highlights the bi-directional influence of these constructs, and the possibility that decreasing levels of responsibility and increasing likelihood of police contacts could both serve to escalate risk over time. Additional research is needed to determine whether there is a sensitive window for interventions that support personal responsibility following police contact.

The experience of being arrested proved to be a risk factor for diminished self-control and responsibility in the following year. This result is analogous to declines in psychosocial maturity among serious offenders after JJS involvement (Dmitrieva et al., 2012). However, the current study results suggest that there are negative effects on developing maturity even at the earlier stage of arrest. Although the current sample was too small to parse the reasons for arrest, explanations are unlikely to include increasing delinquency severity or affiliation with deviant peers (Bernburg, Krohn, & Rivera, 2006) because within-person changes in these factors were accounted for in the analyses. Other potential mechanisms include changes in self-identity following arrest, and having fewer prosocial opportunities once labeled as a “troublemaker” (Lopes et al., 2012). The results could also reflect a change in the caregiver’s perception of the girl’s maturity level following an arrest. Additional

informants (e.g. teachers), unaware of a girls' arrest status, should therefore be included in future studies. Nevertheless, the current findings point to a need for interventions designed to increase personal responsibility (e.g. solution-focused therapy to facilitate autonomous decision-making) and self-control (e.g. anger management, impulse control) for adolescent girls following arrest.

The findings presented here must be considered in the context of several limitations. First, the findings were based on an urban-living sample of girls in one geographical area. Study participants were over-sampled for household poverty resulting in an 'at-risk' sample that also has implications for the generalizability of the results. Future research should investigate whether these findings hold for boys and adolescents in other regions, and whether the adverse effects of justice system contact on future self-control and responsibility persist beyond one year and even into adulthood. Probing the biosocial mechanisms in these prospective associations may reveal negative effects of police contacts on the stress response system (Miller, Chen, & Zhou, 2007; Tsigos & Chrousos, 2002) that impact neural function and underlie later brain-based deficits in psychosocial maturation. Such mechanisms may also help explain why these individuals do not fare well in the transition to adulthood, as evidenced by elevated rates of psychiatric illness, dysfunctional relationships and high service use (Cernkovich, Lanctot, & Giordano, 2008). Second, data on police contacts and arrests were obtained via a best-estimate approach from caregiver and adolescent reports, whereas levels of adolescent self-control and responsibility were derived from caregiver report. While this approach likely reduced problems of shared method variance, unmeasured characteristics of the caregiver (e.g. antisocial personality, religiosity) may have contributed relatively more to measurement of maturational development than to the extent of justice system contacts. Although the similarity of self-control and responsibility scores to the national validation sample (Gresham & Elliott, 1990) supports the validity of our measures, future studies would do well to incorporate information from multiple sources including official records, even though records typically capture only a small proportion of adolescents in community samples (Farrington, Ttofi, Crago, & Coid, 2014). Finally, even though the fixed-effects model controls for unobserved time-invariant confounders, the effects of unmeasured dynamic influences (e.g. genetic factors on change over time, Barnes, Boutwell, Beaver, Gibson, & Wright, 2014) are not known. Furthermore, the difference in the baseline levels of self-control and responsibility among girls with and without JJS contacts presents possible non-random selection into JJS contact, which limits interpretation of true causal inference. Future longitudinal studies that begin early in life are therefore needed to test the hypothesis that decreasing levels of self-control and responsibility may be a causal factor in police contacts.

The current study shows more clearly than previous work, that decreasing levels of personal responsibility predict police contacts among community-based adolescent girls; and that police contacts and arrests can adversely impact future psychosocial maturation. Gaining a better understanding of the ways in which normative developmental processes intersect with the juvenile justice system is critical in the quest to develop individually-tailored prevention and intervention programs that are effective in reducing delinquency (National Research Council, 2013).

Acknowledgments

This project was supported by grants funded through the National Institute of Mental Health (MH056630) and the Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice (2013-JF-FX-0058). The opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect those of the Department of Justice. Special thanks go to the families of the Pittsburgh Girls Study for their participation in this research, and to authors' dedicated research team for their continued efforts.

References

- Allison PD. Fixed effects regression methods for longitudinal data using SAS. Cary, NC: Sas Institute; 2005.
- Allison PD. Fixed effects regression models. Vol. 160. SAGE publications; 2009.
- Barnes J, Boutwell BB, Beaver KM, Gibson CL, Wright JP. On the consequences of ignoring genetic influences in criminological research. *Journal of Criminal Justice*. 2014; 42(6):471–482.
- Baumeister RF, Vohs KD, Tice DM. The strength model of self-control. *Current Directions in Psychological Science*. 2007; 16(6):351–355.
- Beaver KM, DeLisi M, Mears DP, Stewart E. Low self-control and contact with the criminal justice system in a nationally representative sample of males. *Justice Quarterly*. 2009; 26(4):695–715.
- Bernburg JG, Krohn MD, Rivera CJ. Official labeling, criminal embeddedness, and subsequent delinquency a longitudinal test of labeling theory. *Journal of Research in Crime and Delinquency*. 2006; 43(1):67–88.
- Blokland A, Palmen H. Criminal career patterns. In: Loeber R, Hoever M, Slot W, van der Laan P, editors *Persistors and desisters in crime from adolescence into adulthood: Explanation, prevention and punishment*. Aldershot, UK: Ashgate; 2012.
- Burt CH, Simons RL, Simons LG. A longitudinal test of the effects of parenting and the stability of self-control: negative evidence for the general theory of crime. *Criminology*. 2006; 44(2):353–396.
- Cauffman E, Steinberg L. (Im)maturity of judgment in adolescence: Why adolescents may be less culpable than adults. *Behavioral Sciences & the Law*. 2000; 18(6):741–760. [PubMed: 11180420]
- Cernkovich SA, Lanctot N, Giordano PC. Predicting adolescent and adult antisocial behavior among adjudicated delinquent females. *Crime & Delinquency*. 2008; 54(1):3–33.
- Chapple CL. Self-control, peer relations, and delinquency. *Justice Quarterly*. 2005; 22(1):89–106.
- Chapple CL, Vaske J, Hope TL. Sex differences in the causes of self-control: An examination of mediation, moderation, and gendered etiologies. *Journal of Criminal Justice*. 2010; 38(6):1122–1131.
- Chesney-Lind M, Pasko L. *The female offender: Girls, women and crime*. 3rd. Thousand Oaks, CA: Sage; 2012.
- Collins LM. Analysis of longitudinal data: The integration of theoretical model, temporal design, and statistical model. *Annu Rev Psychol*. 2006; 57:505–528. [PubMed: 16318605]
- Crowe L, Beauchamp M, Catroppa C, Anderson V. Social function assessment tools for children and adolescents: A systematic review from 1988 to 2010. *Clinical Psychology Review*. 2011; 31(5): 767–785. [PubMed: 21513693]
- DeLisi M, Berg MT. Exploring theoretical linkages between self-control theory and criminal justice system processing. *Journal of Criminal Justice*. 2006; 34(2):153–163.
- Dmitrieva J, Monahan KC, Cauffman E, Steinberg L. Arrested development: The effects of incarceration on the development of psychosocial maturity. *Development and Psychopathology*. 2012; 24(03):1073–1090. [PubMed: 22781872]
- Duckworth AL, Seligman ME. Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*. 2005; 16(12):939–944. [PubMed: 16313657]
- Elliott D, Huizinga D, Ageton S. *Explaining Delinquency and Drug Use*. Beverly Hills, CA: Sage; 1985.

- Estrada F, Nilsson A. Does it cost more to be a female offender? A life-course study of childhood circumstances, crime, drug abuse, and living conditions. *Feminist Criminology*. 2012; 7(3):196–219.
- Farrington DP, Ttofi MM, Crago RV, Coid JW. Prevalence, frequency, onset, desistance and criminal career duration in self-reports compared with official records. *Criminal Behaviour and Mental Health*. 2014; 24(4):241–253. [PubMed: 25294158]
- Gibson CL, Ward JT, Wright JP, Beaver KM, DeLisi M. Where does gender fit in the measurement of self-control? *Criminal Justice and Behavior*. 2010; 37(8):883–903.
- Gottfredson MR, Hirschi T. A general theory of crime. Stanford, CA: Stanford University Press; 1990.
- Gresham F, Elliott S. Social Skills Rating System. Circle Pines, MN: American Guidance Service; 1990.
- Halaby CN. Panel models in sociological research: Theory into practice. *Annu Rev Sociol*. 2004; 30:507–544.
- Hanes M. Annual Report: How OJJDP is forming partnerships and finding solutions. Washington, DC: NCJ 237051; 2010.
- Henneberger AK, Tolan PH, Hipwell AE, Keenan K. Delinquency in Adolescent Girls: Using a Confluence Approach to Understand the Influences of Parents and Peers. *Crim Justice Behav*. 2014; 41(11):1327–1337. [PubMed: 25419013]
- Hipwell AE, Loeber R, Stouthamer-Loeber M, Keenan K, White HR, Kroneman L. Characteristics of girls with early onset disruptive and antisocial behaviour. *Crim Behav Ment Health*. 2002; 12(1): 99–118. [PubMed: 12357260]
- Keenan K, Hipwell AE, Chung T, Stepp S, Stouthamer-Loeber M, Loeber R, McTigue K. The Pittsburgh girls study: Overview and initial findings. *Journal of Clinical Child and Adolescent Psychology*. 2010; 39(4):506–521. [PubMed: 20589562]
- Leiber MJ, Mack KY. The individual and joint effects of race, gender, and family status on juvenile justice decision-making. *Journal of Research in Crime and Delinquency*. 2003; 40(1):34–70.
- Loeber R, Farrington D, editors *Transitions from Juvenile Delinquency to Adult Crime: Criminal Careers, Justice Policy and Prevention*. New York: Oxford University Press; 2012.
- Loeber R, Farrington D, Stouthamer-Loeber M, Van Kammen W. *Antisocial behavior and mental health problems: Risk factors in childhood and adolescence*. Hillsdale, NJ: Lawrence Erlbaum; 1998.
- Loeber R, Menting B, Lynam DR, Moffitt TE, Stouthamer-Loeber M, Stallings R, Pardini D. Findings from the Pittsburgh Youth Study: Cognitive impulsivity and intelligence as predictors of the age–crime curve. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2012; 51(11): 1136–1149. [PubMed: 23101740]
- Longshore D, Chang E, Messina N. Self-control and social bonds: A combined control perspective on juvenile offending. *Journal of Quantitative Criminology*. 2005; 21(4):419–437.
- Lopes G, Krohn MD, Lizotte AJ, Schmidt NM, Vásquez BE, Bernburg JG. Labeling and cumulative disadvantage the impact of formal police intervention on life chances and crime during emerging adulthood. *Crime & Delinquency*. 2012; 58(3):456–488.
- McGloin JM, Shermer LON. Self-control and deviant peer network structure. *Journal of Research in Crime and Delinquency*. 2009; 46(1):35–72.
- Miller G, Chen E, Zhou E. If it goes up, must it come down? Chronic stress and the hypothalamic-pituitary-adrenocortical axis in humans. *Psychological Bulletin*. 2007; 133(1):25–45. [PubMed: 17201569]
- Miller JM, Miller HV, Barnes J. The effect of demeanor on drug court admission. *Criminal Justice Policy Review*. 2007; 18(3):246–259.
- Moffitt TE, Arseneault L, Belsky D, Dickson N, Hancox RJ, Harrington H, Caspi A. A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America*. 2011; 108(7):2693–2698. [PubMed: 21262822]
- Moffitt TE, Caspi A, Rutter M, Silva PA. Sex differences in antisocial behaviour: Conduct disorder, delinquency, and violence in the Dunedin Longitudinal Study. New York: Cambridge University Press; 2001.

- Monahan K, Steinberg L, Cauffman E, Mulvey E. Psychosocial (im) maturity from adolescence to early adulthood: Distinguishing between adolescence-limited and persisting antisocial behavior. *Development and Psychopathology*. 2013; 25:1093–1105. [PubMed: 24229551]
- Monahan K, Steinberg L, Cauffman E, Mulvey EP. Trajectories of antisocial behavior and psychosocial maturity from adolescence to young adulthood. *Developmental Psychology*. 2009; 45(6):1654–1668. [PubMed: 19899922]
- Mulvey EP, Steinberg L, Piquero AR, Besana M, Fagan J, Schubert C, Cauffman E. Trajectories of desistance and continuity in antisocial behavior following court adjudication among serious adolescent offenders. *Development and Psychopathology*. 2010; 22(2):453–475. [PubMed: 20423553]
- National Research Council. *Reforming juvenile justice: A developmental approach*. Washington, DC: The National Academies Press; 2013.
- Office of Juvenile Justice and Delinquency Prevention. *OJJDP Statistical Briefing Book: Law Enforcement and Juvenile Crime*. 2017. Retrieved from http://www.ojjdp.gov/ojstatbb/crime/JAR_Display.asp?ID=qa05230
- Petrosino A, Turpin-Petrosino C, Guckenburg S. *Formal processing of juveniles: Effects on delinquency*. No. 9 of Crime Prevention Research Review. Washington, DC: 2013.
- Petteruti A. *Education under arrest: The case against police in schools*. Justice Policy Institute; Washington, DC: 2011.
- Piquero A. Taking stock of developmental trajectories of criminal activity over the life course. In: Liberman A, editor *The long view of crime: A synthesis of longitudinal research*. New York, NY: Springer; 2008. 23–78.
- Puzzanchera C, Adams B, Hockenberry S. *Juvenile court statistics 2009*. Pittsburgh, PA: National Center for Juvenile Justice; 2012.
- Sampson RJ, Laub JH. Life-course desisters? Trajectories of crime among delinquent boys followed to age 70. *Criminology*. 2003; 41(3):555–592.
- Schaefer S, Erickson G. *The impact of juvenile correctional confinement on the transition to adulthood*. 2016 Report submitted to the U.S. Department of Justice.
- Schoepfer A, Piquero AR. Self-control, moral beliefs and criminal activity. *Deviant Behavior*. 2006; 27:51–71.
- Sickmund M, Puzzanchera C. *Juvenile offenders and victims: 2014 National Report*. Pittsburgh, PA: 2014.
- Sickmund M, Sladky T, Kang W, Puzzanchera C. *Easy access to the Census of Juveniles in Residential Placement*. 2015. Retrieved from <http://www.ojjdp.gov/ojstatbb/ezacjrp/>
- Steinberg L. Adolescent development and juvenile justice. *Annual Review of Clinical Psychology*. 2009; 5:47–73.
- Steinberg L. Commentary: A behavioral scientist looks at the science of adolescent brain development. *Brain and Cognition*. 2010; 72(1):160. [PubMed: 19963311]
- Steinberg L, Cauffman E. Maturity of judgment in adolescence: Psychosocial factors in adolescent decision making. *Law and Human Behavior*. 1996; 20(3):249–272.
- Tsigos C, Chrousos GP. Hypothalamic–pituitary–adrenal axis, neuroendocrine factors and stress. *Journal of Psychosomatic Research*. 2002; 53(4):865–871. [PubMed: 12377295]
- Welsh B, Lipsey M, Rivara FP, Hawkins D, Aos S, Hollis-Peel M. *Promoting change, changing lives: Effective prevention and intervention to reduce serious offending*. In: Loeber R, Farrington DP, editors *From juvenile delinquency to adult crime*. New York, NY: Oxford University Press; 2012.
- Wiley SA, Esbensen FA. The Effect of Police Contact Does Official Intervention Result in Deviance Amplification? *Crime & Delinquency*. 2016; 62(3):283–307.
- Wright JP, McMahon PM, Daly C, Haney J. *Getting the Law Involved*. *Criminology & Public Policy*. 2012; 11(2):227–249.
- Zahn M, Agnew R, Fishbein D, Miller S, Winn DM, Dakoff G, Chesney-Lind M. *Causes & correlates of girls delinquency*. Washington, DC: US Printing Office; 2010.

Key Points

- Low self-control is an established risk factor for adolescent delinquency, but most research has focused on males and/or selected samples, leaving gaps in knowledge about associations among females from the general population.
- Results showed that decreasing levels of adolescent self-control and responsibility were associated with police contacts, and that reduced responsibility predicted future arrest.
- Little is known about the impact of justice system contacts on psychosocial maturation. Addressing this gap is essential for identifying iatrogenic factors and targets for intervention.
- Our findings showed that arrest and police contact delayed adolescent maturational development and suggest the need for programs to support growth in self-control and responsibility to prevent future justice system involvement.

Table 1

Descriptive statistics (N is the listwise sample size for each age).

	Age 12		Age 13		Age 14		Age 15		Age 16		Age 17	
	N	%	N	%	N	%	N	%	N	%	N	%
Minority race	1329	59.7										
Household poverty	823	37	820	37	839	39	814	38	798	38	811	40
Single parent household	978	44	965	44	1025	47	1012	48	1013	49	1012	50
Police contact	117	5.3	205	9.5	232	11	254	12.3	243	12.2	196	11.4
Arrested	21	.95	43	1.98	60	2.84	76	3.69	91	4.57	65	3.80
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Reading level	2.34	.87										
Self-Control	12.50	3.47	12.58	3.57	12.66	3.64	12.60	3.71	12.89	3.60	12.98	3.69
Responsibility	16.29	2.97	16.29	3.02	16.36	3.01	16.21	3.09	16.24	3.20	16.34	3.13
Delinquency severity	3.53	14.99	5.15	19.18	6.41	22.76	8.13	32.55	9.69	41.98	10.77	46.41
Peer delinquency	4.71	0.66	4.75	0.60	4.69	0.69	4.59	0.77	4.45	0.82	4.22	0.94
Positive Parenting	16.86	3.07	16.55	3.22	16.32	3.34	16.10	3.40	15.99	3.50	15.86	3.63

Table 2

Changes in self-control and personal responsibility influencing the probability of current and future police contacts and arrests between ages 12 and 17.

Predictors	Police contact			Arrest		
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
Self-control	0.923 ***	[.889, .958]	0.964 [†]	[.930, 1.000]	0.972	[.911, 1.038]
Personal responsibility	0.931 ***	[.889, .967]	0.962 *	[.925, .999]	1.021	[.953, 1.094]

Note: All models covary minority race, cohort age, reading level, household poverty, single parent household, delinquency severity, peer delinquency, positive parenting. OR = Odds Ratio.

[†] $p = .052$;
* $p < .05$;
*** $p < .001$.

Change in the occurrence of police contacts and arrests influencing change in concurrent and future levels of self-control and responsibility from ages 12 to 17.

Table 3

Predictors	Self-control						Responsibility					
	Current			Future			Current			Future		
	B	SE	p	B	SE	p	B	SE	p	B	SE	p
Police contact	-0.45	0.09	***	-0.16	0.09	ns	-0.39	0.08	***	-0.28	0.08	***
Arrest	-0.30	0.15	*	-0.43	0.16	**	-0.06	0.13	ns	-0.39	0.15	**

Note: All models covary minority race, cohort age, reading level, household poverty, single parent household, delinquency severity, peer delinquency, positive parenting.

* $p < .05$;
** $p < .01$;
*** $p < .001$.