

**Hostile Attribution Bias as a Mediator of the Relationship Between Psychosocial
Maturity and Aggression**

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Dedications

To my parents.

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Abstract

Hostile Attribution Bias as a Mediator of the Relationship Between Psychosocial Maturity and Aggression

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This study examined hostile attribution bias as a mediator of the relationship between psychosocial maturity and aggression. Specifically, it was predicted that hostile attribution bias would mediate the relationship between the two responsibility constructs of identity and self-reliance, and reactive physical aggression. Using data from 56 female juvenile offenders at three post-adjudication facilities, hostile attribution bias did not mediate the relationship between the responsibility factors of identity/self-reliance and reactive physical aggression. However, results revealed a relationship between the psychosocial maturity factor of temperance and reactive physical aggression, as well as between temperance and relational hostile attribution bias.

CHAPTER 1: BACKGROUND AND REVIEW OF THE LITERATURE

Female youth are being arrested for aggressive offenses at increasing rates (Silverman & Caldwell, 2008). As a result, research has been increasingly focused on the development of effective intervention and prevention programs for this population (Mullis, Cornille, Mullis, & Huber, 2004). Although theories on the causes of aggression-related female delinquency exist (e.g., developmental delays, social maladjustment) research in this area is limited (Mullis et al., 2004; Emeka & Sorensen, 2009). In contrast, there is a great deal of data on risk factors associated with broader behavior problems among female youth (e.g., poor school performance, low self-esteem, gang involvement, abuse) (Mullis et al., 2004). By better understanding the potential precursors to criminally-related female aggressive behavior, intervention and prevention programs may be developed and implemented with greater success (Mullis et al., 2004).

1.1 Types of Aggression

Female adolescents display various types of aggressive behaviors. Reactive aggression occurs in response to perceived threats or when individuals believe they are being provoked (Marsee & Frick, 2007). Proactive aggression is defined as behavior that is unprovoked and used for the purpose of individual gain, domination, or intimidation (Dodge & Coie, 1987). Overt or physical aggression includes acts, such as hitting and kicking, that are intended to physically harm others. Covert or relational aggression is meant to harm social relationships through behaviors, such as spreading rumors, ignoring, or excluding peers from activities (Prinstein, Boergers, & Vernberg, 2001).

1.2 Aggression Research

Adolescents who frequently engage in proactive aggression tend to view aggression as a positive behavior, believing that their aggressive acts will result in positive outcomes (Crick & Dodge, 1996). Proactive aggression also has been linked with difficulties displaying pro-social emotions, such as guilt and empathy (Frick, Cornell, Barry, Bodin, & Dane, 2003), and with lower levels of emotional reactivity (Hubbard et al. 2002). Reactive aggression has been associated with higher levels of anxiety and anger (Hubbard et al. 2002) and with greater likelihoods of displaying a hostile attribution bias (Crick & Dodge, 1996).

Hostile attribution bias is an individual's tendency to view situations as aggressive, regardless of the stimuli presented (Nasby, DePaulo, & Hayden, 1980). Many studies have shown that, compared with non-aggressive youth, physically aggressive youth are more likely to display hostile attribution biases (Crick & Dodge, 1996); this bias has also been found among relationally aggressive children (Crick, 1995). When examining a group of detained girls, Marsee and Frick (2007) found that reactive physical aggression was related to a hostile attribution bias, while proactive physical aggression was associated with the expectation that aggressive behaviors would lead to positive outcomes.

1.3 Psychosocial Maturity

When planning intervention and prevention programs for juveniles, it is important to understand dynamic risk factors that may precede delinquent behaviors (Mullis et al., 2004). Psychosocial maturity is one such factor that has been linked to delinquent behavior (Cruise et al., 2008), and it is composed of the broad characteristics of

responsibility (i.e., self-reliance, identity, and independence), perspective (i.e., the ability to understand potential short-and long-term consequences of behavior, as well as the ability to view situations from multiple angles), and temperance (i.e., the ability to control impulses and analyze possible consequences before taking action) (Greenberger & Sorensen, 1974).

The psychosocial maturity factor of responsibility, also called individual adequacy, includes the constructs of identity, self-reliance, and work orientation. Identity is clarity of self-concept, self-esteem, internalized values, and consideration of life goals. Individuals with a strong sense of identity tend to be self-confident, understand their strengths and weaknesses, and have a firm grasp on their beliefs and values. Individuals with a low sense of identity often have trouble making decisions and will look for approval from others, rather than follow their own instincts (Steinberg & Cauffman, 1996). Self-reliance involves initiative, sense of control, and the absence of need for great amounts of social validation. Individuals with a strong sense of self-reliance tend to make their own decisions and are willing to make mistakes. These individuals take responsibility for their actions, recognizing that their behaviors affect the future (Greenberger & Sorensen, 1974). Work orientation involves the ability to take pleasure in work and general work skills. Greenberger, Josselson, Kneer, & Kneer (1975) found that all three of the responsibility constructs (identity, self-reliance, and work orientation) correlated negatively with anxiety and neuroticism and positively with self-esteem. Neither temperance nor perspective correlated significantly with these measures.

No published research exists on how the psychosocial maturity factors of identity and self-reliance are directly related to reactive physical aggression, but many of the

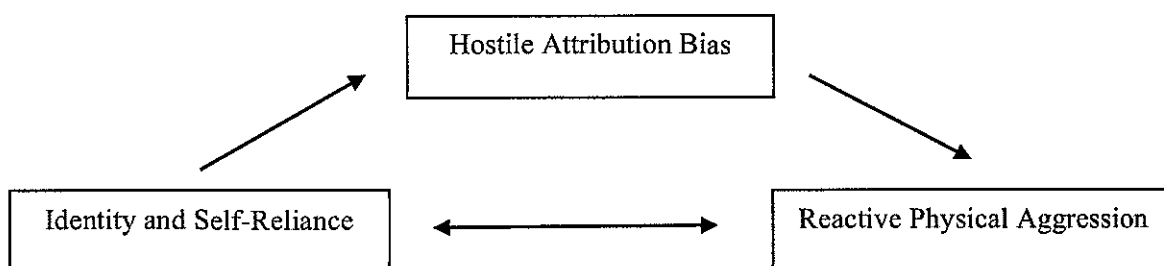
characteristics that constitute identity and self reliance have been associated with reactive physical aggression. For example, reactive aggression has been associated with higher levels of anxiety (Hubbard et al., 2002), poor social skills (Dodge, Lochman, Harnish, Bates, & Pettit, 1997), neuroticism (Fossati et al., 2009) and depression (Day, Bream, & Pal 1992). Physical aggression has been associated with self-regulation difficulties (Calkins & Fox, 2002) (e.g., setting goals, planning, controlling emotional and behavioral reactions) (Gardner, Dishion, & Connell, 2008). In theory, individuals who have a weak sense of identity and self-reliance should be likely to use reactive physical aggression. These individuals lack control and are always looking for approval from others. A rude comment or dirty look from another person, for example, could result in impulsive reactions to respond with physical aggression. Individuals who have a weak sense of identity and self-reliance also might react physically to others' actions because they are more likely to be anxious, angry, depressed, and more reactive to stress.

CHAPTER 2: THE CURRENT STUDY

For the purposes of treatment development, when identifying risk factors associated with aggression in juveniles, it is important to consider dynamic cognitive and emotional factors that can serve as targets for change. Nelson and Coyne (2009) found that fathers who used corporal punishment and psychological control were more likely to have children with a greater hostile attribution bias, and Schwarts and Proctor (2000) found that exposure to marriage and community violence predicts hostile attribution bias in school aged children. It has been shown that hostile attribution bias has been linked to reactive physical aggression in delinquent youth (Marsee & Frick, 2007), but little research has examined precursors to this bias in female juvenile offenders.

The psychosocial maturity factor of responsibility, specifically the identity and self-reliance constructs, share many characteristics with reactive physical aggression. Identity, self-reliance, and reactive aggression have all been linked to anxiety and neuroticism (Hubbard et al., 2002; Fossati et al., 2009; Greenberger et al., 1975); physical aggression is associated with self-regulation difficulties (Calkins & Fox, 2002); and individuals with low senses of identity and self-reliance have trouble taking initiative, making decisions, and following their own instincts (Steinberg & Cauffman, 1996; Greenberger & Sorensen, 1974). In contrast, research on the psychosocial maturity constructs of temperance and perspective has not established relationships with these emotional variables (Greenberger et al., 1975).

Reactive physical aggression, which has been associated with hostile attribution bias (Marsee & Frick, 2007) shares many of the characteristics with the psychosocial factors of identity and self-reliance. The primary purpose of the current study was to examine whether hostile attribution bias mediated the relationship between the responsibility factors of identity/self-reliance and reactive physical aggression. First, I examined whether psychosocial maturity factors were associated with hostile attribution bias; I predicted that responsibility would be significantly associated. Second, the association between identity/self-reliance and reactive physical aggression was examined; I predicted that identity/self-reliance would be significantly associated with reactive physical aggression. See figure below for the proposed theoretical model.



CHAPTER 3: METHODS

This study was part of a larger research project that assessed the efficacy of the Juvenile Justice Anger Management Treatment (JJAM) for Girls. This study was approved by the Institutional Review Board, reviewed by the Office for Human Research Protections, and a Federal Certificate of Confidentiality was obtained.

3.1 Participants

Participants were 56 female juvenile offenders placed in a secure female post-adjudication facility in Pennsylvania and two secure female facilities in New Jersey. Participants ranged in age from 13 – 19 years ($M = 16.98$, $SD = 1.26$); 58.9% were Black, 10.7% White, 2.6% Asian American, and 26.8% identified as of an other race (including bi- and multi-racial); 28.6% identified as Hispanic. Race and ethnicity were representative of the populations of the Philadelphia and New Jersey juvenile justice systems. Time at the facility ranged from seven to 1650 ($M = 154.41$, $SD = 242.98$) days at the time of assessment. The study inclusion criteria were: 1) between the ages of 12 and 19; 2) able to read, write, and speak English sufficiently well to participate in study procedures; 3) has a parent (biological or adoptive) or legal guardian/custodian with general medical decision-making power, or is over the age of 18; 4) will be at the facility for at least another 90 days from date of enrollment. The exclusion criteria were: 1) suicidal intent or behaviors at time of enrollment; 2) substance withdrawal; 3) mental retardation or severe developmental disability. Twenty-seven youth were excluded due to insufficient time remaining at the facility, five were excluded due to substance withdrawal, two youth were excluded due to mild mental retardation and/or developmental disabilities, and one has been excluded due to medical isolation.

At each facility, mental health staff reviewed the inclusion and exclusion criteria for each youth. Eligible youth then completed an interest form. If they were not interested in participating, the form was completed without a name to protect privacy. These forms were kept for enrollment analysis purposes. Interested participants who were 18 or older included their name on the interest forms. If an interested participant was under age 18, the form was completed with the youth's name, as well as the youth's parent/guardian's name and contact information.

If an interested youth was over age 18, a trained research assistant met one on one with the youth to obtain full informed consent. For interested youth under 18, a consent form was mailed to the parent/guardian and five attempts to contact the parent/guardian were made within seventy-two hours. If the parent/guardian was reached by phone, the consent form was reviewed. If interested, the parent/guardian signed and return the consent form by mail, or the consent process was audio taped and the individual provided full informed consent via phone and audio recording. When informed consent was received by hard copy or audio tape, the youth was then assented. If the parent/guardian was reached but declined, the youth was no longer eligible to participate in the study. If the parent/guardian could not be reached after any of the five phone attempts, then a parental consent waiver was invoked and the youth was assented with a participant advocate present (i.e., facility mental health staff who provide education and/or assistance to the youth during the assent process).

3.2 Measures

3.2.1 The Aggression Questionnaire

The Aggression Questionnaire takes five minutes to complete and measures physical and verbal aggression, anger, hostility, and indirect aggression. Reliability is good to moderate, ranging from $r = .71$ to $r = .78$ across the five scales, and $r = .94$ for total scale score. Convergent validity was evaluated by administering both the Aggression Questionnaire and the Novaco Anger Scale. The five scales of the AQ consistently correlated with related constructs on the NAS. For instance, hostility on the AQ correlated most strongly with angry cognitions ($r = .62$), anger correlated with arousal ($r = .59$), and physical aggression correlated most highly with angry behavior ($r = .73$) (Buss & Warren, 2000).

3.2.2 The Psychosocial Maturity Inventory

The Psychosocial Maturity Inventory is a self-report measure that assesses the capacity of individuals to function in society. The self-reliance, work orientation, and identity subscales will be used. Josselson, Greenberger, and McConochie (1975) evaluated convergent validity and found scores on each of these three subscales correlated significantly with self-esteem, on the Tennessee Self Concept Scale ($r = .22, .36, \text{ and } .50$, respectively), and on Rosenberg's Self Esteem scale ($r = .29, .22, \text{ and } .53$, respectively). Each of the three subscales correlated negatively with the Tennessee Self Concept scale's measure of neuroticism ($r = -.21, -.38, \text{ and } -.52$, respectively) and with anxiety on the Welsh Anxiety Scale ($r = -.24, -.32, \text{ and } -.40$, respectively) (Greenberger et al., 1975).

3.2.3 The Peer Conflict Scale, Youth Version

The Peer Conflict Scale is a trait-based scale used to distinguish between reactive and proactive aggression in youth and was normed with youth in the juvenile justice system. The measure consists of four subscales, each with ten items per scale, and these measure reactive relational aggression, reactive physical aggression, proactive relational aggression, and proactive physical aggression. Each scale score is created by summing the scale's items, and scale scores can range from zero to 30. Scores for total overt, total relational, total reactive, and total proactive aggression can also be measured by summing the relevant items, and these scale scores can range from zero to 60. In a sample of individuals ages 6-17, the reactive subscales were correlated with anxiety, and the proactive subscales were correlated with cognitive errors (Marsee, Weems, & Taylor, 2008).

3.2.4 Hostile Attribution Bias

This vignette-based instrument, referred to as "Why Kids Do Things," measures hostile attribution bias and assesses the cognitive characteristics associated with anger and aggression. This measure contains 10 short stories, each describing either a physical or relational provocation situation in which the intent of the provocateur's intention is ambiguous. Participants are asked to select one of four explanations for why the provocateur in each story carried out the described act (options include two hostile reasons and two benign reasons), if they think the provocateur was intentionally being mean, and how upset and angry they would be in the described situation. Reliability estimates were established for both relational provocation situations (alpha = .74 for intent attributions, .74 for upset feelings, and .73 for angry feelings) and for physical

provocation situations (alpha = .80 for intent attributions, .72 for upset feelings, and .69 for angry feelings) (Crick, 1995).

3.2.5 Consideration of Future Consequences Scale

The CFC measures the extent to which an individual's actions are influenced by thoughts of immediate and future consequences of their behavior. Individuals who score low on the CFC are more likely to act to satisfy their immediate needs and concerns, whereas individuals who score high on the CFC focus on the future consequences of their behavior and let future goals influence their behavior. The CFC has good test re-test reliability ($r = .72$ and $.76$). (Strathman, Gleicher, Boninger, & Edwards, 1994)

3.2.6 The Weinberger Adjustment Inventory

The WAI measures emotional distress and self-restraint. Three of the four self-restraint scales (impulse control, suppression of aggression, and consideration of others) will be used to measure psychosocial maturity in this study. The self-restraint scale had good test re-test reliability ($r = .76$) in a sample of early adolescents. (Colwell et al., 2005).

3.3 Procedures

Participants were assessed one-on-one by trained research assistants at the juvenile justice facilities at which they were housed. Research assistants were undergraduate and graduate psychology students who practiced giving the assessment battery at least twice to another trained research assistant and observed at least three assessment administrations at the facilities. Testing took place in private, quiet rooms. Data collected are from the pre-test battery of a clinical trial of an anger management intervention. Youth completed the pre-test battery before assignment to condition. The

full pre-test battery required approximately four hours to complete, and the measures for this project required approximately fifty minutes. Participants received candy bars during testing to thank them for their participation.

CHAPTER 4: METHOD OF ANALYSIS

To test the proposed mediation model, I used Baron and Kenny's (1986) approach. The preliminary hypotheses were evaluated using the regression analyses in the first two steps of their methodology for testing mediation. Based on the sample size for this study ($N = 56$) and an alpha level of .05, there would have been a power of .82 to detect medium effect sizes for the final and most complex regression analysis (i.e., 2 predictor variables) in the mediation testing. This design produced a power of .90 to detect a medium effect in each of the two preliminary bivariate regression analyses.

CHAPTER 5: RESULTS

5.1 Descriptive Statistics

Table 1 shows the means and standard deviations all types of aggression measured in this study. Participants generated higher scores for physical aggression than for relational aggression ($t(55) = 6.24, p < .01$), and higher scores for reactive aggression than for proactive aggression ($t(55) = -9.05, p < .01$). They also produced higher reactive physical aggression scores than reactive relational aggression, proactive relational aggression, and proactive physical aggression scores ($F(1.84, 101.38) = 54.50, p < .01$)¹ (See Table 2).¹ Age was not related to any type of aggression.²

¹ Mauchly's sphericity test was significant ($\chi^2(5, N = 56) = 55.62, p < .01$) and so Greenhouse-Geisser statistics are reported.

² physical aggression ($b = 1.02, SE = 1.43, p = .48, R^2 = .01$); relational aggression ($b = 1.08, SE = 1.10, p = .33, R^2 = .02$); proactive aggression ($b = 1.68, SE = 1.16, p = .16, R^2 = .04$); reactive aggression ($b = 0.42, SE = 1.32, p = .75, R^2 < .01$); proactive physical ($b = 1.02, SE = 0.67, p = .13, R^2 = .04$); proactive relational ($b = 0.66, SE = 0.55, p = .24, R^2 = .03$); reactive physical ($b = 0.01, SE = 0.87, p = .99, R^2 = .01$); reactive relational ($b = 0.42, SE = 0.60, p = .49, R^2 = .01$)

5.2 Preliminary Analyses

To test the preliminary hypothesis of the mediation model, that the psychosocial maturity factor of responsibility would be significantly related to hostile attribution bias, the relationship between each individual psychosocial maturity factor (responsibility, temperance, perspective) and the two categories of hostile attribution bias (relational and overt) were examined using regression analyses.

There was no significant relationship between the psychosocial maturity factor of responsibility and relational hostile attribution bias ($b = -0.84$, $SE = 0.57$, $p = .15$, $R^2 = .04$) or between responsibility and overt hostile attribution bias ($b = -1.2$, $SE = 0.82$, $p = .15$, $R^2 = .04$). Similarly, the two responsibility constructs of identity and self-reliance were not significantly associated with relational hostile attribution bias (identity: $b = -0.40$, $SE = 0.61$, $p = .51$, $R^2 = .02$; self-reliance: $b = -0.15$, $SE = 0.62$, $p = .81$, $R^2 = .02$) or overt hostile attribution bias (identity: $b = 0.06$, $SE = 0.87$, $p = .95$, $R^2 = .04$; self-reliance: $b = -1.06$, $SE = 0.89$, $p = .24$, $R^2 = .04$). These two constructs were also not associated with reactive physical aggression (identity: $b = -3.77$, $SE = 2.37$, $p = .12$, $R^2 = .05$; self-reliance: $b = 3.64$, $SE = 2.44$, $p = .14$, $R^2 = .05$).

The psychosocial maturity factor of temperance was significantly associated with relational hostile attribution bias ($b = -0.79$, $SE = 0.39$, $p = .046$, $R^2 = .07$) but not overt hostile attribution bias ($b = 0.12$, $SE = 0.58$, $p = .83$, $R^2 < .01$). Perspective was not significantly associated with relational hostile attribution bias ($b = -0.09$, $SE = 0.04$, $p = .05$, $R^2 = .07$) or with overt hostile attribution bias ($b = -0.04$, $SE = 0.06$, $p = .52$, $R^2 = .01$).

5.3 Mediation Analyses

Because of the lack of a significant relationship between responsibility and hostile attribution bias, hostile attribution bias was not evaluated as a mediator of the relationship between identity/self-reliance and reactive physical aggression.

5.4 Exploratory Analyses

5.4.1 The Relationship Between Temperance and Aggression

Testing of the preliminary hypothesis revealed that the psychosocial maturity factor of temperance predicted relational hostile attribution bias, and so exploratory analyses were conducted to examine whether temperance predicted reactive physical aggression. Results revealed that temperance significantly predicted reactive physical aggression ($b = -8.60$, $SE = 1.07$, $p < .01$, $R^2 = .54$). Although these results fulfill the first two requirements of Barron and Kenny's (1986) method of testing mediation, the third and final regression equation was not significant ($b = 0.09$, $SE = 0.38$, $p = .81$, $R^2 = .54$); relational hostile attribution bias did not mediate the relationship between temperance and reactive physical aggression.

CHAPTER 6: DISCUSSION

Extent research found greater rates of self-reported reactive physical aggression, as opposed to relational aggression, among detained adolescents (Marsee et al., 2011) and detained adolescent females (Marsee & Frick, 2007). This is in contrast to females in the general population, who are more likely to use relational aggression than physical aggression (Crick & Grotpeter, 1995; Ostrov & Keating, 2004). This study extends these findings on pre-adjudication female adolescents to adolescent girls at the post-adjudication phase. Compared to adolescents in pre-adjudication placements, adolescents

placed in post-adjudication facilities have more opportunities to engage in longer-term relationships, potentially providing more opportunities and fodder for relational aggression. However, this study suggests that, despite the long-term relationships that may serve the basis for heightened relational aggression within residential facilities, youth report greater rates of physical aggression than relational. Future research should expand on the current study's findings to examine whether rates of relational and physical aggression remain consistent throughout time spent in post-adjudication facilities and following discharge.

Previous studies reported that the psychosocial maturity factor of temperance was associated with higher rates of delinquent behavior among female youth and more self-reported, violent, delinquent acts among male youth (Cruise et al., 2008). The results of this study expand on these findings by revealing that female juvenile offenders who scored lower on temperance also demonstrated stronger relational attribution biases and higher levels of reactive physical aggression, although a directional model was not supported. As temperance is the ability to control impulses and analyze possible consequences before taking action (Greenberger & Sorensen, 1974), these results suggest that impulsive post-adjudicated female youth may experience particular difficulties controlling their physical behaviors in situations that cause them to become upset, agitated, or angry, regardless of whether the situation warrants attributions of hostile intent.

Research suggests that neurobiology may account for, at least partially, aggressive acts in individuals with impulse control difficulties. The orbital frontal cortex (involved in decision making) and the anterior cingulate cortex (involved in cognitive and

emotional processing) may be at an imbalance with the regions of the brain that suppress aggression (i.e., the limbic system) in individuals who tend to react aggressively. In addition, deficiencies in serotonin levels in the orbital frontal cortex and anterior cingulate cortex are also implicated in reactive aggressive behavior (Siever, 2008). The interpretation of relationally neutral situations as aggressive, and the impulse to react aggressively in such situations, may be due, at least, in part, to these neurobiological imbalances. However, this study cannot sort out the cause of participants' aggression – it can be neurobiologically based, behaviorally based, emotionally based, and/or resulting from other causes.

The relationship between temperance and relational hostile attribution bias did not extend to overt hostile attribution bias. Although youth in this study reported high rates of physical aggression *perpetration*, it is possible that, as girls, these juvenile offenders are more concerned with relational aggression *victimization*, which directly affects interpersonal relationships, and they may tend to view such behavior as more threatening than overt, physically threatening situations. Female youth associate relational aggression with greater social status among peers (Prinstein & Cillessen, 2003), and the delinquent girls in this study may have felt particularly threatened by relationally aggressive behavior, viewing it as an attack on their social status within the facility. Given the long-term commitments to post-adjudication facilities, delinquent girls may seek to maintain high social status among other female juvenile offenders to protect their self-image (Golmaryami & Barry, 2010) and sense of power (Crothers, Field, & Kolbert, 2005), as well as avoid negative evaluation (Loudin, Loukas, & Robinson, 2003) within a justice facility. Further research with this population is needed to better understand why

temperance was associated with relational but not overt hostile attribution bias and whether this relation differs with female adolescents at the pre-adjudication phase.

6.1 Implications

If future longitudinal studies of female juvenile offenders support findings of greater rates of physical aggression during the post-adjudication phase than during the detention phase, results will contribute to the growing body of research (Gatti, Tremblay, & Vitaro, 2009; McCurdy & McIntyre, 2004) on the iatrogenic effects of residential juvenile justice placement. Such findings would have implications for how we view juvenile justice placement as a means for rehabilitation and behavior modification. Given that many states (e.g., PA, AK, SC) indicate adherence to the Balanced and Restorative Justice (BARS) model of the juvenile justice system, such findings would contradict the explicit goal of restoration and rehabilitation, suggesting that, on the whole, alternatives to long-term residential placement might be preferable.

The stronger tendencies to report reactive than proactive aggression, particularly within the context of physical behaviors, is not surprising given long established social psychological tendencies for people to view their negative behaviors as reactions to others' actions, rather than as reflecting something about their own characters (Brown, 1986). These findings suggest that delinquent girls' implicit motivation to protect their self-image is consistent with what research has long shown about individuals in the general population (Steele, 1988). Future research should examine the cognitive coping strategies delinquent girls use in anger-provoking situations to examine consistency with cognitive approaches in the general population and to inform treatments to reduce anger and prevent aggression. Similarly, female juvenile justice programming might benefit

from assessing psychosocial maturity and helping youth who have difficulty tempering their behavior become less reactive and physically aggressive by teaching strategies that emphasize methods of thinking before acting to decrease impulsivity. Addressing these needs early may help prevent long-term negative outcomes, as impulsivity contributes to antisocial behavior (Mullis et al., 2004). Treatment also may address the tendency of female youth with low temperance abilities to view hostility in relationally provocative situations. By recognizing circumstances in which they may react physically or without forethought, female juvenile offenders may be better able to use cognitive restructuring techniques to challenge automatic assumptions of others' hostile intent and to, subsequently, control their behavior (Goldstein et al., under review).

6.2 Limitations

Results revealed significant relationships between psychosocial maturity and aggression, as well as between psychosocial maturity and hostile attribution bias, but there were limitations. First, like most studies on developmental immaturity and aggression (Cruise, et al., 2008; Marsee et al., 2011; Marsee & Frick, 2007), this study used self-report instruments to assess the key constructs. Individuals may exaggerate or minimize answers, which may affect the reliability and validity of results. However, means and standard deviations of aggression in this study were nearly identical to those from the normative data (Marsee & Frick, 2007), suggesting that psychometric instrument support applies well to this sample of delinquent girls. It is unclear whether results of this study on female juvenile offenders in residential post-adjudication facilities generalize to other populations, such as male juvenile offenders, high-risk female youth, community adolescent populations, or even girls in community-based juvenile justice

programs. Nevertheless, female juvenile offenders in residential placement represent an under-researched, under-served group that has been identified as having particularly difficult to treat problems (Bloom, Owen, Deschenes, Rosenbaum, 2002).

6.3 Conclusion

The rate of female juvenile offending is increasing rapidly (Silverman & Caldwell, 2008) and early offending is becoming more common (Mullis et al., 2004). It is important to understand the factors that may lead to and maintain the performance of delinquent behavior so that effective prevention and intervention programs can be developed (Mullis et al., 2004). If future research supports this study's results, residential juvenile justice programming for delinquent girls may benefit from emphasizing the psychosocial maturity factor of temperance, which was associated with physically aggressive behavior and relational hostile attribution bias.

Past intervention research has shown that it is possible to change adjudicated adolescent offenders' attribution biases, which results in reduced aggressive and impulsive behavior (Guerra & Slaby, 1990). By teaching female juvenile offenders techniques to control impulsive behavior and question their own presumptions about others' behavior, physical aggression among this population may be reduced.

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Table 1

Means and standard deviations of types of aggression.

Aggression	<i>M</i>	<i>SD</i>
Physical (total)	18.11	13.30
Reactive	12.55	8.04
Proactive	5.55	6.31
Relational (total)	10.55	10.26
Reactive	6.29	5.58
Proactive	4.27	5.19
Reactive (total)	18.84	12.21
Proactive (total)	9.82	10.95

Table 2

Post-hoc comparisons of mean scores on types of aggression.

Aggression Type Comparison <i>d</i>	Mean Difference (<i>SE</i> _{difference})	<i>df</i>	<i>t</i> _{difference}
1. PP-PR .35	1.29 (0.49)	55	2.62
2. PP-RP 1.23	-7.00* (0.76)	55	-9.24
3. PP-RR .17	-0.73 (0.58)	55	-1.26
4. PR-RP 1.18	-8.29* (0.94)	55	-8.78
5. PR-RR .61	-2.02* (0.44)	55	-4.61
6. RP-RR .96	6.27* (0.87)	55	7.19

PP = proactive physical; PR = proactive relational; RP = reactive physical; RR = reactive relational

* $p < .004$ (alpha-level was adjusted for multiple post-hoc comparisons; $\alpha = .05/12 = .004$)

Effect size interpretation: $d = .2, .5, .8$ represents small, medium, large effect size respectively.

