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2016 ICPSR Undergraduate Research Paper Competition First-Place Winner

The Moderating Effects of Race and Ethnicity on the Relationship between Body Image and Psychological Well-Being

Candace M. Evans, McMurry University. . . p. 3

2016 ICPSR Master's Research Paper Competition First-Place Winner

Paternal Incarceration and Adolescent Social Network Disadvantage

Brielle Bryan, Harvard University. . . p. 26

From Director Maggie Levenstein

We are pleased to present the winners of the 2016 ICPSR Research Paper Competitions in this special edition of the ICPSR Bulletin.

Brielle Bryan (MA, Sociology) of Harvard University earned first place in the Master's competition with her paper titled "Paternal Incarceration and Adolescent Social Network Disadvantage." The paper uses data from the National Longitudinal Study of Adolescent Health to explore a new aspect of the lives of children affected by parental incarceration: their social networks.

Candace M. Evans (BA, Sociology and Psychology) earned first place in the Undergraduate competition for her paper titled "The Moderating Effects of Race and Ethnicity on the Relationship between Body Image and Psychological Well-Being." The paper uses data from the National Longitudinal Study of Adolescent to Adult Health to examine the moderating effects of race and ethnicity on the relationship between adolescent girls' perceptions of several dimensions of body image (weight, relative physical development, breast size, and curviness) and their psychological well-being.

Congratulations to our winners and thanks to everyone who participated in the competitions this year.

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The Moderating Effects of Race and Ethnicity on the Relationship between Body Image and Psychological Well-Being

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Abstract

Body image is particularly salient amongst adolescent females, whose innate desire for self-comprehension is mingled with the rapid maturations and changes of puberty. Although existing literature points to marked differences across racial ethnic groups in terms of what is considered the ideal female body type, little is known as to how these variances are psychologically internalized and manifested across groups. Through the analyses of secondary data collected by the National Longitudinal Study of Adolescent to Adult Health, the present study investigates the relationships between several dimensions of body image and psychological well-being within a sample of adolescent females. Results indicate the relationship between feeling overweight and low self-esteem to be stronger in Latinas than in whites or blacks. Latinas also demonstrated a stronger relationship between feeling underweight and low self-esteem compared to blacks, for whom a lot/whole lot of perceived changes in curviness were related to high self-esteem. Finally, compared to the other racial-ethnic groups, changes in breast size were strongly correlated with low self-esteem and high depressive affect for Asians girls.

The Moderating Effects of Race and Ethnicity on the Relationship between Body Image and Psychological Well-Being

> The postmodern emphasis on images and illusions is reflected in greater attention to self-presentation and to style over substance. For that matter, the distinction between the real and the presented self, between substance and style, disappears. Fashion and personal appearance increase in importance as central means of creating the self and influencing the definition of the situation. The accentuated emphasis on physical fitness and body shaping is understandable when self and appearance are viewed as the same.

As indicated in the quote above by Gecas and Burke (1995, p. 57), the past few decades of social advancement have brought with it a shift in the ideals and values of our society. Increasingly, individuals conflate external characteristics—i.e. weight, beauty, and appearance—with their perception of self. In doing so, one tends to understand and evaluate the self in terms of his/her body weight, shape, and structure rather than characteristics that are meaningful for self-development, such as intelligence or personality.

Understandably, standards for beauty, weight, and appearance can vary drastically even within a single sociocultural environment. An individual's racial and ethnic group, for instance, greatly impacts his/her notion of the ideal way to look or behave. Accordingly, this study investigated how race and ethnicity shape the manner in which individuals evaluate themselves physically and the subsequent psychological outcomes of those appraisals. More specifically, through analyses of secondary data collected in the first wave of the National Longitudinal Study of Adolescent Health (Harris & Udry, 1994), I examined the moderating effects of racial and ethnic identification on the relationship between body image perceptions and psychological well-being within adolescent females.

The Self and Postmodern Society: The Importance and Effects of Body Image

While construction of self-concept is a healthy and necessary part of human development, the incorporation of both imagined and actual feedback from friends, family, and society into one's own self-evaluation can be highly problematic, particularly within the context of our postmodern society (Gecas et al., 1995). A mere glance at some of today's popular magazines, celebrity idols, and merchandise advertisements reveals an overwhelming admiration of and preference towards "good looks" rather than "good works," especially in their depiction of women (Balcetis, Cole, Chelberg, & Alicke, 2013, p. 109). Young girls socialized with these messages are encouraged to view their physical appearance as indicative of their value and worth as a person. This is particularly consequential for adolescent girls, whose initial judgments of self arise from the amount of discrepancy they feels exists between their current body and what is considered to be the ideal (Biro, Striegel-Moore, Franko, Padgett, & Bean, 2005; Van den Berg, Mond, Eisenberg, Ackard, & Neumark-Sztainer, 2010; Vogt Yuan, 2010).

Scholars stress the role that one's racial and ethnic socialization plays in shaping the specific physical characteristics she upholds as ideal (Clay, Vignoles, & Dittmar, 2005; Fitzgibbon, Blackman, & Avellone, 2000; Skorek, Song, & Dunham, 2014. For example, stereotypical Western notions of thinness are notably less salient within nonwhite, racially and ethnically diverse groups. One of the main reasons for the differences between racial ethnic groups in terms of what is considered attractive or ideal is the racial and ethnic bias seen in many popular magazines, advertisements, and movies that target Non-Hispanic Whites (Granberg, 2009); consequently, females who identify as part of a nonwhite racial and ethnic group do not consider these messages entirely applicable to someone with their skin color, hair texture, etc. Indeed, ethnically and racially diverse women often have definitions of attractiveness and beauty

that go beyond body weight and include the dimensions of appearance that are considered attractive within their own groups, such as curviness, breast size, and overall physical development (Schooler & Daniels, 2013; Swain, 2012). Similarly, other studies have shown that African American and Latina females typically admire a larger, more curvaceous body type than what is typically considered to be attractive by Non-Hispanic Whites; even at fairly low BMI levels Non-Hispanic White females evaluate themselves more negatively than African Americans or Latinas (Fitzgibbon et al. 2000; Frisby, 2004; Swain, 2012).

Body Image and Psychological Well-Being

Research clearly demonstrates a strong link between body image and psychological well-being (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006; Van den Berg et al., 2010; Vogt Yuan, 2010). Although an individual's psychological well-being can be measured in a number of ways, scholars in this area have primarily focused on self-esteem and depressive affect. Because physical appearance is so tied with notions of success and beauty, females who evaluate themselves undesirably are prone to a more negative outlook towards themselves, the world, and the future, which in turn increases feelings of low self-esteem and depressive affect (Paxton et al., 2006; McCarth, 1990; Vogt Yuan, 2010).

In their review of the literature, Clay and colleagues (2005) report an average correlation coefficient between body image and self-esteem of .63, indicating a moderately strong relationship between the two variables. Their own study (2005) also revealed that adolescent girls who believed their bodies to be highly discrepant from what they considered to be ideal internalize a concept of themselves as holistically inadequate, resulting in deflated feelings of self-esteem. Similarly, a longitudinal study by Paxton et al. (2000) revealed that self-perceptions of physical appearance not only impact girls' self-esteem, as demonstrated by Clay et al. (2005),

but also their depressive affect. Other studies have had similar findings and therefore emphasize depressive affect and self-esteem as important measures of psychological well-being (Vogt Yuan, 2010).

Moderating Effects of Race and Ethnicity

Though limited, several researchers have demonstrated the role that race and ethnicity plays in girls' assessments of and attitudes towards their physical appearance. Biro and colleagues (2005) suggest that racial and ethnic identification may serve as a protective factor against negative internalizations of body image. The literature in this area, however, has largely focused on these differences amongst African American and Non-Hispanic White females; much less is known about how body image is perceived and evaluated by Latina and Asian girls. Differences in pubertal timing have been theorized as one explanation for why such racial and ethnic disparities occur (Biro et al., 2005; Skorek et al., 2014; Van den Berg et al., 2011). For instance, African American girls generally experience puberty well before Non-Hispanic White girls. Because they also tend to be socialized to idealize a curvaceous and voluptuous body type, African Americans may experience the increase in breast and hip size that accompanies puberty as bringing them a step closer to meeting their cultural appearance ideal.

Empirical evidence of how racial ethnic identity *moderates* the relationship between body image and psychological well-being is extremely limited. To date, no studies have specifically focused on the manner in which racial and ethnic identity affects this association. Nevertheless, results from Van den Berg et al. (2011) and Vogt Yuan (2010) provide important insights into the basic differences in body image perceptions and psychological well-being between racially and ethnically diverse individuals. In their study, Van den Berg and colleagues (2011) obtained a general measure of body image perception through the subjects' ratings of themselves on ten

aspects of their bodies, which were combined into a single scale. Although Van den Berg et al. focused on the effects of several different factors (i.e. gender, age, body weight, socioeconomic status, etc.) on self-esteem only, statistical analyses revealed several key findings regarding the relationship between self-esteem and race and ethnicity. First, the association between perception of body image and self-esteem was significant for all racial ethnic groups of females. Additionally, this relationship was stronger for Non-Hispanic White girls than for African American or Asian girls.

A similar study by Vogt Yuan (2010) utilized data collected in the National Longitudinal Study of Adolescent Health to measure the effects of body image on adolescents' self-esteem and depressive affect over a one-year time period. Body image perceptions were assessed through participants' answers to a series of questions regarding their perception of their body weight (overweight, underweight, or average weight), desire to control or modify their weight (desire to lose weight, gain weight, or maintain weight) and perceptions of their physical development compared to others their age and gender (look older, younger, or about the same). The primary focus of this study was on gender differences and revealed a strong relationship between perceiving oneself as overweight and self-esteem for all females. However, African American girls who felt they were underweight also exhibited low self-esteem. Regardless of race and ethnicity, perceptions of physical development did not affect self-esteem levels for girls. There was also a strong relationship between perceptions of physical development and depressive affect for Latina and Asian girls, in that Latinas who perceived themselves to be less physically developed than their peers showed increased levels of depressive affect and Asians who felt they were more developed than their peers exhibited lower levels of depressive affect.

Despite this evidence that some racial ethnic groups may be less likely to uphold the predominate culture's ideal of thinness, there is a demonstrated need for further investigation into how race and ethnicity influences the overall manner in which body image perceptions are made and psychologically internalized. In both of the previously discussed studies, comparisons of the interactions between body image and psychological well-being for each racial ethnic group were made only in relation to Non-Hispanic Whites; accordingly, this study will make comparisons *across* models to understand what dimensions of body image are more meaningful and for which groups. Likewise, the primary focus for these papers was not on race and ethnicity; thus, the measures of body image utilized were primarily composed of dimensions generally more salient to Non-Hispanic Whites. The present study will therefore include measurements (e.g. curviness and breast size) that have been regarded as important within African American and Latina cultures. Finally, because the literature clearly indicates that racial and ethnic identity shapes the salience of appearance in females' self-evaluations, I believe that racial and ethnic identity may also influence the measure of psychological well-being most affected by their body image perceptions. Because weight seems to be less important to self-identity within African American and Latina cultures, self-perceptions of weight may be more strongly tied to higher depressive affect and lower self-esteem for Non-Hispanic Whites compared to African Americans or Latinas.

Four main hypotheses will be tested in this study: First, I hypothesize that females who perceive themselves as overweight will have lower self-esteem and higher depressive affect than those who perceive themselves as average weight; second, perceiving oneself as overweight will be more strongly correlated to lower self-esteem and higher depressive affect for whites than for blacks or Latinas; third, black and Latina females who believe they look younger than their

same-aged peers will have lower self-esteem and higher depressive affect compared to whites; fourth, black and Latina females who perceive little/no changes in breast size and curviness will have lower self-esteem and higher depressive affect than whites.

Because of the lack of information available regarding body ideals within Asian cultures, specific hypotheses for this group were not made.

Method

Data Source

Data for this study came from the first Wave of The National Longitudinal Study of Adolescent to Adult Health (Add Health), which was initiated by the United States Congress in 1994 to assess the general well-being of adolescents (grades 7-12) during the 1994-95 school year (Harris & Udry 2014). The study began with a school-administered questionnaire to a nationally representative sample of students, followed by four waves of data collected through in-home interviews. The first wave (occurring in 1994-1995) focused on how various aspects of personality, interpersonal relationships, educational achievements/progress, self-image, etc. influenced adolescents' overall physical, emotional, and psychological well-being. The sampling frame for the baseline included 132 schools in which students had completed the initial in-school questionnaire. Eligible students from the schools were then stratified by sex and grade level and randomly selected into a core Wave 1 sample of 12,105 adolescents.

Sample

This study features the data collected in Wave 1 of the ADD Health study. Because adolescent girls are taught early on to measure their worth in terms of their physical appearance, body image perceptions appear to be more impactful for females than males. Accordingly, in this study I specifically focused on the relationship between body image perceptions and

psychological well-being within adolescent females, for whom measures such as curviness and breast size are more relevant. Therefore, only the female participants from this wave were included (N=3356). Additionally, females who reported their race to be Native American, other, or more than one race were excluded from the analyses because of the small sample size and lack of power to make statistical comparisons. Thus, this subsample consists only of those who self-identified their race and ethnicity as Non-Hispanic White ("white"), Non-Hispanic Black ("black"), Asian, or Latina (n=3043).

Measurements

Table 1 provides a description of the range and frequency of the primary variables of interest used in these analyses for the full sample as well as for each racial ethnic group.

Dependent variables. The dependent variables analyzed in this study are self-esteem and depressive affect.

Self-Esteem. Self-esteem was measured by the ADD Health study through a set of six items similar to those found in the Rosenberg Self-Esteem Scale. Participants were asked to choose the answer (on a 5 point Likert scale) that best described the degree to which they felt the statement to be true. For instance, to the item "You feel you have a lot of good qualities," participants choose from one of the following answer categories: 1 [strongly disagree], 2 [disagree], 3 [neither agree nor disagree], 4 [agree] and 5 [strongly agree]. For this study, participants' answers to these separate items were averaged into a single self-esteem score, ranging from 1-5 (1 indicating very low self-esteem).

Depressive Affect. Participants' depressive affect was assessed by the ADD Health study through a nineteen item "feelings scale," similar in nature to the Beck Depression Scale. Participants were asked to choose one of four answers that best described the number of times a

certain statement/scenario had been true within the past week. For instance, to the item "You felt lonely" answer categories ranged from 0 (never or rarely) to 3 (most or all of the time). For this study, positively worded items such as "You felt hopeful about the future" were reversed coded. Participants' answers to the individual items were then averaged into a single depressive affect score, ranging from 0-3 (3 indicating high depressive affect).

Independent variables. The independent variables used in this study are weight image, relative physical development, breast size, and curviness.

Weight image. The ADD Health study used the term *weight image* to refer to how participants' perceived themselves in terms of their weight. Participants were asked to respond to the item: "How do you think of yourself in terms of weight?" by selecting one of six possible answer categories. For the purposes of this study, responses to this item were recoded into three dummy variables of weight image: participants who answered 1 [very underweight] or 2 [somewhat underweight] were recoded into the variable "underweight;" participants who answered 3 [about the right weight] were recoded into "average weight;" participants who answered 4 [somewhat overweight] or 5 [very overweight] were recoded into "overweight." "Average weight" is used as the comparison category for weight image in the analyses.

Relative physical development. Individuals' perceptions of their overall physical development relative to their same-aged peers were measured through the ADD Health item: "How advanced is your physical development compared to other girls your age?" Participants were asked to choose from one of five answer categories: 1 [I look younger than most], 2 [I look younger than some], 3 [I look about average], 4 [I look older than some], and 5 [I look older than most]. In this study, responses were recoded into three dummy variables of relative physical development: those who felt they looked "younger" than their peers (responses of 1 or 2), those

who felt they looked about the same as their peers or "average" (responses of 3), and those felt they looked "older" than their peers (responses of 4 or 5). "Average" is used as the comparison category for relative physical development.

Breast size. A subjective measure of breast size was assessed by the ADD Health study through the item: "As a girl grows up her breasts develop and get bigger. Which sentence best describes you?" Answer categories for this item were: 1 [my breasts about the same as when in grade school], 2 [My breasts are a little bigger than when in grade school], 3 [My breasts are somewhat bigger than when in grade school], 4 [My breasts are a lot bigger than when in grade school], and 5 [My breasts are a whole lot bigger than when in grade school]. In the present study, answers from this item were recoded into three dummy variables of breast size. Responses of 1 or 2 were recoded as "not or slightly larger"; 3 as "moderately larger"; and 4 or 5 as "a lot or whole lot larger." "Moderately larger" is used as the comparison category for breast size.

Curviness. A subjective measure of curviness was also measured by the ADD Health study through a similarly constructed item: "As a girl grows up her body becomes more curved. Which sentence best describes you?" participants were asked to respond by choosing one of five answer categories: 1 [My body is about as curvy as when in grade school], 2 [My body is a little more curvy than when in grade school], 3 [My body is somewhat more curvy than when in grade school], 4 [My body is a lot curvier than when in grade school], and 5 [My body is a whole lot curvier than when in grade school]. Again, participants' answers were recoded in this study into three dummy variables. Responses of 1 or 2 were recoded into "no or slightly curvier"; 3 into "moderately curvier"; and 4 or 5 into "a lot or whole lot curvier." "Moderately curvier" is used as the comparison category for weight image.

Controls. Participants' age at time of interview ("age") and their body mass index ("BMI") were both controlled for in all analyses. Socioeconomic status of participants ("SES") was also controlled for in the analyses, determined by the highest level of education completed by the participants' resident mom or resident dad control (answer categories ranged from "eight grade or less" to "professional training beyond four-year university/college").

Plan of Analysis

Mean self-esteem and depressive affect levels for each racial ethnic group were computed and t-tests across groups were examined. Linear regressions were run separately for each racial ethnic group in order to compare of the nature of the relationships between body image perceptions and self-esteem and body image perceptions and depressive affect, and significant coefficients were then calculated to compare the effects of the independent variables across race groups.

Findings

Bivariate Analyses: Race Differences in Self-Esteem and Depressive Affect

Table 1 shows the average self-esteem and depressive affect scores for each racial ethnic group. The average self-esteem in blacks (3.21) was greatest ($p<.001$) compared to whites (3.03), Latinas (2.96), and Asians (2.75). The average depressive affect score was greatest for Asians (0.81) and significantly lower ($p<.001$) in whites (0.57), blacks (0.65), and Latinas (0.74). Overall, t-tests revealed significant differences in *all* cross-model comparisons of self-esteem and depressive affect.

Moderating Effects of Race and Ethnicity

Linear regression analyses of the relationship between body image and self-esteem for each racial ethnic group are shown in Table 2. Results indicate that regardless of race and ethnicity, all individuals who perceived themselves as overweight also scored low on self-esteem. Z-scores of the significant coefficients across models revealed this relationship to be significantly stronger ($p<.05$) for Latinas compared to whites and blacks. For blacks and Latinas, being underweight was also negatively associated with self-esteem; however, the relationship was significantly stronger for Latinas ($p<.05$) for Latinas than for blacks. With regard to relative physical development and self-esteem, looking younger was negatively related to self-esteem for whites but not for any of the other racial groups. In comparisons across models, this relationship was significant to the .05 level. A lot/whole lot of perceived changes in breast size and low self-esteem were found in both Asians and whites but not in blacks or Latinas. Interestingly, the strength of the relationship was significantly stronger ($p<.05$) for Asians compared to both whites and blacks, but not Latinas. A positive relationship between a lot/whole lot of perceived

change in curviness and self-esteem was also found in blacks but not for the other race groups; this relationship was significantly stronger ($p<.05$) only in comparison to Latinas.

Table 3 displays the linear regression analyses of the relationship between body image and depressive for each racial ethnic group. Despite racial ethnic identification, all individuals who perceived themselves as overweight scored high on depressive affect; unlike the other groups, however, being underweight was also negatively associated with high depressive affect for blacks. T-tests revealed the strength of this relationship to be significantly stronger ($p<.05$) than in both whites and Asians. White and black respondents who felt they looked younger than their peers also scored high on depressive affect compared the other groups; the same was also true for whites who felt they looked older. Neither of these relationships was significant in the comparisons across models. Little/no perceived changes in breast size were positively correlated to high depressive affect for Asians, but not for any of the other racial ethnic groups. Indeed, the strength of this correlation was significantly stronger compared to all other racial groups ($p<.05$).

Discussion

This paper investigates the manner in which individuals' racial ethnic identification moderates the relationship between their perceptions of body image and psychological well-being. Based on the literature, I developed four main hypotheses regarding the degree to which race and ethnicity influences how individuals make and internalize body image perceptions. Because of general societal pressure to be thin, I anticipated that the correlation between weight image and both psychological well-being variables would be present across groups. Considering the different cultural ideals emphasizing breast size and curviness within black and Latina cultures, however, I expected these variables to be more important for blacks and Latinas than for whites (Clay et al., 2005). Further, based on findings from previous studies, I also predicted

that physical development, in terms of looking younger or less physically developed, would be significantly related to lower self-esteem and higher depressive affect for blacks and Latinas but not for whites.

Results from this study clearly indicate that race and ethnicity influences the manner in which body image perceptions are made and internalized by adolescent girls. First, consistent with the literature's discussion of the intense pressure women feel in terms of their weight, low self-esteem and high depressive affect were found in all girls who perceived themselves as overweight (Balcetis et al., 2013; Biro et al., 2005; Clay et al., 2005). However, this relationship was stronger for Latinas compared to whites, which contrasts what other studies have revealed about a larger cultural body ideal for Latinas (Skorek et al., 2014; Van den Berg et al., 2010; Swain, 2012). It is possible that this finding highlights a divergence in the racial socialization of some adolescents, in that those who negatively perceived themselves as overweight were more assimilated into the dominant white culture and subsequently more influenced by the pressure to be thin. Future research should examine how assimilation in Latinas may influence body image and subsequent psychological wellbeing. Being underweight was also related to lower self-esteem and higher depressive affect in both Latina and black females. Moreover, black girls who felt they were a lot/whole lot curvier than when they were younger exhibited high self-esteem. These findings are consistent with Vogt Yuan's (2010) conclusion that black girls who felt they were underweight exhibited low self-esteem and high depressive affect and offers support for the heavier cultural body ideal described by Van den Berg et al. (2010). For young girls who are socialized within cultures where a shapely, voluptuous figure is idealized, it follows that being underweight or having changed a lot in terms of curviness would influence how they evaluated themselves.

Despite the small sample size of Asians, this study also revealed several interesting findings regarding how Asian girls perceive and evaluate themselves. Asians who felt their breasts had changed a lot since grade school scored low on self-esteem and those who felt their breast size had not changed a lot scored high on depressive affect. Considering the substantial dearth of information regarding the manner in which Asian women make evaluations of their bodies, these findings provide an import area of inquiry for future research.

Limitations and Avenues for Future Research

Overall, this study is merely the first step in examining how different aspects of body image influence the self-esteem and depressive affect of a racially and ethnically diverse sample and several limitations are worth noting. First, respondents in the ADD Health study were asked how they perceived their breast size and curviness in relation to their younger selves rather than their same-aged peers, which may account for the lack of support for my anticipation of an increased salience of breast size and curviness for blacks and Latinas. Since non-white girls tend to undergo puberty much earlier than whites, blacks and Latinas may not have perceived as much change between their former and current bodies compared to individuals who had only recently experienced these changes. Future studies should therefore utilize a comparative measure for breast size and curviness in which evaluations are made in relation to peers rather than the self. Also, this study was limited in that in only included female participants. It is possible that the effects of race and ethnicity on the association between body image and self-esteem differ drastically for males, who are likely to make body image perceptions in a much different manner than females. Future studies should seek to include or focus on males in order to more thoroughly investigate the influence that one's racial and ethnic socialization has in terms of how body image perceptions are made and internalized.

In summary, the present paper contributes to a growing body of literature regarding racial and ethnic differences in self-conceptualization and psychological well-being (Clay et al., 2005; Skorek et al., 2014; Swain, 2012). My findings suggest important differences in what racially and ethnically diverse individuals consider to be ideal in terms of appearance, as well as similarities in how negative evaluations of one's appearance are manifested psychologically.

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Table 1. Descriptive Statistics for Central Measures

Student Characteristics	Full Sample (n=3043)	White (n=1877)	Black (n=734)	Latina (n=338)	Asian (n=94)
Race (in %)					
White	61.7				
Black	24.1				
Latina	11.1				
Asian	3.1				
Age in years (s.d.)	15.98 (1.77)	15.95 (1.76)	15.99 (1.78)	16.01 (1.75)	16.41 (1.89)
Parent's Education (in %)					
Less Than High School	12.5	7.5	14.0	38.5	0.1
High School Graduate	29.0	30.2	28.2	25.4	22.3
At Least Some College	19.8	20.9	19.2	16.6	12.8
College Graduate	35.5	38.6	34.1	15.7	56.4
Body Mass Index (s.d.) (12.01-46.32)	22.29 (4.43)	21.89 (4.2)	23.42 (5.03)	22.53 (4.00)	20.76 (3.45)
Independent Variables					
Weight Image					
Underweight	10.3	8.6	12.1	13.6	17.0
Average weight	49.9	50.8	51.0	43.8	44.7
Overweight	39.9	40.6	36.9	42.6	38.3
Relative Body Development					
Younger	19.3	15.8	24.7	23.1	33.0
Average	39.3	40.9	34.6	38.8	44.7
Older	41.4	43.3	40.7	38.2	22.3
Breast size					
Not/slightly larger	21.7	17.7	28.7	24.9	33.0
Moderately larger	32.7	33.8	28.3	35.2	35.1
A lot/whole lot larger	45.6	48.4	42.9	39.9	31.9
Curviness					
No/slightly curvier	20.2	17.7	24.1	24.3	25.5
Moderately curvier	33.6	35.9	25.1	36.1	44.7
A lot/whole lot curvier	46.2	46.4	50.8	39.6	29.8
Dependent Variable					
Self-esteem (1-5)	3.06 (0.60)	3.03 (0.59)	3.21 (0.57)	2.96 (0.66)	2.75 (0.64)
Depressive Affect (0-3)	0.62 (0.43)	0.57 (0.40)	0.65 (0.44)	0.74 (0.46)	0.81 (0.44)

Table 2. Regression: Effects of body image on self-esteem by racial-ethnic group

	White		Black		Latina		Asian	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Body assessment								
Overweight[a]	-.30***	.03	-.22***	.06	-.52***	.09	-.36*	.17
Underweight[a]	-.03	.05	-.18**	.07	-.33**	.11	.08	.19
Younger[b]	-.10*	.04	.02	.06	.10	.10	-.24	.15
Older[b]	-.02	.03	-.02	.05	-.02	.09	.16	.18
No/slightly larger breasts[d]	-.08	.04	.05	.06	-.04	.11	-.33	.17
A lot/whole lot larger breasts[d]	-.02*	.03	.04	.06	.05	.56	-.41*	.17
No/slightly curvier[c]	.04	.04	.01	.07	.04	.10	-.08	.17
A lot/whole lot curvier[c]	.05	.03	.12*	.06	.01	.01	.04	.18
Controls								
BMI	.01	.00	-.01	.01	.00	.01	.02	.03
SES	.05***	.01	.02	.02	.02	.03	-.07	.06
Age	-.01	.01	-.037**	.01	.01	.02	-.04	.04
R^2	41.605***		16.161***		18.890***		8.130*	
df	11		11		11		11	

[a] The comparison category is average weight
[b] The comparison category is average development
[c] The comparison category is moderately larger breasts
[d] The comparison category is moderately curvier
*p<.05; **p<.01; ***p<.001

Table 3. Regression: Effects of body image on depressive affect by racial-ethnic group

	White		Black		Latina		Asian	
	B	S.E.	B	S.E.	B	S.E.	B	S.E.
Body assessment								
Overweight[a]	.20***	.02	.14**	.04	.17**	.06	.31**	.12
Underweight[a]	.02	.03	.18**	.05	.07	.08	-.16	.13
Younger[b]	.12***	.03	.09*	.05	.11	.07	.11	.10
Older[b]	.05*	.02	.06	.04	.11	.06	-.06	.12
No/slightly larger breasts[d]	.04	.03	-.06	.05	-.01	.08	.26*	.12
A lot/whole lot larger breasts[d]	.04	.02	-.04	.04	.05	.07	.14	.13
No/slightly curvier[c]	-.00	.03	.00	.05	.12	.08	.05	.11
A lot/whole lot curvier[c]	.00	.02	.01	.04	.08	.07	-.08	.13
Controls								
BMI	-.01**	.00	.00	.00	.00	.01	-.02	.13
SES	-.06***	.01	-.06***	.01	-.05*	.02	.01	.04
Age	.02***	.01	.02*	.01	-.02	.02	.02	.02
R^2	27.523***		11.045***		5.715**		4.160*	
df	11		11		11		11	

[a] The comparison category is average weight
[b] The comparison category is average development
[c] The comparison category is moderately larger breasts
[d] The comparison category is moderately curvier
*p<.05; **p<.01; ***p<.001

Paternal Incarceration and Adolescent Social Network Disadvantage

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Abstract

This paper explores the relationship between paternal incarceration and the structure and quality of adolescents' social networks. Previous research suggests that the composition of adolescents' social networks is important for exposing them to, or insulating them from, disadvantageous peer relationships and providing social support during a critical developmental period. Recent studies on the collateral consequences of incarceration have explored the implications of parental incarceration for children's behavioral problems, academic achievement, health, and housing stability, but none have yet examined the social networks of these children. Using network data from the National Longitudinal Study of Adolescent Health, I find that children of recently incarcerated fathers have more disadvantaged social networks than other adolescents: they have fewer friends, are more socially isolated, and are connected to less advantaged, less academically successful and more delinquent friends than their peers. These differences are robust to a variety of specifications and are generally consistent across race and gender subgroups. This adolescent social network disadvantage sheds new light on the young adult behavioral differences previously observed among children of incarcerated parents and reveals a new way in which mass incarceration may promote social exclusion.

Introduction

The emergence of historically high imprisonment rates in the United States has exposed large numbers of low-income, largely black and Latino, children to parental incarceration. Approximately 2.6 million American children had a parent in jail or prison on a typical day in 2012, up from 500,000 children in 1980 (Sykes and Pettit 2014). These 2.6 million children represented 11.4 percent of all black children, 3.5 percent of Hispanic children, and 1.8 percent of white children in the United States in 2012 (Sykes and Pettit 2014). The numbers are even more striking if we consider cumulative exposure rather than point-in-time estimates: by age 17 approximately 24 percent of all black children, 11 percent of all Hispanic children, and 4 percent of all white children in the U.S. have experienced some form of parental incarceration, and these percentages are markedly higher for children whose parents have not completed high school (Sykes and Pettit 2014; Wildeman 2009).

Research on the collateral consequences of incarceration has linked parental incarceration to household-level instability and disadvantage (Geller et al. 2009; Geller, Garfinkel, and Western 2011; Schwartz-Soicher, Geller, and Garfinkel 2011; Wildeman 2014), as well as child-level behavioral problems, like increased externalizing behavior, greater delinquency, lower educational attainment and higher levels of substance abuse in late adolescence and early adulthood (Cho 2011; Foster and Hagan 2013; Geller et al. 2012; Hagan and Foster 2012; Murray and Farrington 2005, 2008; Roettger and Swisher 2011; Wakefield and Wildeman 2014; Wildeman 2010). Taken together these results suggest that the disadvantages associated with incarceration – and perhaps even criminal involvement and incarceration itself – may be passed from one generation to the next.

This paper extends research on the effects of parental incarceration to consider adolescent social networks. Social networks are an important context through which information, social norms, and social support flow, particularly during adolescence (Giordano 2003). Adolescent peer groups differ greatly in their level of delinquency, academic orientation and structure (Coleman 1961; Ryan 2001), all of which are strongly associated with later academic achievement and deviance. Although previous research has not considered how adolescent social networks are shaped by parental incarceration, networks are an important pathway by which parental incarceration may negatively affect children's behavior and life chances.

I use the National Longitudinal Study of Adolescent Health (Add Health) to study the effects of paternal incarceration on adolescent social networks, examining how the structure and quality of networks differ by recent paternal incarceration. Across a wide variety of specifications that include adjustments for adolescent deviance, school fixed effects, and comparisons of matched respondents, I find strong evidence that teenagers whose fathers have recently been incarcerated are more socially isolated than their peers and have friends who are less advantaged, less academically successful and more delinquent than those of other students. Like earlier research, these findings point to the possibility of intergenerational inequalities associated with incarceration.

Background

Adolescent Social Networks and Peer Groups

Differential association and differential reinforcement theory propose that adolescent social groups play an important role in socializing youth into delinquent behavior (Akers 1985; Burgess and Akers 1966; Sutherland 1947; Sutherland and Cressey 1955). Many studies support these theories, finding that friends influence adolescents' engagement in deviant and delinquent

activities, ranging from alcohol and drug use to serious property and violent crimes (Clark and Lohéac 2007; Haynie 2002; Ingram et al. 2007; Kandel 1978; Warr and Stafford 1991). Delinquency among one's friends also contributes to children's school failure both directly and indirectly through diminished academic achievement (Battin-Pearson et al. 2000). Moreover, having a low-achieving friend group can reduce an adolescent's own academic aspirations and achievement (Davies and Kandel 1981; Flashman 2014; Kandel 1978; Ryan 2001).

In addition to friends' characteristics, adolescents' location within their peer social networks may also influence behavior and academic success. For example, Haynie (2001) finds that social location conditions the effect of friends' delinquency on an adolescent's own delinquency. Popularity and centrality – essentially, the condition of being well connected within a network – are associated with lower delinquency for adolescents embedded in non-delinquent friend groups, while these characteristics are associated with increased delinquency for adolescents embedded in delinquent friend groups. Other research has found that centrality predicts academic achievement: better connected adolescents perform better in school (Calvó-Armengol, Patacchini, and Zenou 2009). Additionally, many studies have found that social isolation and rejection by peers during childhood predict subsequent school failure and delinquency (Ollendick et al. 1992; Parker and Asher 1987).

In the context of historically high incarceration rates, parental incarceration may shape adolescent social networks, ultimately contributing to the delinquency and diminished achievement commonly observed among the children of incarcerated parents (Aaron and Dallaire 2010; Besemer et al. 2011; Cho 2011; Dannerbeck 2005; Hagan and Foster 2012; Murray and Farrington 2005; Roettger and Swisher 2011). I illuminate this potential pathway by

examining the structure of social networks and the peers that comprise them for adolescents experiencing paternal incarceration.

A child's social network may vary in both its structure and its content. Structure describes the pattern of one's connections in a network, including the number of one's social ties and the centrality of one's position in the whole network. Content refers to the specific characteristics – or quality – of one's social ties, such as the proportion of friends from two-parent homes, friends' mean GPA, and so on. Children of incarcerated parents may be socially marginalized in terms of both the structure and the content of their social networks.

The social networks of children with incarcerated parents may differ from those of other adolescents for two main reasons: stigma and the network effects of behavioral problems.

Few studies have directly examined the extent to which children of incarcerated parents experience stigma in various social contexts, but a variety of scholars have hypothesized that the poor outcomes often observed among these children are due at least partly to the stigma surrounding parental incarceration (Besemer et al. 2011; Gabel 1992; Hagan and Dinovitzer 1999; Johnson 2009; Murray and Farrington 2005; Murray and Murray 2010; Phillips and Gates 2011; Western and Wildeman 2009). While the evidence to support this hypothesis is limited, Braman (2004), for example, finds that families – including children – experience stigma and shame as the result of having an incarcerated relative, even in neighborhoods where incarceration is common. Dallaire, Ciccone, and Wilson (2010) also find that teachers stigmatize students with incarcerated parents, holding lower expectations for them once they learn of parental incarceration.

Stigma is fundamentally a social status, a socially-conferred judgment of moral contamination that attaches to one's biography, physical appearance, or social connections

(Goffman 1963). Peer groups are a particularly important domain in which adolescents are likely to experience and ascribe stigma (Moses 2010). Therefore, if children of incarcerated parents experience what Erving Goffman calls a "courtesy stigma" (1963:30), then we would expect both the structure and content of their social networks to reflect this. Goffman (1963) claims that stigmatized individuals are socially isolated, either because they are shunned or because they avoid social interactions in expectation of being shunned. Consequently, they connect with other stigmatized or marginalized individuals who share their situation. Thus, if parental incarceration confers a stigma on children, we should expect those children to have fewer friends and be more marginal in social networks. We would also expect them to disproportionately befriend other stigmatized adolescents, like those who also have an incarcerated parent or who have experienced other stigmatic forms of family disruption. I test both of these possibilities, assessing the proportion of their friends who have also experienced parental incarceration and who come from two parent households, as well as the size of each respondent's friend group and how well connected that respondent is to the rest of the students in her school.

In addition to stigma, behavioral problems may mediate the association between parental incarceration and the structure and content of adolescents' social networks. Various studies have linked parental incarceration to internalizing behaviors and depression in children (Foster and Hagan 2013; Johnson 2009; Murray and Farrington 2008; Wakefield and Wildeman 2011, 2014), which may, in turn, cause these children to withdraw from social networks, making them more socially isolated, with fewer friends than their peers (Laursen et al. 2007).

Parental incarceration also appears to increase children's aggressive and antisocial behaviors (Geller et al. 2012; Johnson 2009; Murray and Farrington 2005; Murray, Farrington, and Sekol 2012; Wakefield and Wildeman 2011; Wildeman 2010). Such behavior may increase a

child's risk of social isolation even in the absence of stigma (Cairns et al. 1988; Laursen et al. 2007). Other research shows that aggressive adolescents tend to associate with other aggressive adolescents and that early aggression is associated with delinquency in adolescence (Cairns et al. 1988; Vitaro et al. 1997). Thus, adolescents who have experienced parental incarceration may have more antisocial, delinquent friends than other adolescents.

Both of these channels – stigma and behavioral problems – point to the same set of hypotheses: adolescents who have experienced parental incarceration will be more socially isolated and will have fewer, more delinquent, and more disadvantaged friends than other adolescents.

Correlated Adversity and Selection Bias

Identifying the causal effects of incarceration on either adult or child outcomes is challenging because of selection bias. Incarceration predominantly affects the most disadvantaged members of American society. Incarcerated adults have less education, lower employment and lower wages than most Americans, and they are disproportionately likely to be black, Hispanic or Native American (Pettit and Western 2004; Western 2006; Western and Pettit 2010; Western and Wildeman 2009). In addition to these widely observed characteristics, those who are incarcerated have higher rates of drug abuse, mental illness, lower cognitive ability, and perhaps greater impulsivity even prior to incarceration (Loeber et al. 2012; Schnittker, Massoglia, and Uggen 2012). In addition, incarceration has been found to have a variety of effects on economic opportunities, health and well being (Geller and Curtis 2011; Holzer 2009; Johnson and Raphael 2009; Pager 2003; Pager, Western, and Bonikowski 2009; Turney, Wildeman, and Schnittker 2012; Western 2006; Western, Kling, and Weiman 2001). Both the correlates of incarceration and its adult effects may shape adolescent social networks.

As a result of these overlapping disadvantages and the limitations of most datasets with information on children of incarcerated parents, identification of the causal effects of parental incarceration is extremely difficult (Johnson and Easterling 2012; Wildeman, Wakefield, and Turney 2013). Selection bias that results from these social adversities correlated with incarceration could be addressed by pre- and post-incarceration observations, but no data are currently available that measure characteristics of children's social networks both before and after parental incarceration.[1]

While isolating exogenous variation in parental incarceration is challenging with observational data, below I examine the sensitivity of the estimates under a variety of different identification strategies. Robust associations between paternal incarceration and network characteristics under a variety of adjustments for observable factors and for different subsets of the sample would lend confidence that the observed differences are not only an artifact of unobserved confounding.

Data, Measures & Analytic Approach

Data

The National Longitudinal Study of Adolescent Health (Add Health) is a nationally representative survey that has followed over 15,000 adolescents from grades 7-12 through adulthood. Respondents were initially surveyed in the 1994-1995 school year, with follow up interviews in 1996, 2001-2002, and 2008. The data are unique in providing detailed information about adolescent networks and parental incarceration. The survey's school based sampling frame may under-observe high-risk teenagers who have dropped out or have a high rate of absenteeism,

[1] Though a limited set of social network data are collected in the second wave of Add Health, the vast majority of respondents who experience parental incarceration have already had a parent incarcerated prior to the first survey.

however. Parental incarceration effects may thus be under-estimated with this school-based design.[2]

Add Health selected a stratified sample of 80 high schools chosen to be representative of all U.S. schools with respect to region, urbanicity, size, type, and ethnic mix.[3] One feeder middle school was selected for each sampled high school (unless the selected high school spanned grades 7 to 12), adding 52 middle schools to the sample. In-school surveys were administered to all 7th through 12th graders present in these 132 schools on the day of the initial survey (N= 90,118). The Wave I in-school survey collected data on friendship networks, school activities, future expectations, health-related behaviors and conditions, and basic household characteristics. The friendship network data consist of up to five male and five female friend nominations for each in-school survey participant. Eighty-five percent of students identified at least one friend (Harris 2013).

Because most nominated friends also completed the Wave I in-school survey, characteristics of respondents' friendship networks can be constructed by linking respondents directly to their friends' questionnaire responses. Add Health has used these data to construct basic network descriptors for each respondent, respondent-centered measures of friend characteristics, and school-level measures of global network structure and segregation. I use several of these measures as dependent variables. I also use friends' responses from the in-school survey to create additional summary measures of friends' characteristics, such as proportion of friends who live in two-parent households and friends' average delinquency levels.

[2] Previous research suggests that children of incarcerated parents are more likely to drop out of school than other adolescents (Cho 2011), so the dropouts excluded from this analysis are probably disproportionately likely to have experienced paternal incarceration.
[3] High schools were defined as schools containing an 11th grade and more than 30 students.

A longitudinal in-home study sample was generated by stratifying each school by sex and grade and randomly selecting students within strata to yield a sample of approximately 200 students from each pair of sampled schools. This core student sample was supplemented with special oversamples of racial and ethnic minorities, sibling pairs, adopted students, and disabled students, yielding a total sample of 20,745 Wave I in-home study participants. Parent interviews, usually completed by the resident mother, were then conducted in respondents' homes in Wave I. A parent completed an interview for 85 percent of students in the longitudinal sample (N=17,670). The fourth survey wave in 2008, which collected data on parental incarceration, included 15,701 members of the original sample, for a 75.7 percent response rate (Harris 2013).

I use data from the Wave I in-school survey, the Wave I in-home survey of longitudinal sample members, and the Wave IV survey of longitudinal sample members.[4] Because data on parental incarceration history are only available for longitudinal sample members who participated in the Wave IV survey, I limit my analyses to these respondents. I look only at paternal incarceration in this paper, because few respondents experienced maternal incarceration prior to Wave I (N=232) and previous research suggests that maternal and paternal incarceration affect children differently (Lee, Fang, and Luo 2013). I focus specifically on biological father incarceration, rather than including social fathers, as it is unclear what role social fathers played in each respondent's life prior to Wave I and their incarceration.

My analytic sample is thus restricted to longitudinal sample members who could be correctly matched to their Wave I in-school questionnaires and who reported biological father incarceration history in Wave IV (N=11,356). I have created a subset of social network measures from the full Wave I in-school survey data for all respondents who meet these criteria.

[4] I use the more detailed data from the Wave I in-home survey to create control variables for these respondents.

Additionally, I use social network measures created by Add Health for some of my analyses. For the sake of reliability, these measures were only constructed for students in schools with response rates of 50 percent or higher and for friendship nominations in which both the sender and receiver of the nomination are uniquely identifiable students, leaving me with a total of 10,619 respondents when using these Add Health network measures.[5]

For analyses of friend characteristics, I limit the sample to respondents who nominated at least one in-school friend (N=10,146) so that friends' characteristics can be measured from their responses to the in-school survey.[6] The sample size for the analyses of friends' average characteristics, therefore, depends upon how many respondents had at least one in-school friend who completed the survey and provided a valid response on that particular question (e.g., GPA, household composition, delinquent activities). The sample size for each model is reported in Table 2. See Table A1 in the appendix for a schematic of the above noted sample size restrictions.

Dependent Variables

In order to assess whether and how adolescents' social network structures differ by paternal incarceration history, I examine differences in the size of an adolescent's friend group and her social location within the whole school social network. The specific measures I use are the *total number of friends nominated* by the respondent, the *number of friend nominations*

[5] I do not use Add Health's sample restriction criteria for the one network measure that I have created (total number of friends nominated), because it is not necessary to have a response rate of at least 50 percent or to be able to uniquely identify nominated friends to accurately identify the number of friends a respondent nominated. These restrictions are important, however, for getting a reliable picture of the number of friendship nominations a respondent receives and for calculating measures of centrality and social location.

[6] Approximately eight percent of all friendship nominations were to individuals whose names were not on the school rosters. Typically students were missing from school rosters because they had moved into the school system after the rosters were printed, but some nominations may not have been matched to the roster because students were known only by nicknames (Carolina Population Center 2001).

received from other students in the school, the respondent's *centrality* within her school social network, and her *network reach in three steps* within the school.

The number of friends a student nominates can be thought of as a measure of the extent to which she isolates herself from peers, while the number of friendship nominations received can be thought of as a measure of her popularity or exclusion within the school. Centrality is a measure of the respondent's prominence in the whole school social network – it is essentially a measure of the number of friends a respondent has, weighted by the popularity of those friends. Because the scale of the centrality measure is not intuitive, I log each respondent's centrality score to make coefficients easier to interpret. The results I obtain using this transformed centrality measure are consistent with those I find when using the untransformed measure of centrality. Network reach in three steps captures the size of each respondent's extended social network by counting how many students the respondent is connected to in three steps (i.e., friends of friends' friends), providing an indication of the extent to which the respondent and her friends are socially isolated within their school.

I examine differences in the content of adolescents' social networks with the following measures of friends' average characteristics: *proportion of friends with an incarcerated parent*, *proportion from two-parent households*, *mean GPA*, and *mean level of delinquent behavior*. These measures can only be calculated for friends who attended the same school as the respondent and completed the in-school survey. More detailed descriptions of variable coding can be found in the appendix.

Key Independent Variable: Father Incarcerated in 3 years before Wave I

I use information on respondents' age at paternal incarceration and release to create an indicator variable identifying respondents whose biological father was incarcerated at some point

in the three years prior to the baseline survey (N=467), which collected complete in-school network data. I focus on paternal incarceration within this three-year window based on the assumption that a more recent paternal incarceration spell is likely to be more salient for both the respondent and her peers.

Analytic Approach

I report four estimates of the association between paternal incarceration and adolescent social network structure and content. First, I calculate a baseline estimate of mean differences between adolescents who did and did not experience paternal incarceration in the three years prior to Wave I. I then estimate the effects of paternal incarceration using three different approaches to account for compositional differences between these two groups and potentially confounding factors: regression, within-school fixed effects regression, and propensity score matching.

In the absence of pre-treatment data, I first estimate an OLS model that controls only for demographic characteristics that could not have been affected by paternal incarceration: *race, age* and *gender*. I cluster standard errors throughout to account for school-based sampling. The next model adds post-treatment controls that may have been affected by paternal incarceration but nevertheless represent factors that could confound the relationship between paternal incarceration and social network and friend characteristics: *years in attendance at current school*, *respondent's GPA*, *respondent's delinquency*, *presence of a mother and/or father figure in the respondent's household*, *education level of resident mother and/or father figures* and *school fixed effects*.

Because they experience greater housing instability (Geller et al. 2009; Tasca, Rodriguez, and Zatz 2011), children of incarcerated parents may change schools more often than other

children and may thus have less time to establish friendships. To account for residential mobility I control for the student's self-reported number of years in attendance at their current school. Additionally, I control for respondent's own GPA and standardized delinquency index score to help ensure that differences in social network characteristics between children of incarcerated fathers and their peers are not attributable to behavioral differences in these two groups. This model also controls for parental education, but because not every student lives with a mother and/or father figure, I interact mother and father figures' education with dummy variables indicating whether the student had a mother or father figure present in their household. I multiply impute missing values for years in current school (n=42), GPA (n=235), delinquency index score (n=445), and mother education and father education when a mother and/or father is present in the household (n=221 and n=348, respectively) using respondents' data from the other control variables noted above. Further description of the coding of these variables can be found in the appendix.

The third model also adds school fixed effects as Add Health respondents are clustered within schools and certain school-level characteristics – like the prevalence of parental incarceration, the size and diversity of the student body, or family income variance – may confound the relationship between paternal incarceration and social network characteristics. Fixed effects models yield the average difference in network characteristics within schools for children with and without a recently incarcerated father. The fixed effects model thus controls for all school-level variables correlated with paternal incarceration and adolescent networks. High rates of incarceration in poor schools, for example, are controlled in this specification.

The final estimates are based on within school nearest neighbor propensity score matching to restrict the comparison set to a subset of appropriate control-case respondents.

Ideally propensity scores should only be calculated based on pre-treatment characteristics, but as noted above I do not have access to such data. I, therefore, estimate propensity scores based on characteristics that seem least likely to have been affected by and most likely to help predict paternal incarceration: *race*, *biological mother's and/or father's education* (when available), *biological mother's and/or father's age at respondent's birth* (when available), *resident mother figure's education* (if applicable) and *resident mother figure's welfare receipt*, as well as missingness on these variables. I then use nearest neighbor caliper matching, within school, to match respondents who experienced paternal incarceration to other students in their school who had a similar propensity score (within one-quarter standard deviation of the respondent's own propensity score). Respondents with an incarcerated father who do not have a good match within their school are dropped from this analysis. I then compare average outcomes on network and friend characteristics between adolescents who have experienced paternal incarceration and those who have not within this matched sample.

Table 1 provides an overview of control variable characteristics for members of the analytic sample by paternal incarceration history. Adolescents with and without recently incarcerated fathers are closely matched on age, presence of a mother figure in the household and, to a lesser extent, on gender, years in current school and GPA. However, students whose father was incarcerated in the three years prior to Wave I are more likely to be black and tend to have less educated parents than students who have not experienced paternal incarceration. Those whose father had been incarcerated recently also have higher delinquency index scores on average and, unsurprisingly, are much less likely to have any father figure present in their home at Wave I (70 percent vs. 83 percent, respectively). I control for differences in these characteristics in the latter portion of my analyses to help account for the possibility that these

compositional differences between adolescents who have experienced paternal incarceration and those who have not drive any observed differences in network and friend characteristics.

Table 1. Control Variable Characteristics by Paternal Incarceration History

		Father incarcerated in 3 years before Wave I	
	All	No	Yes
Father incarcerated in 3 years before Wave I	4.1%	--	100%
Gender			
Male	46.3%	46.4%	43.0%
Female	53.8%	53.6%	57.0%
Race			
White	54.4%	55.0%	41.3%
Black	22.6%	21.9%	38.3%
Hispanic	14.7%	14.6%	15.9%
Asian	6.5%	6.7%	1.9%
Other	1.8%	1.7%	2.6%
Age (mean)	14.9	15.0	14.6
	(1.7)	(1.7)	(1.6)
Years in current school (mean)	2.7	2.7	2.5
	(1.6)	(1.6)	(1.5)
GPA (mean)	2.8	2.8	2.6
	(0.8)	(0.8)	(0.7)
Delinquency index score[a]	-0.04	-0.05	0.13
	(1.0)	(1.0)	(1.0)
Mother figure present in household	97.4%	97.4%	97.9%
Father figure present in household	82.8%	83.3%	69.6%
Mother figure's education (if present)			
No school	0.2%	0.2%	0.0%
Less than high school	15.3%	14.9%	23.6%
High school or GED	30.0%	30.1%	26.9%
Some college	27.4%	27.2%	31.1%
College graduate	15.8%	15.9%	12.3%
More than college	9.4%	9.7%	4.2%
Missing	2.0%	2.0%	2.0%
Father figure's education (if present)			
No school	0.2%	0.1%	0.9%
Less than high school	15.2%	14.9%	23.1%
High school or GED	28.8%	28.6%	33.9%
Some college	23.6%	23.7%	19.1%
College graduate	16.2%	16.4%	12.0%
More than college	12.4%	12.7%	5.2%
Missing	3.7%	3.6%	5.9%
N	11,356	10,889	467

Note: Standard deviations in parentheses

[a] Delinquency index score is standardized across all in-school survey respondents, not just members of the longitudinal cohort included here.

Results

Table 2 displays the regression and matching estimates of the effect of recent paternal incarceration on network and friend characteristics. (Tables A2 and A3 in the appendix display coefficients and standard errors for control variables.) The simple bivariate associations in column 1 show that the social networks of adolescents who have had a father incarcerated differ significantly from those of other adolescents. Respondents who reported recent paternal incarceration nominate significantly fewer friends (about .6 fewer on average) and are named as a friend by significantly fewer students in their school (about .4 fewer on average). These differences represent nearly one-tenth of the average number of friends nominated and friendship nominations received for all students. Baseline comparisons also reveal that respondents who have experienced recent paternal incarceration are less connected to other students in their schools on average. They have significantly lower centrality scores (approximately 10 percent lower than average), indicating that their friends are less well connected than the average student's friends. They also have smaller extended networks than their peers – they are able to reach about 10 fewer students in three steps than their peers who have not experienced paternal incarceration. All of these differences are consistent with those hypothesized above.

Adolescents with recently incarcerated fathers also have less advantaged, less academically successful, and more delinquent friends, on average, than other adolescents. In this bivariate comparison, a significantly higher proportion of their friends experience parental incarceration (about 8 percentage points more, on average), and a significantly lower share of their friends live in two-parent households (11 percentage points fewer, on average). Moreover, friends' mean GPA is significantly lower (by .18 points) and friends' average delinquency scores

are significantly higher (by .12 standard deviations) among adolescents who have experienced recent paternal incarceration.

Table 2. Coefficients from Regression of Social Network and Friend Characteristics on Paternal Incarceration in Last Three Years

Dependent Variable	Bivariate Association	Pre-Treatment/ Demographic Controls Only	Full Controls + School Fixed Effects	Propensity Score Matched Pairs
Network Characteristics				
No. friends nominated	-0.617***	-0.514**	-0.340*	-0.547*
(std error)	(0.175)	(0.156)	(0.154)	(0.239)
N	11,356	11,356	11,356	812
No. friend nominations received	-0.360*	-0.252	-0.107	-0.0604
(std error)	(0.164)	(0.155)	(0.150)	(0.224)
N	10,619	10,619	10,619	762
Centrality (log)	-0.0960***	-0.0872***	-0.0572***	-0.0676**
(std error)	(0.016)	(0.015)	(0.015)	(0.022)
N	10,619	10,619	10,619	762
Network reach in 3 steps	-10.30***	-8.264***	-6.191***	-6.273*
(std error)	(2.117)	(1.885)	(1.634)	(2.515)
N	10,619	10,619	10,619	762
Friend Characteristics				
Prop. friends with incarcerated parent[a]	0.0825***	0.0752***	0.0406**	0.0394
(std error)	(0.020)	(0.017)	(0.015)	(0.020)
N	6,269	6,269	6,269	404
Prop. friends in two parent households	-0.110***	-0.0715***	-0.0490***	-0.0567**
(std error)	(0.017)	(0.013)	(0.013)	(0.020)
N	9,405	9,405	9,405	610
Mean GPA	-0.182***	-0.136***	-0.0707**	-0.112**
(std error)	(0.029)	(0.030)	(0.023)	(0.036)
N	10,123	10,123	10,123	694
Mean delinquency index score	0.123**	0.160***	0.0895*	0.126*
(std error)	(0.043)	(0.041)	(0.039)	(0.056)
N	9,359	9,359	9,359	610

Note: Standard errors in parentheses. Standard errors are clustered at the school level. Results for covariates are reported in Tables A2 and A3 in the appendix.

[a] Proportion of friends who also experienced parental incarceration can only be calculated for respondents who nominated at least one friend who (1) was also a member of the longitudinal sample and (2) participated in the fourth wave of the survey in which parental incarceration history questions were asked. Estimates are weighted by total number of Wave IV participant friends reported by the respondent.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).

The coefficients in the second column represent residual differences in network and friend characteristics after controlling for demographic differences in race, gender, and age, none of which could plausibly have been affected by paternal incarceration. Once we account for these compositional differences between the two groups, all of the social network differences, with the

exception of friends' delinquency, diminish in size. However, only the difference in number of friendship nominations received between the two groups is no longer statistically significant. These findings suggest that adolescents affected by paternal incarceration may choose to self-isolate but are not necessarily shunned by their peers more often than other students. The fact that they have lower centrality scores, smaller extended networks, and less advantaged, lower achieving and more delinquent friends, however, suggests that perhaps they are being identified as friends by more peripheral, less advantageous peers within their schools (as well as disproportionately selecting such students as friends).

Accounting only for pre-treatment characteristics is the safest approach to modeling social network differences, but it limits us to a handful of demographic controls. The third column in Table 2 displays the coefficients from a regression model that controls for potential confounding variables (years in current school, GPA, delinquency, mother/father figure presence in household, and mother/father figure education) and includes school fixed effects in addition to demographic characteristics. As a result of the inclusion of school fixed effects, the coefficients in the third column of Table 2 reflect *within school* differences in social network and friend characteristics between adolescents who experienced paternal incarceration in the three years prior to Wave I and those who did not. Because the potentially confounding characteristics included in this model were measured post-treatment, the estimates in column 3 may underestimate the effect of paternal incarceration.

Once these additional controls and school fixed effects are added to the model, the magnitudes of the coefficients drop to somewhere between 40 and 70 percent of what they were in the bivariate association. With the exception of number of friend nominations received, however, the differences remain statistically significant, indicating that compositional

differences between adolescents who do and do not experience paternal incarceration and differences in school context do not fully explain the differences observed in column 1. Examining the coefficients in this third model, we see that, net of controls and school fixed effects, adolescents who experienced recent paternal incarceration nominated .3 fewer friends on average than other adolescents, which is roughly equivalent to the difference seen for respondents with three fewer years at their current school than the average respondent (see Table A3 in the appendix). Similarly, adolescents who recently experienced paternal incarceration now have centrality scores about 6 percent lower than those of their peers, and their extended networks (in three steps) contain about 6 fewer students, which is about 10 percent lower than the average network reach for all respondents. To help put the magnitude of these differences in context, this difference in centrality is roughly equivalent to the difference we see for respondents with two fewer years at the school than the average respondent, and the difference in extended network reach is approximately equal to the difference associated with a two standard deviation increase in delinquency.

Significant differences in friend characteristics remain even when we include this fuller set of demographic, household and behavioral controls and restrict comparison to within schools. Respondents who experienced paternal incarceration within the last three years report a significantly higher proportion of friends who have also experienced parental incarceration (4 percentage points, or roughly 37 percent, more than their peers), and the share of their friends who come from two-parent households is about 5 percentage points (roughly 7 percent) lower. This is roughly equivalent to the difference between adolescents who lack a mother figure in their household and those who do not. These adolescents' friends also have significantly lower GPAs (by .07 points, on average) and are significantly more delinquent (by about .09 standard

deviations) than other adolescent's friends. The difference in friend's average delinquency is approximately equal to what we would see for a respondent whose GPA is a full point lower than the average respondent's.

On the whole, these differences are consistent with the above hypotheses about how stigma and behavioral differences among children of incarcerated fathers may shape their social network outcomes. The findings in Table 2 confirm that, on average, children who experience paternal incarceration are more socially isolated and have more marginalized, more delinquent, and lower achieving friends than their peers even after we account for compositional differences between these two groups of children and compare them to students in their own schools.

Finally, the last column of Table 2 displays mean differences in network and friend characteristics from the within school nearest neighbor propensity score matches. Because I have used one-to-one nearest neighbor matching and dropped children of recently incarcerated fathers without close matches from the sample, the sample sizes are much lower and standard errors are larger for the results in this column. Though the magnitudes differ slightly, the differences observed from propensity score matching closely mirror those observed from the school fixed effects model with full controls. Again we see that, on average, adolescents whose father has been incarcerated within the last three years nominate fewer friends, are more socially isolated within their schools (lower centrality scores and smaller extended networks) and have more disadvantaged (i.e., less likely to come from two parent households), less academically successful and more delinquent friends than their peers who have not recently experienced paternal incarceration.

Robustness Checks

These findings are robust across a variety of model specifications. In addition to those listed above, I have also estimated models accounting for household income (as reported by the respondent's primary caregiver), gender interactions, and race interactions, finding substantively consistent results. Moreover, I have tried a variety of specifications for the paternal incarceration variable – including incarceration at Wave I, incarceration any time between birth and Wave I, years of paternal incarceration prior to Wave I, and a set of dummy variables representing age at paternal incarceration (birth to age 3, 4 to 8, 9 to 12, and 13 or older) – consistently finding that the experience of paternal incarceration is associated with the same general network and friend characteristic differences noted above.[7] I also estimated Poisson regression models for the 3 network characteristics variables that are counts: total number of friends nominated, number of friend nominations received, and size of network reach in three steps. The results of these models are qualitatively similar to those produced above.

To further explore the validity of these findings I conducted a falsification test in which I use paternal incarceration *after* Wave I (but not before or during) to predict differences in social network and friend characteristics at Wave I using the school fixed effect model in column 3. The relationship between recent paternal incarceration and network characteristics may be spuriously significant because of unobserved differences between children who experience paternal incarceration and those who do not. With unobserved confounders, we would expect to observe a significant association between network characteristics and post-Wave I paternal

[7] In general, the magnitudes in social network and friend characteristic differences are larger for more recent paternal incarceration (including at the time of Wave I, after age 12, and in the last 3 years) and for longer duration of incarceration. The only exception is for the relationship between paternal incarceration and friends' average delinquency, which appears to be largest for respondents who experience paternal incarceration between the ages of 4 and 8. Paternal incarceration at any time after birth but before Wave I is associated with the same trends in network differences indicated in Table 2, but the magnitudes are smaller.

incarceration, even though post-Wave I incarceration could not have influenced Wave I network characteristics. Insignificant estimates in a falsification test thus help to rule out unobserved confounders.

Results for six of the eight dependent variables are insignificant, as we would hope. Only two outcomes differ significantly by paternal incarceration after Wave I: the proportion of friends living in two parent households ($p<.01$) and the number of friendship nominations received ($p<.05$), which was *not* significantly different beyond the bivariate associations in the above analyses. These findings suggest that the differences in number of friends nominated, centrality, extended network reach, proportion of friends with incarcerated parents, friends' average GPA and friends' average delinquency observed above are not simply an artifact of unobserved differences in adolescents who experience paternal incarceration. The falsification test results are shown in Table A4 in the appendix.

Because the effects of parental incarceration may differ based on the gender of the child (Roettger and Boardman 2012; Wildeman 2010) and because incarceration rates in the US differ widely by race, I also examine variation in these estimated effects across four race and gender subgroups using the school fixed effects model from column 3 in Table 2. Figure 1 displays the coefficients from separate race and gender subgroup regressions using standardized versions of the dependent variables. (Table A5 in the appendix reports the coefficient values, standard errors and sample sizes.)

In general, paternal incarceration coefficients are signed consistently across subgroups. Paternal incarceration is associated with nominating fewer friends, being more socially isolated within one's school, having fewer friends from two parent households, and having friends who are less academically successful and more delinquent than other adolescents' friends across race

and gender subgroups. Although it appears that some of the effects may be heterogeneous across subgroups, models that include gender and race interactions with paternal incarceration do not reveal any significant differences by gender. The only significant difference by race is in the relationship between recent paternal incarceration and friends' average GPA; for black respondents paternal incarceration is not associated with friends' GPA.

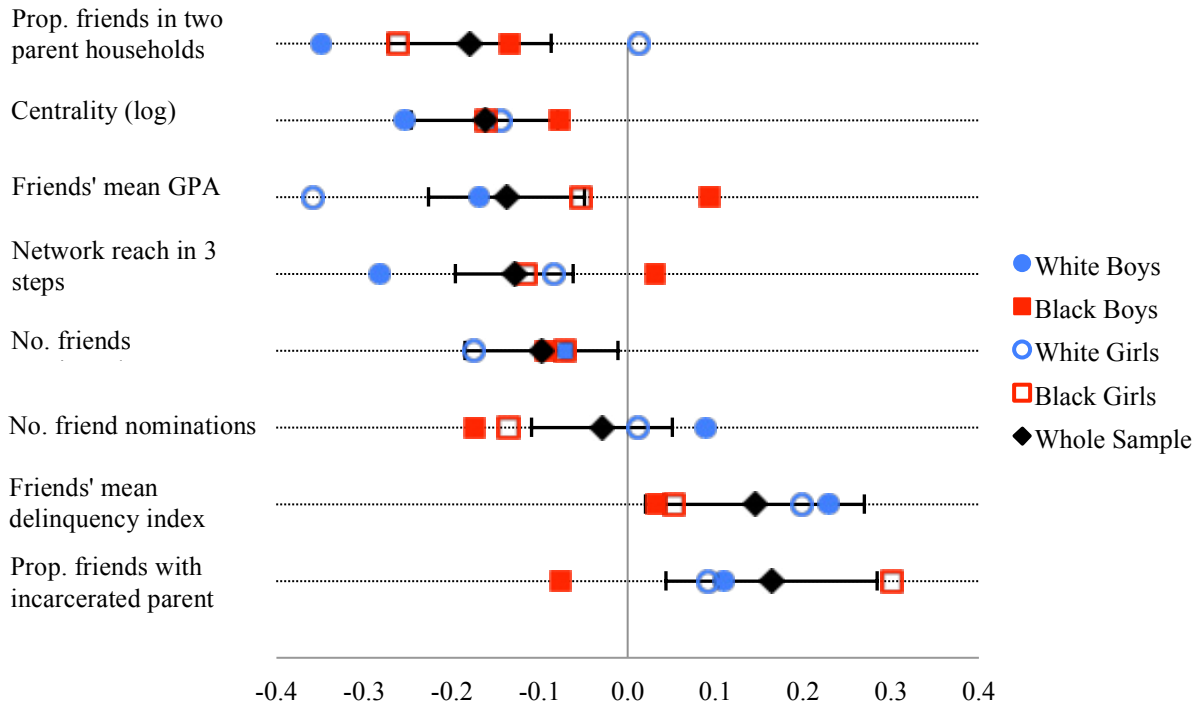

Figure 1. Coefficients on Paternal Incarceration for Race and Gender Subgroups
Note: Outcome variables have been standardized so they can be displayed on the same scale

In sum, the results indicate that there is a strong and robust association between paternal incarceration and social network disadvantage among adolescents. The above findings indicate that even when common demographic differences and likely confounders are controlled for and comparisons are limited to the most similar comparison group, children who have experienced paternal incarceration tend to report smaller, more socially isolated, and more disadvantageous friend groups than do other adolescents.

Discussion and Conclusion

Prior research indicates that incarceration introduces a host of disadvantages into the lives of adults who emerge from American prisons and jails (Holzer 2009; Pager 2003; Wakefield and Uggen 2010; Western 2006; Western et al. 2001). Research focused on the children of the formerly incarcerated links parental incarceration to a wide variety of disadvantages at both the household and child level. This paper explores a new context: adolescent social networks. I find that adolescents who have experienced paternal incarceration are embedded in less advantaged, more peripheral social relationships than their peers, indicating that children of incarcerated fathers experience social network disadvantage in their schools in addition to the resource deprivation and many other disadvantages they already face at home.

Adolescents who have experienced recent paternal incarceration limit the size of their social networks, nominating fewer friends than the average student in their school, and they befriend more disadvantaged and more peripheral peers. These adolescents are not necessarily nominated as friends less often than other students in their schools, but they are less connected within their schools than the average student, having significantly lower centrality scores and smaller extended networks. Moreover, the peers they befriend are less advantaged and less successful than other students' friends – they are significantly more likely to come from single-parent households, experience parental incarceration more often, get lower grades and are more delinquent than the average student's friends. These results are generally robust to a variety of models, a falsification test, and race-gender subgroups.

The findings are consistent with the hypothesized effects of parental incarceration stigma, lending support to the more general hypothesis that stigma contributes to poor outcomes for children of incarcerated parents. The fact that adolescents who have experienced paternal

incarceration are in less privileged positions in their social networks and associate with more disadvantageous friends – even after their own achievement and behavior are taken into account – also helps explain previous research linking parental incarceration to higher levels of delinquency and lower academic achievement in adolescence. Given that academic achievement and delinquency are influenced by friends as well as social location in one's school (Calvó-Armengol et al. 2009; Flashman 2014; Haynie 2002; Parker and Asher 1987; Vitaro, Brendgen, and Tremblay 2000; Weerman and Smeenk 2005), my findings suggests that social networks may be a mechanism through which the children of incarcerated parents become more delinquent and lower achieving. Ideally, the strength of this mechanism could be tested in the future with data that observe the social networks of children with incarcerated parents in early adolescence, then observe academic achievement and delinquency in late adolescence.

Despite the strength of the results under a variety of specifications, threats to causal inference remain where unobserved factors are both associated with incarceration and affect peer networks. In particular, behavioral characteristics of fathers such as criminal involvement, substance abuse and propensity for violence are unobserved in the Add Health data.[8] Future research could improve the current estimates with more detailed measurement of paternal behaviors and contact with child prior to incarceration.

Data limitations also prevent me from adjudicating between the relative influence of the two mechanisms I proposed earlier in this paper: stigma and behavioral differences. I can control for respondents' own delinquency and achievement at the time of the baseline survey, but because friends may influence each other's behavior, it is not possible to distinguish between baseline behavioral differences resulting from paternal incarceration and those resulting from

[8] To the extent that these characteristics of fathers are correlated with children's own delinquency, they are controlled for in model 3.

friends' influence. Therefore, I cannot confidently attribute all of the social network differences that remain after adding behavioral controls to stigma. Future research might distinguish these two mechanisms by including behavioral observations both before and after parental incarceration, as well as measures of stigma, such as teacher's observations of classroom interactions. Despite the challenges of causal identification and empirically isolating the distinct mechanisms for incarceration effects, the results clearly show inequality in the distribution of social capital associated with paternal incarceration.

In connecting paternal incarceration to childhood social network disadvantage, these findings add a new dimension to our understanding of the social exclusion associated with mass incarceration in America. Previous research has established mass incarceration as an institution for social isolation and exclusion for adults entangled in the system (Murray 2007; Travis 2002). With this paper we see evidence of very literal social isolation and exclusion crossing generational bounds and touching the lives of the children of America's prisoners.

Moreover, in identifying the social network disadvantages – both in structure and content – faced by children of incarcerated fathers, this paper contributes to the existing literature on the constriction and disadvantage of social networks among the poor in modern America (Desmond 2012; Sampson, Raudenbush, and Earls 1997; Smith 2007). We see in these findings that even in adolescence the children of America's prisoners find themselves embedded in more isolated and disadvantaged social groups than their peers. Rather than being a domain in which children are insulated from the burden of parental incarceration, adolescent friendship networks appear to be yet another site in which the disadvantage surrounding the children of incarcerated parents is tangible.

A substantial body of research suggests that the punishment inflicted by America's prison system extends well beyond those who have been convicted of crimes and the stated duration of their sentences. This study highlights a previously undocumented way in which the children of prisoners are penalized for their parents' infractions. By shedding light on the smaller, less advantageous friendship networks in which children of incarcerated parents are embedded, this paper enriches our understanding of the broad variety of ways in which both inmates and their children are marginalized in American society and provides further evidence of the social isolation and inequality associated with mass incarceration.

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APPENDIX A. Variable Coding

Key Independent Variable: Paternal Incarceration

Father incarcerated in 3 years before Wave I	In the Wave IV survey respondents indicated whether any of their biological parents or, if applicable, social parents had ever been incarcerated, the number of times each parent was incarcerated, and their own age when each parent was first incarcerated and last released from prison or jail. I use the respondent's age at the time of the Wave I in-school survey and her reported age at biological father's first imprisonment and last release to identify respondents whose biological father was incarcerated at some point in the three years preceding the baseline survey.

Dependent Variables: Social Network Characteristics

Total number of friends nominated[a]	The total number of friends the respondent identified on the in-school survey, regardless of whether those friends were located in the student's school or could be matched to names on the school's student roster.
No. of friend nominations received[a]	A measure of the number of times the respondent was nominated as a friend by other students in the respondent's school.
Centrality (log)[a]	I use the Add Health calculated measure of Bonacich centrality, which weights how many connections a respondent has (both the number of friends they nominate and the number of students who nominate them as friends) by the centrality of the friends that she nominated (i.e., how many connections they have). This measure is premised upon the notion that "one's status is a function of the status of those one is connected to" (Bonacich 1987:1181). In practical terms, this means that the centrality of a respondent is determined by the centrality (i.e., number of ties) of her ties. To make interpretation easier I log each respondent's Bonacich centrality. The centrality score equals zero for respondents who do not nominate any friends and are not nominated by any other students as friends. To avoid losing these respondents when logging the centrality score, I add 1 to each respondent's centrality score before taking the natural log.
Reach in 3 steps[a]	The number of other students the respondent can reach in just three steps. If *i* nominates *j, j* nominates *k,* and *k* nominates *l*, then *i* and *l* are three steps apart.
Prop. Wave IV friends with incarcerated parent	The share of a respondent's Wave IV participant friends who had any parent figure incarcerated at some point after their birth and before their 18th birthday. Because parental incarceration history is only known for respondents who participated in Wave IV, this measure is calculated using only nominated friends who also participated in the Wave IV survey and for whom we know parental incarceration history. Therefore, the sample is restricted to respondents with at least one friend who also completed the Wave IV survey (N=6,269). I weight analyses by total number of Wave IV participant friends nominated when proportion of friends with an incarcerated parent is the dependent variable.

Prop. friends with two parents	The share of the respondent's nominated friends who indicated that they lived with both a mother figure (biological, step, adoptive or foster) and a father figure at the time of the in-school survey. Only friends who attended the same school as the respondent and completed the in-school survey are used to calculate this measure.
Mean GPA[a]	An Add Health created measure of the approximate mean GPA for the respondent's in-school friend group (both the friends that the respondent nominated and other students who nominated the respondent as a friend), excluding the respondent. Students reported their letter grade in English/Language Arts, Mathematics, History/Social Studies, and Science on the in-school survey. GPA is calculated as the mean grade across these four core subjects with grades weighted as follows: A = 4, B = 3, C = 2, D or F = 1. GPA was calculated using only valid responses for identifiable friends in the same school as the respondent.
Mean delinquency	The delinquency index is based upon the respondent's friends' responses to questions about the frequency with which they engaged in the following 7 activities in the last 12 months: smoking cigarettes, drinking alcohol, getting drunk, engaging in dangerous activities on a dare, lying to parents, skipping school without an excuse, and getting in physical fights. I standardized responses for each activity across all 90,118 participants in the Wave I in school survey. I then calculated the mean of all valid responses across these seven activities and standardized it to create an index score for each of the respondents' friends with a mean of zero and a standard deviation of one. I average these friend delinquency index scores across each respondent's friends.
Control Variables	
Race	I measure respondent race with a series of five mutually exclusive dummy variables including white, black, Hispanic, Asian and other, based on response to the Wave I in-home survey. Respondents who selected two or more races were asked to identify the single race that best suited them. If they did not do so, their race was recorded as Other. Respondents who indicated a Hispanic background are classified as Hispanic, regardless of their racial background. I replaced missing race data from the Wave I in-home interviews with reported race from Wave I in-school questionnaires. White is the reference category in regressions.
Gender[b]	A dummy variable set equal to one if the adolescent is male.
Age[b]	Age on the date of the Wave I in-school survey.
Years in current school	Self-reported by the respondent on the in-school Wave I survey.
GPA	Students reported their letter grade in English/Language Arts, Mathematics, History/Social Studies, and Science on the in-school survey. GPA is calculated as the mean grade across these four core subjects with grades weighted as follows: A = 4, B = 3, C = 2, D or F = 1.

Delinquency index score	The respondent's standardized score on the delinquency index described above.
Mother and/or father figure presence in household	Dummy variables respectively set equal to one if the student had some sort of mother or father figure in the house according to the parent survey and in-school student survey.
Mother Figure Education & Father Figure Education	A series of dummy variables for highest level of educational attainment: no school, less than high school, high school or GED, some college, college graduate, and more than college, with high school or GED completion omitted as the reference category. Because not every student lived with a mother and/or father figure, I interact mother's and father's education level with a dummy variable indicating whether or not the student had a mother or father figure present in the household. Because student reports of parent education levels may be incorrect, I use reported education level from the in-home parent survey when possible. In most cases the parent survey was completed by the adolescent's resident mother; however other adults in the household sometimes completed the survey if the interviewer was unable to schedule an interview with the child's mother or father (Carolina Population Center 2008). The parent survey recorded the education level of the respondent and that of his or her spouse/partner, when applicable. I have recoded these education level variables into mother figure and father figure education based on the respondent's self-reported gendered relationship to the child (e.g., biological mother, grandfather, etc.) and the gender of respondent parent's partner. Thus, the education level for any female respondent to the parent survey – or that of the female partner for a male respondent to the parent survey – is recorded as the education level of the child's "mother figure." When parents did not participate in the survey or did not report their level of education I fill in missing data with parent education level as reported by the student on the in-school survey. In cases where a respondent's biological respondent lived in the same household as the respondent but did not complete the survey (and the biological parent's spouse did not complete it) I use student-reported parent education from the in-school survey.

[a] Created by Add-Health for respondents in schools with at least a 50 percent response rate and for social ties in which both students were uniquely identifiable.

[b] I use gender and age reported in the Wave IV survey as Add Health considers data from the last wave of participation to be the most correct (Carolina Population Center n.d.).

APPENDIX B. Additional Tables

Table A1. Analytical Sample

		Wave I In-School Survey Respondents	
		Total	With Add Health Network Measures[a]
		90,118	75,871
Wave I In-Home Respondents (Longitudinal Sample Members)	20,745	15,356	14,317
Wave IV Survey Participants	15,701	11,682	10,926
With valid data on paternal incarceration	15,243	**11,356**	**10,619**
With at least one *in-school* friend		**10,146**	**9,590**
With at least one in-school friend *with valid data on parental incarceration*		**6,269**	N/A

[a] For the sake of reliability, these measures were only constructed for students in schools with response rates of 50 percent or higher and for friendship nominations in which both the sender and receiver of the nomination are uniquely identifiable students.

Table A2. Full Regressions of Social Network and Friend Characteristics on Recent Paternal Incarceration with Pre-Treatment Controls Only

	Network Characteristics				Friend Characteristics			
	No. friends nominated	No. friend nominations received	Centrality (log)	Network reach in 3 steps	Prop. friends with incarcerated parent[a]	Prop. friends in two parent homes	Mean GPA	Mean delinquency index score
Father incarcerated in 3 years before Wave I	-0.514**	-0.252	-0.087***	-8.264***	0.075***	-0.072***	-0.136***	0.160***
	(0.156)	(0.155)	(0.015)	(1.89)	(0.017)	(0.013)	(0.030)	(0.041)
Black	-1.132***	-1.182***	-0.108***	-20.32***	0.031	-0.253***	-0.263***	-0.155***
	(0.170)	(0.183)	(0.016)	(5.13)	(0.017)	(0.016)	(0.044)	(0.030)
Hispanic	-1.222***	-1.188***	-0.059**	-26.08***	0.015	-0.083**	-0.278***	-0.043
	(0.161)	(0.218)	(0.021)	(4.33)	(0.016)	(0.026)	(0.075)	(0.064)
Asian	-0.923***	-1.322***	-0.026	-30.13***	-0.045***	0.011	0.200***	-0.290***
	(0.251)	(0.206)	(0.039)	(4.18)	(0.009)	(0.026)	(0.045)	(0.030)
Other Race/Ethnicity	-0.683*	-0.443	-0.066*	-15.56***	0.088*	-0.106***	-0.010*	0.012
	(0.304)	(0.369)	(0.027)	(4.47)	(0.0375)	(0.029)	(0.041)	(0.057)
Male	-1.223***	-0.407***	-0.055***	-4.65***	-0.010	0.007	-0.025	0.045**
	(0.082)	(0.092)	(0.008)	(1.28)	(0.005)	(0.006)	(0.013)	(0.015)
Age	-0.048	-0.085*	-0.020***	-0.74	-0.001	-0.002	-0.033***	0.070***
	(0.035)	(0.038)	(0.003)	(0.82)	(0.002)	(0.002)	(0.009)	(0.007)
Constant	8.656***	6.467***	0.889***	81.50***	0.114**	0.822***	3.408***	-1.028***
	(0.506)	(0.535)	(0.042)	(11.75)	(0.034)	(0.038)	(0.126)	(0.106)
Observations	11,356	10,619	10,619	10,619	6,269	9,405	10,123	9,359

Note: Standard errors in parentheses. Standard errors are clustered at the school level.

[a] Proportion of friends who also experienced parental incarceration can only be calculated for respondents who nominated at least one friend who (1) was also a member of the longitudinal sample and (2) participated in the fourth wave of the survey in which parental incarceration history questions were asked. Estimates are weighted by total number of Wave IV participant friends.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).

Table A3. Full Regressions of Social Network and Friend Characteristics on Recent Paternal Incarceration with Full Controls and School Fixed Effects

	Network Characteristics				Friend Characteristics			
	No. friends nominated	No. friend nominations received	Centrality (log)	Network reach in 3 steps	Prop. friends with incarcerated parent[a]	Prop. friends in two parent homes	Mean GPA	Mean delinquency index score
Father incarcerated in 3 years before Wave I	-0.197*	-0.081	-0.034***	-3.12**	0.014	-0.039***	-0.066***	0.072***
	(0.114)	(0.126)	(0.012)	(1.43)	(0.013)	(0.010)	(0.015)	(0.022)
Black	-0.702***	-0.452***	-0.130***	-13.25***	0.068***	-0.203***	-0.181***	-0.133***
	(0.107)	(0.120)	(0.012)	(1.37)	(0.015)	(0.009)	(0.014)	(0.020)
Hispanic	-0.244**	0.229	-0.027**	-2.65*	-0.005	-0.008	-0.055***	0.016
	(0.124)	(0.139)	(0.013)	(1.58)	(0.025)	(0.010)	(0.017)	(0.024)
Asian	-0.333**	-0.156	-0.031*	-6.82***	-0.027	0.005	0.163***	-0.147***
	(0.155)	(0.171)	(0.017)	(1.94)	(0.020)	(0.013)	(0.021)	(0.029)
Other Race/Ethnicity	-0.332	0.060	-0.054**	-4.99*	0.043**	-0.061***	-0.065**	-0.002
	(0.239)	(0.266)	(0.026)	(3.02)	(0.020)	(0.020)	(0.032)	(0.045)
Male	-1.235***	-0.352***	-0.041***	-2.55***	-0.017***	0.012**	0.012	-0.022*
	(0.063)	(0.070)	(0.007)	(0.79)	(0.005)	(0.005)	(0.008)	(0.012)
Age	-0.161***	-0.186***	-0.041***	-5.30***	-0.004	-0.004*	0.002	0.043***
	(0.029)	(0.032)	(0.003)	(0.36)	(0.003)	(0.002)	(0.004)	(0.005)
Years in current school	0.117***	0.212***	0.024***	1.39***	-0.004*	0.004*	0.005	0.006
	(0.027)	(0.030)	(0.003)	(0.34)	(0.002)	(0.002)	(0.004)	(0.005)
GPA	0.413***	0.565***	0.057***	4.31***	-0.018***	0.021***	0.184***	-0.098***
	(0.046)	(0.051)	(0.005)	(0.58)	(0.004)	(0.004)	(0.006)	(0.009)
Delinquency Index score	0.165***	0.172***	-0.020***	-3.08***	0.011***	-0.015***	-0.051***	0.195***
	(0.035)	(0.039)	(0.004)	(0.44)	(0.0029)	(0.003)	(0.005)	(0.007)
Mother figure present in household	0.666***	0.511**	0.079***	7.84***	0.009	0.050***	-0.007	0.002
	(0.200)	(0.222)	(0.021)	(2.52)	(0.023)	(0.018)	(0.027)	(0.040)
Father figure present in household	0.071	0.151	0.017	1.84	-0.020**	0.034***	0.009	-0.017
	(0.101)	(0.112)	(0.011)	(1.27)	(0.009)	(0.008)	(0.013)	(0.019)
Mother Figure Education (if present)								
No school*Mother figure in household	-0.005	0.292	-0.009	-7.73	0.035	0.154**	-0.233**	0.151
	(0.784)	(0.843)	(0.082)	(9.61)	(0.110)	(0.067)	(0.101)	(0.155)

Less than high school*Mother figure in household	-0.251** (0.106)	-0.202* (0.117)	-0.030*** (0.011)	-4.03*** (1.33)	-0.009 (0.009)	-0.001 (0.009)	-0.028** (0.014)	0.023 (0.020)
Some college*Mother figure in household	0.212** (0.085)	0.130 (0.094)	0.015* (0.009)	1.09 (1.06)	-0.006 (0.006)	0.005 (0.007)	0.029*** (0.011)	0.0035 (0.016)
College graduate*Mother figure in household	0.070 (0.104)	0.302*** (0.115)	0.017 (0.011)	1.01 (1.32)	-0.013* (0.008)	0.019** (0.009)	0.066*** (0.014)	-0.038** (0.019)
More than college*Mother figure in household	0.291** (0.131)	0.533*** (0.145)	0.048*** (0.014)	4.24*** (1.64)	-0.021** (0.010)	0.026** (0.011)	0.113*** (0.017)	-0.037 (0.024)
Father Figure Education (if present)								
No school*Father figure in household	-2.512*** (0.854)	-2.238** (0.969)	-0.221** (0.094)	-19.49* (11.04)	0.107 (0.087)	0.009 (0.085)	-0.071 (0.126)	0.022 (0.198)
Less than high school*Father figure in household	-0.080 (0.114)	-0.324** (0.126)	-0.015 (0.012)	-0.96 (1.43)	0.024*** (0.009)	-0.014 (0.009)	-0.067*** (0.015)	0.031 (0.021)
Some college*Father figure in household	0.082 (0.097)	0.014 (0.107)	0.013 (0.010)	1.66 (1.22)	0.003 (0.007)	-0.005 (0.008)	0.032** (0.013)	-0.002 (0.018)
College graduate*Father figure in household	0.062 (0.112)	0.268** (0.125)	0.031*** (0.012)	1.45 (1.41)	-0.004 (0.008)	0.007 (0.009)	0.054*** (0.015)	-0.021 (0.021)
More than college*Father figure in household	-0.011 (0.131)	0.052 (0.146)	0.018 (0.014)	0.18 (1.65)	0.004 (0.011)	0.013 (0.011)	0.072*** (0.017)	-0.018 (0.024)
Constant	7.811*** (0.474)	4.602*** (0.527)	0.870*** (0.051)	116.6*** (5.98)	0.124** (0.046)	0.680*** (0.039)	2.246*** (0.063)	-0.319*** (0.090)
Observations	11,356	10,619	10,619	10,619	6,269	9,405	10,123	9,359
Number of schools	133	121	121	121	128	132	121	132

Note: Standard errors in parentheses. Standard errors are clustered at the school level.

[a] Proportion of friends who also experienced parental incarceration can only be calculated for respondents who nominated at least one friend who (1) was also a member of the longitudinal sample and (2) participated in the fourth wave of the survey in which parental incarceration history questions were asked. Estimates are weighted by total number of Wave IV participant friends.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).

Table A4. Falsification Test: Regressions of Social Network and Friend Characteristics on Paternal Incarceration AFTER Wave I with Full Controls and School Fixed Effects

	Network Characteristics				Friend Characteristics			
	No. friends nominated	No. friend nominations received	Centrality (log)	Network reach in 3 steps	Prop. friends with incarcerated parent[a]	Prop. friends in two parent homes	Mean GPA	Mean delinquency index score
Father incarcerated after Wave I	0.057 (0.204)	-0.530* (0.230)	-0.004 (0.022)	-1.01 (2.60)	-0.013 (0.012)	-0.049** (0.017)	-0.016 (0.027)	0.042 (0.039)
Black	-0.721*** (0.107)	-0.455*** (0.121)	-0.132*** (0.012)	-13.38*** (1.37)	0.069*** (0.015)	-0.206*** (0.009)	-0.187*** (0.014)	-0.127*** (0.020)
Hispanic	-0.253* (0.124)	0.240 (0.140)	-0.028* (0.014)	-2.66 (1.59)	-0.004 (0.026)	-0.007 (0.010)	-0.056*** (0.017)	0.017 (0.024)
Asian	-0.334* (0.155)	-0.151 (0.171)	-0.031 (0.017)	-6.81*** (1.94)	-0.026 (0.020)	0.006 (0.013)	0.163*** (0.021)	-0.146*** (0.029)
Other Race/Ethnicity	-0.367 (0.241)	0.053 (0.268)	-0.054* (0.026)	-5.00 (3.04)	0.036 (0.022)	-0.058** (0.020)	-0.062 (0.032)	-0.009 (0.045)
Male	-1.237*** (0.063)	-0.351*** (0.070)	-0.041*** (0.007)	-2.54** (0.79)	-0.017*** (0.005)	0.012* (0.005)	0.011 (0.008)	-0.022 (0.012)
Age	-0.158*** (0.029)	-0.185*** (0.032)	-0.041*** (0.003)	-5.33*** (0.37)	-0.004 (0.003)	-0.004 (0.002)	0.002 (0.004)	0.043*** (0.005)
Years in current school	0.117*** (0.027)	0.208*** (0.030)	0.024*** (0.003)	1.42*** (0.34)	-0.004 (0.002)	0.004 (0.002)	0.006 (0.004)	0.006 (0.005)
GPA	0.418*** (0.047)	0.563*** (0.051)	0.058*** (0.005)	4.47*** (0.58)	-0.018*** (0.004)	0.021*** (0.004)	0.184*** (0.006)	-0.100*** (0.009)
Delinquency Index score	0.161*** (0.035)	0.173*** (0.039)	-0.020*** (0.004)	-3.11*** (0.44)	0.011*** (0.003)	-0.015*** (0.003)	-0.052*** (0.005)	0.196*** (0.007)
Mother figure present in household	0.657** (0.201)	0.523* (0.223)	0.078*** (0.022)	7.71** (2.53)	0.007 (0.024)	0.050** (0.018)	-0.003 (0.027)	0.004 (0.040)
Father figure present in household	0.082 (0.101)	0.149 (0.112)	0.019 (0.011)	2.02 (1.27)	-0.021* (0.009)	0.032*** (0.008)	0.012 (0.013)	-0.019 (0.019)
Mother Figure Education (if present)								
No school*Mother figure in household	0.007 (0.784)	0.283 (0.844)	-0.007 (0.082)	-7.33 (9.61)	0.039 (0.109)	0.154* (0.067)	-0.231* (0.102)	0.154 (0.155)

Less than high school*Mother figure in household	-0.253* (0.106)	-0.196 (0.117)	-0.029* (0.011)	-3.83** (1.33)	-0.009 (0.009)	-0.002 (0.009)	-0.031* (0.014)	0.027 (0.020)
Some college*Mother figure in household	0.206* (0.085)	0.122 (0.094)	0.014 (0.009)	1.06 (1.06)	-0.005 (0.007)	0.004 (0.007)	0.028* (0.011)	0.004 (0.016)
College graduate*Mother figure in household	0.065 (0.105)	0.304** (0.116)	0.017 (0.011)	0.90 (1.32)	-0.013 (0.008)	0.019* (0.009)	0.064*** (0.014)	-0.038 (0.019)
More than college*Mother figure in household	0.288* (0.131)	0.527*** (0.145)	0.048*** (0.014)	4.17* (1.65)	-0.021* (0.010)	0.027* (0.011)	0.113*** (0.017)	-0.036 (0.024)
Father Figure Education (if present)								
No school*Father figure in household	-2.552** (0.854)	-2.280* (0.970)	-0.227* (0.094)	-20.16 (11.03)	0.106 (0.086)	0.002 (0.085)	-0.087 (0.126)	0.029 (0.198)
Less than high school*Father figure in household	-0.084 (0.114)	-0.334** (0.126)	-0.017 (0.012)	-1.22 (1.43)	0.025** (0.009)	-0.016 (0.009)	-0.069*** (0.015)	0.033 (0.021)
Some college*Father figure in household	0.089 (0.097)	0.015 (0.107)	0.014 (0.010)	1.78 (1.22)	0.003 (0.007)	-0.005 (0.008)	0.034** (0.013)	-0.002 (0.018)
College graduate*Father figure in household	0.068 (0.112)	0.259* (0.125)	0.032** (0.012)	1.52 (1.41)	-0.004 (0.008)	0.008 (0.009)	0.055*** (0.015)	-0.022 (0.021)
More than college*Father figure in household	-0.003 (0.131)	0.054 (0.146)	0.019 (0.014)	0.30 (1.65)	0.004 (0.011)	0.013 (0.011)	0.073*** (0.017)	-0.018 (0.024)
Constant	7.762*** (0.474)	4.626*** (0.527)	0.863*** (0.051)	115.9*** (5.98)	0.132** (0.047)	0.680*** (0.039)	2.240*** (0.063)	-0.314*** (0.090)
Observations	11,356	10,619	10,619	10,619	6,269	9,405	10,123	9,359
Number of schools	133	121	121	121	128	132	121	132

Note: Standard errors in parentheses. Standard errors are clustered at the school level.

[a] Proportion of friends who also experienced parental incarceration can only be calculated for respondents who nominated at least one friend who (1) was also a member of the longitudinal sample and (2) participated in the fourth wave of the survey in which parental incarceration history questions were asked. Estimates are weighted by total number of Wave IV participant friends.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).

Table A5. Coefficients from Regression of Social Network and Friend Characteristics on Paternal Incarceration

	White Boys	Black Boys	White Girls	Black Girls
Network Characteristics				
No. friends nominated	-0.070	-0.093	-0.175*	-0.072
(std error)	(0.105)	(0.145)	(0.082)	(0.097)
N	2,931	1,062	3,248	1,506
No. friend nominations received	0.089	-0.174	0.013	-0.136
(std error)	(0.119)	(0.129)	(0.110)	(0.082)
N	2,768	995	3,035	1,420
Centrality (log)	-0.254*	-0.077	-0.144	-0.161
(std error)	(0.110)	(0.139)	(0.093)	(0.096)
N	2,768	995	3,035	1,420
Network reach in 3 steps	-0.282**	0.031	-0.084	-0.116
(std error)	(0.107)	(0.121)	(0.086)	(0.083)
N	2,768	995	3,035	1,420
Friend Characteristics				
Prop. friends with incarcerated parent[a]	0.109	-0.077	0.091	0.301
(std error)	(0.119)	(0.202)	(0.106)	(0.156)
N	1,605	466	2,019	852
Prop. friends in two parent households	-0.349***	-0.134	0.013	-0.262*
(std error)	(0.101)	(0.201)	(0.085)	(0.123)
N	2,459	709	2,959	1,255
Mean GPA	-0.169	0.094	-0.359***	-0.053
(std error)	(0.095)	(0.126)	(0.082)	(0.084)
N	2,652	900	2,975	1,345
Mean delinquency index score	0.229*	0.033	0.198*	0.053
(std error)	(0.112)	(0.153)	(0.092)	(0.098)
N	2,457	703	2,954	1,248

Note: Standard errors in parentheses. Standard errors are clustered at the school level.

[a] Proportion of friends who also experienced parental incarceration can only be calculated for respondents who nominated at least one friend who (1) was also a member of the longitudinal sample and (2) participated in the fourth wave of the survey in which parental incarceration history questions were asked. Estimates are weighted by total number of Wave IV participant friends.

*** p<0.001, ** p<0.01, * p<0.05 (two-tailed tests).

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