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Phenotypic Variations in Violence Involvement: Results from the National Longitudinal Study of Adolescent Health

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Phenotypic Variations in Violence Involvement: Results from the National Longitudinal Study of Adolescent Health

Abstract

Numerous studies suggest that our society is stratified not only by race and class, but also by phenotypic characteristics. The main objective of the present investigation was, using the National Longitudinal Study of Adolescent Health, to elucidate the link between phenotype and violence involvement. Two outcomes were examined: being a perpetrator of violence and criminal justice system contact. Cross-sectional and longitudinal analyses were conducted on Asian, black and Hispanic respondents and as well as on the subsample of siblings. Independent variables included phenotype, socio-economic status, other family, peer and neighborhood effects. Notwithstanding a certain degree of heterogeneity of outcomes across race-ethnicity, the results indicate a negative relationship between proximity to the European phenotype and the likelihood of violence involvement. In other words, the darker one's complexion, eye and hair color, the higher the likelihood of violence involvement.

Keywords: colorism, phenotype, violence, race-ethnicity

INTRODUCTION

Although the prejudice and discrimination based on race, or shortly racism, is a recurrent topic of research, within-race variation in phenotype has received less attention from both the media and the academy (Hall, 2008; Hunter, 2013). Yet, the favoring of European facial features, including light skin, light-colored eyes, and pale hair color, over non-European ones also known as *colorism*, contributes to larger patterns of racial inequality for racial-ethnic minorities. Evidence abounds that for minorities with darker phenotype colorism amplifies racism (Hersch, 2011; Hunter, 2002; Loury, 2009). Compared to their lighter-complected co-ethnics, darker-complected minorities encounter more significant barriers to upward social mobility, are more likely to be discriminated in education, employment, housing, and criminal justice system (Hersch, 2006; Hannon, DeFina, & Bruch, 2013; Hochschild & Weaver, 2007; Montalvo & Codina, 2001).

The measures of school violence are flat out measures of serious violence and/or crime. The title should be reflected to take that into consideration – these are criminal acts and not just school related problems. This is very separate than, for instance, bullying based violence.

The purpose of this investigation is to study the effect of phenotypic variations among minorities on physical violence perpetration in adolescence and young adulthood. The focus on physical violence is not trivial. Not only is interpersonal physical violence the direct cause of violent crime, but it also has serious implications for public health (Copeland-Linder et al., 2011; Widom et al., 2014). According to the most recent data (2011) from the Youth Risk Behavior Surveillance System (YRBSS), during the 12 months before the survey, 32.8% of adolescents had been in a physical fight. In the United States and worldwide, violence is among the leading causes of death for adolescents and young

adults (Eaton et al., 2012). Although precise estimates are difficult to determine, the cost of violence translates into billions of U.S. dollars in annual health care (Brown, 2008). More importantly, this cost goes beyond its material dimension: physical violence causes enduring emotional pain, depression, isolation and anxiety among its victims (Smith et al., 2001). The exposure to violence is a contributing factor for a range of high-risk behaviors and disorders that are, in turn, causally related to other public health problems (Brady et al., 2008; Widom et al., 2014).

This paper used a large sample of U.S. racial-ethnic minorities derived from the National Longitudinal Survey of Adolescent Health (hereafter, the Add Health) to examine whether proximity to the European phenotype influences violence involvement in adolescence and young adulthood. Violence involvement was operationalized as violence perpetration and criminal justice system contact. In addition to phenotype, a composite variable that was created by applying principal component analysis to items related to phenotype (skin tone, hair color and eye color), the present study included a range of factors that might increase or decrease the likelihood of violence involvement, including respondents' family background, peer network and neighborhood characteristics. Drawing from structural (Merton 1938, Sellin, 1938) and cultural explanations of violent behavior (Brady et al., 2008; Crosnoe, Cavanagh, & Elder, 2003; Haynie & Payne, 2006; Melde & Esbensen, 2013; Osgood & Chambers, 2000; Sampson, Morenoff, & Raudenbush, 2005), I proposed a new empirical model that links phenotype, association with violent peers, peer network heterogeneity and neighborhood disadvantage with violence perpetration and contact with criminal justice system. The analyses were carried out cross-sectionally and longitudinally by race-ethnicity—for non-Hispanic blacks (hereafter, blacks), Asians and

Hispanics. Separate analyses were also conducted on the subsample of siblings. This allowed controlling for homogeneity of family background as well as family connectedness and neighborhood characteristics, factors known to influence adolescent outcomes.

THE HISTORICAL CONTEXT OF COLORISM

Considering the long history of research into the social stratification by phenotype, it is safe to say that there were two waves of literature and discourse on colorism in the United States. The first wave of literature on colorism encompasses the era of Jim Crow segregation, roughly between the 1870s to the 1960s. Although the first scholars to articulate the problem of colorism within the black community were Cooper (1892) and DuBois (1900 [1903]), it is scholars from outside the black community, such as Myrdal (1944) and Frazier (1957), who are commonly credited for raising genuine awareness of this issue in academic circles. Research by scholars such as Drake & Cayton (1945) and Frazier (1957) have often been mentioned as classic sociological studies on colorism (Herring, 2002; Keith & Herring, 1991). Black scholars Drake & Cayton (1945) found that color hierarchy among blacks explained differences in employment, occupational status, and mate selection. In a comprehensive sociological analysis of attitudes and behaviors of the black middle class, Frazier (1957) showed that a significant number of middle class blacks had lighter skin. More importantly, Frazier (1957) established that, historically, black upward mobility was linked to phenotype.

All in all, scholarship of the first wave succeeded in showing that the differential treatment of individuals according to the visibility of African ancestry is traceable to slavery. Chattel slavery involved white sexual violence against blacks which led to two interrelated practices, both linked to the organization of labor in the plantation economy of

the antebellum South: the house slave/field slave dichotomy, and the emergence of a mulatto buffer class thoroughly oriented toward European values and culture (Cole, 2005; Keith & Herring, 1991; Saperstein & Gullickson, 2013).

Concerning the dichotomy of house versus field slaves, historical accounts point to a pattern whereby lighter-complected slaves were selected to work in domestic positions, while darker-complected slaves were relegated to labor-intensive fieldwork (Bodenhorn, 2002, 2006; Myrdal, 1944). According to Frazier (1957), whether a person was a field slave or a house slave was a function of skin color. House slaves were better treated and generally more comfortable than field slaves. Not only were they normally granted better food and clothing, but also manumission and educational opportunities (Cole, 2005).

With time, a mulatto class emerged from the substratum of house slaves. They were literate, employed in a skilled trade and some were even able to acquire their own farm land (Bodenhorn, 2006; Bodenhorn & Ruebeck, 2007; Edwards, 1959). Because white masters often freed light-skinned slaves who were their illegitimate offspring, the mulattos were “overrepresented in the free black population and the underrepresented among slaves” (Keith & Herring, 1991, p.763). Socially, lighter blacks distanced themselves from their darker co-ethnics by shunning intermarriage with darker blacks, maintaining their allegiance to the values, traditions and norms of white society, and passing their advantage on to their descendants (Saperstein & Gullickson, 2013).

The civil rights and the black power movements encouraged black consciousness and black pride and consciously challenged white standards of beauty (Branigan, et al., 2013; Keith & Herring, 1991; Saperstein & Gullickson, 2013). These movements also marked a break in the scholarship on colorism. While work of the first wave delved into

historical records and collected copious ethnographic data to uncover the roots of colorism, with the civil rights and the black power movements, social science research on blacks moved away from colorism toward the issues of economic insecurity, deviance and crime in the inner city (Monk, 2014). This shift of research focus reflected in part the magnitude of societal change: as a result of the Civil Rights Act of 1965, blatant racial domination became politically unacceptable and blacks became more integrated into previously white-dominated institutions. For the time, it appeared that intra-racial stratification based on the skin tone diminished (Gullickson, 2005; Udry, Bauman, & Chase, 1971).

In fact, several studies argued that skin tone effects among blacks declined over time because the Civil Rights era changed perceptions of attractiveness (Goering, 1972; Gullickson, 2005; Udry, Bauman, & Chase, 1971). The most recent and, arguably, the most discussed of these studies is the work by Gullickson (2005) who revealed evidence that colorism is waning in the post-civil rights era among younger cohorts of blacks. Using data come from the four waves of the National Survey of Black Americans (NSBA) and the 1982 General Social Survey, he found that the effect of skin color on schooling declined for cohorts born after 1945. Gullickson's (2005) analyses were challenged by Goldsmith, Hamilton, & Darity (2006) who claimed that Gullickson did not consider the sample attrition: the NSBA sample size declined from 2,103 observations in 1979–1980 to 644 observations in 1992. Further, Hughes & Hertel (1990), using the same data as Gullickson (2005), found that between 1950 and 1980 there was as much socioeconomic disparity between darker-skinned and light-skinned blacks as there was between blacks and whites. Moreover, blacks with lighter skin were found to have lower race consciousness than those with dark skin (Hughes & Hertel, 1990). Given that numerous studies before and after

Hughes & Hertel (1990) have shown that colorism's impact on income and wealth among blacks in the United States is as potent now as in the past (Hersch, 2006; Hochschild & Weaver, 2007; Monk, 2014), it is safe to say that phenotype still plays a significant role in shaping social and economic stratification patterns within the black community.

It is worth noting that the civil rights movement empowered not only blacks but also other racial-ethnic minorities. When Latinos and Asian Americans from various ethnic groups began to share their experiences of racism and colorism, it became clear that colorism affects every racial-ethnic group where there is skin tone variation. A second wave of literature, which started with the Civil Rights Era and continues to the present day, has raised the awareness of the fact that colorism is a pervasive problem for people of different racial and ethnic backgrounds (Hunter, 2007; Kiang & Takeuchi, 2009; Leong, 2006; Montalvo & Codina, 2001).

Much of the literature that followed in the footsteps of the Civil Rights Movement was enriched by the insights from postcolonial and critical race theories (Hall, 2003; Hunter, 2002, 2013; Taylor, Gillborn, & Ladson-Billings, 2009). This strand of literature contends that colorism in the United States has parallels in many parts of the world, and the essential reason why this is so is that European colonialism institutionalized white privilege worldwide (Hall, 2003; Hordge-Freeman, 2013; Hunter, 2002). Indeed, evidence suggests that colorism is a global phenomenon that occurs in Latin America, Asia, Africa, and the Arab world. (Hall, 2003, 2008; Hordge-Freeman, 2013; Leong, 2006; Painter, Holmes, & Bateman, 2015; Rondilla & Spickard, 2007).

In all their colonies, Europeans established a color-based social hierarchy whereby higher social status and economic privilege were accorded based on one's proximity to the

European phenotype (Hall, 2003; Hunter, 2013; Rondilla & Spickard, 2007; Montalvo & Codina, 2001). Those whose skin, hair or eye color was lighter could enjoy the fruits of European culture and those whose skin, hair or eye color was darker had lesser chance of climbing the social ladder and were typically relegated to the lower classes. It did not take long till colorism was internalized by the colonized, and, thus, darker phenotype became associated with cultural backwardness, savagery and genetic inferiority (Hall, 2008; Hunter, 2007, 2013).

Studies of the second wave have shifted attention from exclusively black perspective of color discrimination to the one that encompasses experiences of all people of color (Hunter, 2007, 2013; Hochschild & Weaver, 2007). This is important because, due to immigration, the non-Anglo minority groups become more visible in the racial landscape of the U.S. in the 20th centuries. In fact, by 1990 blacks no longer constituted a majority of the minority population in the U.S. (Edmonston & Passel, 1994). New non-white immigrants, Asians and Hispanics in their majority, became ‘racialized’ as ‘other’ in the American racial hierarchy (Bonilla-Silva, 2004; Frank, Akresh, & Lu, 2010). While similarly to blacks being viewed as racially inferior to whites, Asians and Hispanics became subjects to racial oppression and colorism (Hunter, 2013; Montalvo & Codina, 2001; Rondilla & Spickard, 2007). However, it is naïve to assume that Asian and Hispanic immigrants came to the United States without any preconceived notions of phenotypic hierarchy. The values that privilege whiteness over other possible racial identities constitute the legacy of colonialism, and evidence suggests that these values, though in diminished form, persist to this day in the immigrant communities in the United States (Hall, 2003; Rondilla & Spickard, 2007). Thus, the phenotypic stratification that

established itself in the slavery era is not the only reason why colorism was quickly internalized by Asians and Hispanics.

PHENOTYPE AND CRIMINAL JUSTICE

The second wave of research on colorism that has convincingly demonstrated that phenotypic differences matter in the same social settings where race matters: phenotype has been shown to affect income and wealth, education, occupational mobility, mental and physical health (Borrell et al., 2006; Klonoff & Landrine, 2000; Goldsmith et al. 2007; Hochschild & Weaver, 2007; Ryabov & Goza, 2014). Studies conducted on all major racial-ethnic groups in the United States demonstrate that minorities with a darker phenotype encounter multiple socio-economic disadvantages relative to their lighter-colored co-ethnics (Hochschild & Weaver, 2007). It can be further argued that phenotypically darker minorities are disadvantaged not only socially and economically, but also culturally. Some recent investigations have concluded that darker-complected individuals are commonly viewed as less attractive as spouses and less capable and intelligent as employees (Hill, 2002; Hochschild & Weaver, 2007).

The labor and marriage markets are not the only areas where phenotypically darker minorities experience discrimination. Many aspects of phenotype have been shown to operate in the domain of criminal justice as well. Specifically, a few studies found that people tend to associate Black phenotypic traits with criminality. Using a photographic data set of 44 capital cases from Philadelphia in the years 1979 to 1999, Eberhardt et al. (2006) examined how phenotypic features affect sentencing outcomes for black men. They found that defendants with more pronounced Afrocentric features were twice as likely to receive the death sentence compared to those with less pronounced Afrocentric features.

Blair, Judd, & Chapleau, (2004) found a comparable effect when analyzing sentencing length of young male inmates. Inmates possessing more Afrocentric features received harsher sentences than those with less Afrocentric features. Another study by King & Johnson (2016) found a similar effect for male offenders from Minnesota. It is important to note that all these studies used intra-racial variation along a spectrum of phenotypic traits, rather than a single one (e.g., skin tone).

In a related study, Burch (2005) showed with the data from that, while the sentence length for white and light-skinned blacks did not differ statistically, medium- and dark-skinned Blacks received longer sentences than whites in Georgia. Skin color also has been reported to affect sentence length and served prison time among male inmates in Mississippi, and among female inmates in North Carolina (Gyimah-Brempong & Price, 2006; Viglione, Hannon, & DeFina, 2011). A recent work by White (2014) demonstrate that skin tone plays a significant role in shaping criminal justice outcomes not only for blacks, but also for Hispanics. Using the Add Health data, White (2014) examined the relationship between skin tone and police contact defined as the odds of being stopped or arrested by the police. Her analyses demonstrated that having darker skin increases the likelihood that blacks and Hispanics are stopped or arrested by the police. She also acknowledged the role that prior delinquency and gender play in predicting police contact. Involvement in prior delinquency was significant in all her models for both blacks and Hispanics. Finally, using the same dataset, Hannon et al., (2013) demonstrated that administrative responses to school discipline are prone to be influenced by phenotypic stereotypes. Their analyses indicated that darker skin tone significantly increases the odds of school suspension for minority adolescents. Additionally, black students were found to

be punished more harshly than white students for the same offenses. Importantly, this study indicates that phenotypic-based discrimination is not limited to criminal justice system.

STRUCTURE VERSUS CULTURE: EXPLANATIONS OF THE LINK BETWEEN RACE AND VIOLENCE

Scholars have tracked patterns of violent delinquency by race-ethnicity and have routinely found significant differences in violence between racial-ethnic groups (Sampson et al., 2005). For example, it has long been documented that black adolescents are more likely than white adolescents to be arrested for violent offenses (McNulty & Bellair, 2003; Morenoff et al., 2001). One way to explain the racial-ethnic disparities in violent behavior is to examine risk factors for violent behavior. For example, it can be argued that because blacks are more socially and economically disadvantaged relative to whites, they are more likely to exhibit violent behavior. Socio-economic disadvantage can be interpreted as a structural strain that results in the differential racial-ethnic propensities to violent behavior mentioned above. Hence, social strain can be seen as a risk factor for violent delinquency. In other words, violent behavior is a coping mechanism and a response to social strains that are products of social structure.

In view of the above and of the fact that racial and phenotypic discrimination have the same roots, general strain theory can be used to explicate phenotypical variations in violence involvement. Violent behavior has been posited to fit into the general social strain framework (Agnew, 2001, 2006). Moreover, discrimination has been interpreted as a social strain variable in past research (Agnew, 2006; Pérez, Jennings, & Gover, 2008). In his original construction of the strain theory, Merton (1938) claimed that structural strain is caused by the restricted access to the legitimate means designed to achieve culturally

acceptable goals. He also postulated that lower-status individuals are more prone to deviant criminal behavior as a form of adaptation to the existing opportunity structure. Drawing from this theory, it can be argued that, compared to their lighter complected counterparts, phenotypically darker minorities experience more social strain in the form of discrimination and may lack significant coping resources to deal with strain in a non-violent manner. The framework of strain theory can also address the issue of why some individuals exhibit violent behavior while others do not, even if they are experiencing the same social strain. According to strain theory, those individuals experiencing strain who have access to protective culture-specific resources such as family, peers and schools will not engage in delinquent behavior (Agnew, 2006).

Therefore, in order to understand concrete mechanisms through which phenotype influences violence involvement, it is worth considering cultural explanations of violent behavior. Among these, there is one that has long held an important position in the study of group differences in violence—the subculture of violence theory (Wolfgang, Ferracuti, & Mannheim, 1967). This theory has originally been used to explain greater crime, homicide, and suicide among young, black, poor, southern, and male populations (Blau & Blau, 1982; Wolfgang et al., 1967) and has become a particularly common explanation for racial-ethnic differences in crime (Brady et al., 2008; Messner, Baller, & Zevenbergen, 2005; Heerde, Hemphill, & Scholes-Balog, 2014). According to this argument, disproportionately high rates of violence among some minorities stem from variations in violence-related values and normative systems (Wolfgang et al., 1967; Parker, 1989). In violent subcultures, the use of violence is perceived as a legitimate means of interaction and problem-solving (Heerde et al., 2014). It is worth noting that subcultural theorists have

been criticized for adopting a “blame the victim” stance and reinforcing the negative and self-perpetuating stereotypes (Anderson, 2002). Nevertheless, the subculture of violence theory can provide a valid explanation of violent behavior in the peer context (Anderson, 2002; Melde & Esbensen, 2013; Pratt et al., 2014).

PEER NETWORKS AND NEIGHBORHOOD CONTEXT

Peer effects have long been recognized as crucial to the study of delinquency (Brady et al., 2008; McNulty & Bellair, 2003; Papachristos, Meares, & Fagan, 2012). For instance, differential association theory (Sutherland & Cressey, 1955) and social learning theory (Akers, 1985) are specifically devoted to the peer influences on one’s values, attitudes, and motives for criminal behavior. Although the socialization theories of Sutherland and Akers have limited applicability—while centering on peer socialization and being oblivious to peer selection—they have been influential in the study of adolescent delinquency and spurred great interest in peer effects (Haynie & Payne, 2006). A related perspective that has emphasizes the role of peers in shaping deviant behavior is social capital theory (for a state-of-the-art theoretical account see Coleman, 1988, 1990; for a practical application, see Sandefur, Meier, & Campbell, 2006). Unlike the socialization theories, this approach addresses the peer selection process and, unlike the subculture of violence theory, it views social capital as a resource that can be used to promote either positive or negative behaviors. This theory has proven particularly fruitful for the study of delinquent peers (Crosnoe et al., 2003).

It has long been argued that racial-ethnic minorities befriend co-ethnics because, for the most part, they live, study and work in segregated environments (Haynie & Payne, 2006; Widome et al., 2008). In this respect, social disorganization theory is a useful

framework to analyze neighborhood-level effects on individual-level violence involvement (Braga & Clarke, 2014). As initially proposed by Shaw & McKay (1942) and later extended by Kornhauser (1978), social disorganization theory views neighborhood racial-ethnic heterogeneity and poverty as the major contributing factors to crime and violence. One of the most central and durable facts produced by the classic research of Shaw & McKay (1942) and by empirical studies that followed was that the lack of social and economic resources in disadvantaged neighborhoods predisposes them to social disorder. In brief, social disorganization theory may provide a useful explanatory framework within which to understand the neighborhood context of phenotypic variations in violent behavior.

PRESENT STUDY

The goal of the present article is to examine the relationship between phenotypic variation among Asians, blacks and Hispanics and violence perpetration in young adulthood and whether this relationship is modified by the contextual effects, such as peer network and neighborhood factors. The argument that I advance in the following pages has not received systematic investigation in the literature. While the previous research almost exclusively, with the exception of Hannon et al.' (2013) work, focuses on the phenotypic-based discrimination in the criminal justice system, I seek to demonstrate that discrimination present in the criminal justice system is not the only explanation for why darker-complected minorities are more likely to be involved in physical violence than their light-complected co-ethnics. First, criminal justice system is the end of the pipeline: variations in physical violence perpetration by phenotype are likely to manifest themselves prior to criminal justice system contact. Second, phenotypically darker children are likely to face discrimination in school, at home and in the community early in their lives (Burton

et al., 2010; Hannon et al., 2013; Hochschild, & Weaver, 2007; Hunter, 2007). Finally, and most importantly, phenotype is an important but neglected dimension of social stratification, meaning that colorism is rooted in the value system of American culture. Similarly to racism, colorism has been based on the belief in the superiority of Eurocentric phenotype and its entitled privilege (Delgado & Stefancic, 2012; Hall, 2008; Hunter, 2007). It is both structural and cultural and operates on individual, institutional, and cultural levels. Therefore, I consider both structural and cultural explanations of the possible relationship between phenotype and violence.

I also recommend stronger thought into WHY a darker skin color, even within racial groups, would lead to more perpetration. Victimization in some way makes sense – if these individuals are marginalized, even by their own kind, then they are more at risk. But with regards to perpetration, while it appears that you are making a socially constructed argument instead of a biologically based one, you've open up a whole can of worms that I do not think is intended and also cannot be supported with the current data or conclusions.

Specifically, I draw on structural theories of the link social status and crime (e.g., Agnew, 2001; Huang, Laing, & Wang, 2004; Lochner, 2004; Merton, 1938, Sellin, 1938) to explain the relationship between phenotype and delinquency that has been noted in other research (e.g., Burch, 2005; Gyimah-Brempong & Price, 2006; Hannon et al., 2013; Viglione et al., 2011). Merton's (1938) social structure and anomie thesis and Sellin's culture conflict theory (1938) are classical examples of structural explanations that view group differences in crime and violence as stemming from inequality in relative socio-economic standing of social groups. Much of the research that followed is grounded in contemporary versions of Merton's (1938) and Sellin's (1938) views. For example, Blau & Blau's (1982) influential work drew heavily from Merton's (1938) to show that the discrepancy between socially accepted goals (e.g., material comfort) and structural

contains (e.g., socioeconomic resources) intrinsic to the dominant economic system in our society can be a seductive trap for those on the bottom of the proverbial ladder of success. This goals/means dilemma leads to frustration and alienation of the oppressed that are, in turn, reflected in deviant behavior. Furthermore, studies rooted in social psychology (Evans, 2004; Copeland-Linder et al., 2011; Park et al., 2013; Vaillancourt & Hymel, 2006) contend that low social status, by itself, increases stress and weariness that may trigger aggression and violence.

Based on research on the relationship between race, social class and violent delinquency (e.g., Evans, 2004; Copeland-Linder et al., 2011; Gabbidon & Greene, 2012; Park et al., 2013; Vaillancourt & Hymel, 2006), I can expect that violence perpetration and criminal justice contact will vary inversely with proximity to the European phenotype (*Hypothesis 1*). Such a relationship is congruent with a structural theory of social class and violence (Blau & Blau, 1982; Merton, 1938, Sellin, 1938). Given that colorism is not only structural but also cultural phenomenon, I use cultural explanations to derive the next four hypotheses. These hypotheses focus on the pathways linking phenotype and violence perpetration through the cultural contexts of peer relationships and neighborhood conditions.

Because violent behavior is largely learned in interaction with peers, peer associations matter when predicting violent delinquency (Akers, 1988; Sutherland & Cressey, 1955). Since several empirical studies informed by social capital theory find strong behavioral similarity among delinquent peers (Crosnoe et al., 2003; Haynie & Payne, 2006), it is reasonable to expect that there is a positive association between the prevalence of violence in one's peer network and one's own violence involvement

(*Hypothesis 2*). Drawing from the subculture of violence theory, previous studies also demonstrate that racial-ethnic minorities tend to have ethnically homogeneous peer networks in which friends encourage violence (e.g., Brady et al., 2008; Melde & Esbensen, 2013). Specifically, Haynie (2012) using the Add Health data found that adolescents located in racially homogeneous networks are more likely to display delinquent behavior. Therefore, *Hypothesis 3* predicts a negative association between racial heterogeneity of peer networks and violence involvement. My last hypothesis (*Hypothesis 4*) is derived from social disorganization theory (Shaw & McKay, 1942; Kornhauser, 1978). It proposes that those respondents who lived in disadvantaged neighborhoods will be more likely to become violence perpetrators than their peers who did not.

Overall, *Hypotheses 2-4* state that peer and neighborhood effects in adolescence will predict violence perpetration and criminal justice system contact in young adulthood. Apart from the aforementioned theoretical perspectives, these hypotheses are also based on Manski's (1993) work. Following Manski (1993), I distinguish endogenous, correlated and exogenous group effects on individual violent delinquency. An endogenous effect occurs when individual behavior responds to the behavior of others in their peer group. For example, an individual is more likely to exhibit violent behavior if there is a high prevalence of violence among the peer group because seeing friends' violent behavior can stimulate a desire to act similarly (Kreager, 2007; Kremer & Levy, 2008). *Hypothesis 2* stating that the prevalence of violence in one's peer network affects one's own violent behavior predicts on an endogenous effect. A correlated effect refers to behavioral similarity of individuals in the group resulting from shared socio-demographic characteristics (e.g., race, social class, gender). For example, co-ethnics are more likely to

act similarly because they share the same cultural norms (McNulty & Bellair, 2003; Ryabov, 2015; Zhou & Kim, 2006). The correlated group effect is modeled in the present study by racial homogeneity of peer network (see *Hypothesis 3* above). An exogenous effect occurs when individual behavior responds to the exogenous characteristics of the peer group. For example, there is a high prevalence of violent crime among the adult population in a neighborhood. Spillover may occur even to the individuals who have never observed violent behavior in the family. Another reason to examine the exogenous (neighborhood-level) effect in this study is that minority groups in the United States are differentially exposed to salient neighborhood conditions, such as the concentration of poverty, that cannot be explained by individual or family circumstances (Sampson et al, 2005). *Hypothesis 4* specifies that the exogenous (neighborhood-level) factors contribute to the individual-level variations in violent behavior. The conceptual model in Figure 1 specifies the intervening links between phenotype and violent delinquency in terms of the arguments about the interplay between individual (family), peer and neighborhood effects, as discussed above. The study hypotheses are also shown in Table 1.

[Figure 1 is about here]

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DATA AND METHODS

Data Source

To test the hypotheses outlined above, I relied on the sample derived from the National Longitudinal Study of Adolescent Health (Add Health), a U.S.-based, nationally representative longitudinal survey of middle- and high-school students who were in grades 7 to 12 in 1994-1995. The Add Health design has been described elsewhere in detail (Harris

et al., 2009). In short, the Add Health utilizes a stratified, school-based sampling design incorporating students from a variety of backgrounds in terms of region, urbanicity, school size, school type, and racial-ethnic composition. The Add Health was conducted as a prospective panel study. Follow-up interviews were administered in several subsequent waves. In order to make sure that temporal inferences can be made, I used data from the most recent wave (Wave 4) of data collection, with information on the majority of independent variables being drawn from Wave 1 survey. Ninety three percent of the original Add Health respondents (N=15,701), then young adults between the ages of 24 and 44, were administered Wave IV survey in 2007 and 2008. My final selection of respondents was limited to all individuals who were assigned valid sampling weights, and had no missing data on the key independent and dependent variables. These restrictions resulted in a sample of 12,929 respondents. In terms of racial-ethnic composition the sample was 66% white (N=8,488), 17% black (N=2,205), 5% Asian (N=621) and 12% Hispanic (N=1,615). Only minorities (Asians, blacks and Hispanics) were considered for multivariate analyses.

A subsample of sibling pairs was also included with the purpose of supplementing the analyses conducted on the larger sample. Siblings often differ in skin tone despite sharing not only race-ethnicity but also family background. The siblings subsample included siblings of Asian, black and Hispanic racial and ethnic origin with valid sample weights and information on the key variables of interest (n=1,714). Whereas the larger sample was selected from the in-home sample of all adolescents (N=15,701 at Wave 4) by applying the aforementioned criteria (see above), the siblings subsample was derived from the Add Health sample of sibling pairs. The subsample of sibling pairs was composed of

dizygotic twins, full biological siblings, half-siblings and non-related siblings. Monozygotic twins were excluded from the subsample because they are genetically identical and, therefore, do not differ with respect phenotype.

Dependent Variables

One outcome variable was obtained from the Wave 1 survey and two from the Wave 4 survey. Two outcome variables, violence perpetration at Wave 1 and violence perpetration at Wave 4, were measured using the same scale. The scale was constructed as the sum of responses to four items: using or threatening to use a weapon to take something from someone, pulling a knife or gun on someone, shooting or stabbing someone, and hurting someone badly enough to need bandages or care from a doctor or nurse. Each item comprising the aforementioned scale was set equal to one if the respondent was involved as a perpetrator in serious physical violence in the past 12 months and zero if otherwise. The scale represents a binary response of whether the respondent had engaged in *any* of these four activities, thus yielding a range of 0 to 1. The Kuder-Richardson coefficient (KR_{20}) for violence perpetration at Wave 1 is 0.73 and for violence perpetration at Wave 4 is 0.77. Internal consistency for this scale is described in greater detail elsewhere (e.g., McNulty & Bellair, 2003; Popovici et al., 2012; Schreck, Fisher, & Miller, 2004).

Criminal justice contact was the third outcome measure. The Add Health provided information on different aspects of contact with the criminal justice system. Specifically, at Wave 4 respondents were asked to indicate whether they had ever been arrested, convicted, or incarcerated. With the Add Health I could examine the type of offense for which the respondent was last arrested, convicted, or incarcerated. Since I was interested in serious physical violence, I included only violent crimes, that is offenses of murder,

forcible rape, robbery, and aggravated assault. Thus, I constructed criminal justice contract as a dichotomous variable, indicating whether the respondent had been arrested, convicted, or incarcerated for violent offenses by Wave 4 of the Add Health (0 = no, 1 = yes).

The descriptive statistics shown in Table 2 demonstrated that the majority of sampled respondents claimed no prior involvement in violent criminal activity. Cross-tabular analysis and comparison of means (not shown) suggested that there were significant variations in violent behavior across racial-ethnic groups, as well. Compared to blacks and Hispanics, Asians and whites were much less likely to become a perpetrator and a victim of violence by young adulthood. These results were generally consistent with prior research conducted on the Add Health, as well as with the national data (Haynie & Payne, 2006; McNulty & Bellair, 2003; Popovici et al., 2012).

[Table 2 is about here]

Phenotyping

There were three interviewer-assessed phenotypic characteristics — skin tone, eye color and hair color — available in the Add Health data set. Skin tone was a 5-category variable distinguishing respondents with black, dark brown, medium brown and light brown and white skin tones. Eye color was also a 6-category variable (black, brown, hazel, blue and green, other). The values for the category ‘other’ (1.4% of all cases) were treated as missing values. The hair color indicator allowed distinguishing respondents with black, brown, blond and red hair color. The remaining two categories — ‘no hair’ (1.3% of all cases) and ‘other’ (1.4% of all cases) — are not interpretable and, thus, values for these were considered missing data. To reduce the main variable of interest, phenotype, into a more manageable and parsimonious set, I performed a principle component analysis to

obtain a final solution. Using the results of principal component analysis performed on skin tone, eye color and hair color items, I created a phenotype scale with higher values indicating a more European phenotype. Cronbach's alpha for this scale was 0.82. In the analysis run on the siblings subsample, phenotype was categorized as binomial outcome — being lighter than the sibling. Put differently, if one sibling scored higher on the phenotype scale described above than the other sibling, it was assigned the value of '1' and the other one the value of '0'.

Contextual Variables

Violent peer association was calculated as the percentage of friends who had been a perpetrator of violence at Wave 1. This variable was assessed using peer-reported items from the Wave 1 survey. The Add Health participants were asked to nominate up to five friends in each wave of the survey. Taken together, these nominations allowed for the creation of behavioral averages for all friends who were nominated by, or who nominated, each respondent. Violent peer association was defined using the same scale as violence perpetration. Similar to violence perpetration, the items were dichotomized prior to aggregation, so that violent peer association captured the percentage of a respondent's friends who had been a perpetrator of physical violence.

Another peer network variable was used as a predictor of violence delinquency— racial/ethnic heterogeneity of the peer network. Similar to violent peer association, this measure was obtained from the friend nominations. Peer network heterogeneity represented the degree to which one's peer network is heterogeneous with respect to race-

ethnicity. It can be expressed mathematically as a ratio of observed ties in the network to all possible ties in the total friendship network:

$$Heterogeneity = 1 - \sum_1^4 \left(\frac{R_C}{4 * I} \right),$$

R is the number of peers in a network belonging to the respondent's C race/ethnic category, I is the total number of peers in a peer network, and 4 is the number of racial-ethnic categories (i.e., Asian, black, Hispanic, and white). Note that heterogeneity ranges from 0 (i.e., all members of a network are of the same race-ethnicity as the respondent) to 1 (i.e., all four racial-ethnic groups are equally represented in one's peer network).

Also included in the analysis was the measure that captures high levels of neighborhood disadvantage. Following previous research (Morenoff, Sampson, and Raudenbush, 2001; Wickrama, Noh, & Bryant, 2005; Wickrama, Wickrama, & Bryant, 2006), I identified four socio-economic indicators from the contextual data set of the Add Health as relevant predictors of neighborhood disadvantage: (1) share of population below poverty level, (2) proportion of households headed by a female, (3) median household income (reverse coded), and (4) male unemployment rate. A factor analysis revealed that the four items loaded strongly on a single factor. I standardized and averaged these indicators to create a composite measure of neighborhood disadvantage. Internal consistency for the scale with this sample is 0.81 (Cronbach's alpha).

A number of socio-demographic indicators were entered at the individual level as predictors of violent delinquency. SES is, arguably, the most important indicator to provide a baseline from which to evaluate racial-ethnic differences in violent behavior (Evans, 2004; Haynie & Payne, 2006; Popovici et al., 2012; Schreck, Fisher, & Miller, 2004). Two measures—average educational attainment and occupational prestige of the respondent's

parents—were used to control for SES of the households in which the respondents had been raised. It is worth mentioning that, because parental income, a common indicator of SES, was a subject to significant non-response and underreporting in the Add Health (up to 30% missing data), this measure was not analyzed in the present study. Because parents' educational attainment and occupational prestige were strongly intercorrelated (Pearson's $r = 0.78$), I created the aggregate family SES score as the sum of the rankings of parents' education and occupation. Internal consistency of family SES score has been described in detail elsewhere (e.g., Bearman, Moody, & Stovel, 2004). Family structure was a dichotomous outcome indicating whether the respondent as a child lived with two parents (coded as 1) or not (equal 0).

Family connectedness has been an influential predictor of adolescent outcomes, as per prior studies (Bernat et al., 2012; Shlafer et al., 2013). Family connectedness was measured as the average of four items: respondents' parents care about them; their family understands them; they have fun with their family; and their family pays attention to them. Responses to items were scored on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). The scale produced good internal consistency (Cronbach's alpha is 0.76). An index of school connectedness, a factor known to affect several adolescent outcomes (McNeely & Falci, 2004; Resnick, Ireland, & Borowsky, 2004), was included in the analyses. The index was derived from 3 items, each rated on a 5-point Likert scale. Students were asked how much they agreed or disagreed with the following statements: "You feel close to people at your school," "You feel like you are part of your school," and "You are happy to be at your school." The items were averaged to produce an index (Cronbach's

alpha is 0.75). A higher score indicates greater level of connection to school. Age was measured at Wave 4 in years.

Analytic Strategy

To account for the sampling design of the Add Health this problem of heteroscedasticity of error terms, all regression models were weighted and adjusted for neighborhood-level clustering. This was done via a cluster option available in Stata for logit regression estimations. The identification number of neighborhoods from the contextual data set of the Add Health was used as the clustering variable.

I considered it important for the purposes of the present study to measure and analyze violence involvement for each racial-ethnic group separately because considerable cross-ethnic variations by phenotype are expected. Identical regression models were estimated for sibling pairs (Table 3), Asians (Table 4), Blacks (Table 5) and Hispanics (Table 6). Logit models predicting the odds ratios of being a perpetrator of violence at Wave 1 were shown in Panel A of these tables. Likewise, models predicting the probability of being a perpetrator of violence at Wave 4 and criminal justice contact at Wave 4 were presented in Panels B and C, respectively. The baseline model included phenotype and six control variables—family SES, whether or not the respondent had been raised in two-parent household (1=yes, 0=no), family connectedness, school connectedness, age and gender. The next three models incorporated contextual factors, one at a time. Models 2, 3 and 4, respectively, added violent peer association, peer network heterogeneity and the neighborhood disadvantage index. Because models 2, 3 and 4 test, correspondingly, *Hypotheses 2, 3 and 4*, contextual variables were not included altogether in one model. Thus models 2, 3 and 4 each added one more predictor to model 1. The final model, model

5, included all predictors and tested *Hypotheses 1*. Violence perpetration at Wave 1 was included as a control variable in the full model when predicting violence perpetration at Wave 4 and criminal justice contact at Wave 4. For the sake of parsimony, the coefficients of control variables were not shown in Tables 3-6, but are available upon request from the author.

Honestly, the distinction between Wave 1 characteristics and Wave 4 outcomes is a bit confusing – this does not mean that it was not well-thought out, but it is not obvious to the reader. Why are school network characteristics at Wave 1 used to predict violent behavior at Wave 4? Do you still talk to all of your friends from middle school and high school? Forgive me if my understanding is incorrect, but I read this as if the school friend roster from Wave 1 was used to moderate the outcomes at Wave 4 – why? Presumably, friendship groups have changed (and some of them may have changed specifically because someone was becoming violent). This is not clear and needs much more explanation in order for the reader to better understand how these school based characteristics are related to the Wave 4 findings from a bunch of almost middle-aged adults.

RESULTS

Table 3 shows the estimation of violence involvement for siblings. Inspection of Panels A and B of this table revealed much similarity between the logistic regression models predicting the odds of being a perpetrator of violence at Wave 1 (Panel A) and Wave 4 (Panel B). In all models, these results showed a strong and negative association between proximity to the European phenotype and the odds of being a perpetrator of violence. In other words, phenotypically darker respondents were more likely to become violence perpetrators than their lighter-complected siblings. The finding lended strong support to *Hypothesis 1*. However, when predicting criminal justice system contact at Wave 4, the effect of phenotyping was not significant after accounting for the effects of the contextual variables and violence perpetration at Wave 1. It is also worth noting that the effect of violence perpetration in adolescence (at Wave 1) was strong (at $P < 0.01$) when

predicting both violence perpetration and criminal justice system contact in young adulthood (at Wave 4). Thus, prior violence involvement in adolescence is an important risk factor for later violence perpetration and contact with criminal justice system.

In line with my expectations (see *Hypotheses 2, 3 and 4*), peer network and school-level measures added in models 2, 3 and 4 were all significant determinants of violent perpetration at Wave 1 in the siblings subsample. The effects were all in predicted directions. Having violent friends, being a member of racially homogeneous network and living in a disadvantaged neighborhood increased the probability of being a violence perpetrator in adolescence. However, in the full models of Panels B and C only violent peer association was significant. Thus, while the cross-sectional analysis fully confirmed *Hypotheses 2-4*, the longitudinal analysis supported only *Hypothesis 2*. All in all, the findings presented in Table 3 were generally in line with the main research hypothesis about the effect of phenotype (*Hypothesis 1*), but lended only partial support to the auxiliary hypotheses concerning peer network and neighborhood effects (*Hypotheses 2-4*).

[Table 3 is about here]

The results presented in Table 4 suggested that proximity to the European phenotype diminished the probability of being a perpetrator of violence for Asian respondents. Specifically, phenotypic variation explains approximately 20% of the likelihood of becoming a perpetrator of violence in adolescence for Asians. It is important to note that these effects were observed while controlling for contextual effects. Phenotype was also important factor in most models predicting criminal justice system contact. Only in the full model of Panel C which included all contextual variables and prior violence perpetration, the effect of phenotype lost significance. The coefficients for both peer

network variables (violent peer association and racial heterogeneity) were significant when estimating violence perpetration in adolescence, but only violent peer association had a significant ($p < 0.05$) effect on violence perpetration and criminal justice system contact in young adulthood (Panels B and C of Table 3). As predicted (see *Hypotheses 2*), having friends who have been perpetrators of violent activities raised the chances of violence perpetration and criminal justice system contact for Asian respondents. Again, in line with my prediction (*Hypotheses 4*), the odds of being a perpetrator of violence in adolescence were strongly and positively affected by neighborhood disadvantage. The effect of neighborhood disadvantage was, nevertheless, insignificant in full models when the outcomes were violence perpetration and criminal justice system contact in young adulthood.

[Table 4 is about here]

Table 5 shows the results of logistic regressions conducted on the subsample of black respondents. As predicted by *Hypothesis 1*, proximity to the European phenotype significantly drives down the odds of violence perpetration for blacks. Approximately 23% of the odds of becoming a perpetrator of violence in adolescence and in young adulthood for blacks was explained by phenotype. As in the preceding analysis conducted on Asians, the effect of phenotype on contact with criminal justice system in young adulthood was fully explained by the contextual factors and prior violence perpetration. Both violent peer association and violence perpetration at Wave 1 were highly predictive of violence perpetration and criminal justice system contact at Wave 4.

[Table 5 is about here]

The multivariate analyses presented in the last table (Table 6) structurally repeat those above with the difference that they were conducted on the subsample of Hispanics. As in the previous analyses conducted on Asians and blacks (Tables 4 and 5), proximity to the European phenotype was found to be a strong predictor of violence perpetration. Results were fairly robust across specifications. Regardless of when violence perpetration was measured (in adolescence or in young adulthood), Hispanics with lighter phenotype were much less likely to become a perpetrator of violence than their co-ethnics with darker phenotype. However, the for phenotype was not significant in the full model (model 5) of Panel C that predicts the probability of criminal justice system contact for Hispanics. Prior violence perpetration could be easily identified as a highly influential factor that explained the association between phenotype and criminal justice system. The results presented in Table 6 also suggested that, when added one by one to the baseline model, all contextual variables were related to violence perpetration and criminal justice system contact in young adulthood. However, only violent peer association consistently exerted a significant influence on all dependent variables.

[Table 6 is about here]

Auxiliary Analyses

I conducted additional analyses, not shown, to explore the possibility that phenotypic variations among Asians, blacks and Hispanics influenced not only violence perpetration but violence victimhood. Thus, multivariate logistic regressions were carried out using the same predictors where the outcome was the odds of being a victim of physical violence in adolescence and young adulthood. The findings indicated that, after controlling

for all other variables, phenotype was a strong predictor of being a victim of violence in adolescence and in young adulthood for all racial-ethnic groups.

Given that prior research reported the association between skin tone and socio-economic outcomes being stronger for women than for men, auxiliary analyses were conducted (but not shown for parsimony) to test whether these findings were sensitive with respect to gender. For each set of race-ethnicity-specific analyses reported in Tables 4, 5 and 6 a series of auxiliary analyses for males and females were conducted in which violence perpetration and criminal justice system contact were regressed against the same predictors. The results did not differ significantly from those reported here.

The use of logistic regression, while mathematically appropriate, really doesn't allow you the level of nuance that your theoretical approach would warrant. The magnitude of the outcomes do not justify the strong language of the conclusions. Indeed, the variables used to create your colorism composite score do not take into consideration other potential markers of social inclusion: country of origin, native language, and accent, for instance. Humans use many markers to determine the crux of "us versus them" and skin color is only one of them.

CONCLUSION AND DISCUSSION

It has been clear to many scholars for a long time that my society is stratified not only race but also by color (Bonilla-Silva, 2004; Hall, 2008; Hochschild & Weaver, 2007). Phenotype is as much a social construct as race (Hall, 2003). Moreover, phenotype is a significant dimension of social stratification that shapes access to socioeconomic opportunities for all racial and ethnic minorities (Hochschild & Weaver, 2007). Numerous studies indicated that phenotypically darker minorities encounter multiple forms of disadvantage relative to their lighter co-ethnics (Goldsmith et al., 2007; Hannon et al., 2013; Hunter, 2016; Loury 2009; Painter et al., 2015; Ryabov, 2013). Recent studies also suggested that the proximity to (or distance from) European phenotype influences criminal

justice outcomes for blacks and Hispanics in the U.S. (Hannon et al., 2013; White 2014). Generally, the links among phenotyping, stereotyping, and the criminal justice system are well-established (Eberhardt et al. 2006; Hochschild & Weaver, 2007; Viglione et al., 2011). The present study that examined the impact of phenotype on violence involvement was intended as a contribution to this strand of research.

The main argument advanced in this paper was that phenotypically darker Asians, blacks and Hispanics were more likely to exhibit violent behavior in adolescence and young adulthood than their lighter-completed co-ethnics. The findings demonstrated that for all three minority groups (Asians, blacks and Hispanics) proximity to the European phenotype was negatively associated with the odds of being a perpetrator of violence in adolescence and in young adulthood. Furthermore, the analysis of the relationship between phenotype and violence involvement in the subsample of siblings (Asians, Blacks and Hispanics) corroborated these findings. After controlling for all individual- and neighborhood-level covariates, Asian and Hispanic respondents who had siblings with phenotype lighter than theirs were significantly less likely to become perpetrators of violence.

Drawing from subculture of violence theory (e.g., Wolfgang et al., 1967), social capital theory (e.g., Coleman, 1988, 1990), social disorganization theory (e.g., Shaw & McKay, 1942), I also hypothesized that peer and neighborhood effects jointly provide the context through which the relationship between phenotype and violent behavior should be interpreted. Accordingly, the analyses included two peer network measures, violent peer association and racial heterogeneity, and one neighborhood-level measure — neighborhood disadvantage. Unlike the racial heterogeneity of the peer network, the

percentage of friends who had been a perpetrator of violence, as indicated by the findings, was a consistent predictor of one's violence perpetration in adolescence and young adulthood and criminal justice system contact in young adulthood. Neighborhood disadvantage, another contextual factor, had inconsistent effect on violence perpetration and criminal justice system contact. Importantly, prior violence perpetration together with contextual factors fully explained the effect of phenotype on criminal justice contact in young adulthood.

These outcomes should be interpreted in light of two limitations. First, measuring violent delinquency is challenging. Indicators derived from the police reports and court system have been known to underestimate violent offenses (Jolliffe et al., 2003; Kirk, 2006; Thornberry and Krohn 2000). Therefore, self-reports measures are often considered to capable of yielding reliable and valid data on violent delinquency (Kirk, 2006; Thornberry and Krohn 2000). Considering the above, my approach to measure violence involvement — the outcome measures in this study were derived from self-reports — is justifiable. However, future investigations of the relationship between phenotype and violence involvement should incorporate a wide range of delinquency measures, both self-reported and obtained from the official statistics. Second, the Add Health data did not allow to test whether self-perceived discrimination confounded the relationship between phenotype and violence involvement. Research is warranted to uncover potential mechanisms, in addition to those examined in this study, through which phenotypic discrimination perpetuates social disadvantage. Finally, quantitative methods like logistic regression do not permit to analyze phenotypical prejudice and discrimination as processes. Future research using qualitative methods needs to provide a rich, contextualized insight into these processes.

To summarize, there are three major outcomes of this investigation: (1) when all else is equal — family background, family relationships, and neighborhood conditions — phenotypically darker minorities tend to exhibit higher levels of violence perpetration than their lighter-completed co-ethnics; (2) one avenue through which phenotype may come to influence violent delinquency is association with violent peers. It is important to stress that, according to my analysis, the effect of phenotype on violence perpetration across all racial-ethnic groups were robust to the inclusion of both peer and neighborhood contextual variables. At the same time, the effect of phenotype on criminal justice system contact was not significant after the inclusion of potential explanatory variables and, in all likelihood, was accounted for by earlier violence perpetration. The likely explanation of the fact that the effect of phenotype on violence involvement was manifested prior to contact with criminal justice system is that phenotypically darker minorities encounter discrimination early in childhood and recur to physical violence as an act of reprisal. In other words, darker complected minority children experience disadvantage early in their lives which is likely to be attributable to phenotypic discrimination. However, the auxiliary analyses indicated that, compared to their lighter-complected co-ethnics, phenotypically darker minority adolescents and young adults were also more likely to become victims of violence, meaning that cultural explanations (e.g., those derived from the subculture of violence theory) also warrant further investigation.

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Table 1. Study Hypotheses.

Hypothesis 1.	Phenotypically darker racial-ethnic minorities will be more likely to commit acts of physical violence than their lighter co-ethnics. The hypothesis is drawn from structural theories of the link social status and crime (e.g., Blau & Blau; Merton 1938, Sellin 1938)
Hypothesis 2.	There is a positive association between the prevalence of violence in one's peer network and one's violence involvement. This hypothesis is based on social capital theory (Coleman, 1988, 1990).
Hypothesis 3.	There is a negative association between racial heterogeneity of peer networks and violence involvement. The hypothesis is derived from the subculture of violence theory (Brady et al., 2008; Melde & Esbensen, 2013).
Hypothesis 4.	This hypothesis is derived from social disorganization theory (Shaw & McKay, 1942; Kornhauser, 1978). It proposes that those respondents who lived in disadvantaged neighborhoods will be more likely to become violence perpetrators than their peers who did not.

Table 2. Descriptive Statistics, Full Sample and Siblings Sample.

Full Sample (n=4,441)		Sibling Pairs (n=1,714)	
Variables	Weighted Mean		Weighted Mean
Dependent Variables		Dependent Variables	
Violence Perpetration, Wave 1	0.12	Violence Perpetration, Wave 1	0.12
Violence Perpetration, Wave 4	0.15	Violence Perpetration, Wave 4	0.16
Criminal Justice System Contact, Wave 4	0.10	Criminal Justice System Contact, Wave 4	0.11
Independent Variables		Independent Variables	
<i>Race-Ethnicity</i>		<i>Race-Ethnicity</i>	
Asian	0.14	Asian	0.12
Black	0.50	Black	0.49
Hispanic	0.36	Hispanic	0.39
<i>Phenotype</i>	0.21	<i>Phenotype: Lighter than the Sibling</i>	0.24
<i>Control Variables</i>		<i>Relationship</i>	
Family SES, Wave 1	5.13	Full Sibling	45%
Two-Parent Household, Wave 1	0.51	Half Sibling	16%
Family Connectedness, Wave 1	2.76	Dizygotic twin	15%
School Connectedness, Wave 1	2.51	Unrelated	24%
Age, Wave 4	28.20	<i>Control Variables</i>	
Gender (Male)	0.49	Family Connectedness, Wave 1	2.67
		School Connectedness, Wave 1	2.52
		Age, Wave 4	28.24
<i>Contextual Factors</i>		<i>Contextual Factors</i>	
Violent Peer Association, Wave 1	0.14	Violent Peer Association, Wave 1	0.15
Peer Network Heterogeneity, Wave 1	0.43	Peer Network Heterogeneity, Wave 1	0.46
Neighborhood Disadvantage, Wave 1	0.00	Neighborhood Disadvantage, Wave 1	0.01

Table 3. Odds Ratios of the Key Predictors and Their Standard Errors (In Parenthesis); Sibling Pairs (N=1,714).

	Model 1	Model 2	Model 3	Model 4	Model 5
Outcome: Violence Perpetration, Wave 1					
Phenotype: Lighter than the Sibling	0.722 *** (0.227)	0.737 *** (0.234)	0.745 *** (0.235)	0.741 *** (0.247)	0.758* (0.267)
Violent Peer Association, Wave 1		1.518 *** (0.234)			1.307 *** (0.230)
Peer Network Heterogeneity, Wave 1			0.744 *** (0.241)		0.800* (0.246)
Neighborhood Disadvantage, Wave 1				1.658 *** (0.429)	1.357 *** (0.444)
-Pseudo log-likelihood	1,353	1,320	1,322	1,327	1,301
Pseudo R^2	0.225	0.228	0.229	0.228	0.237
Outcome: Violence Perpetration, Wave 4					
Phenotype: Lighter than the Sibling	0.698 *** (0.230)	0.722 *** (0.244)	0.736 *** (0.242)	0.721 *** (0.256)	0.817* (0.268)
Violent Peer Association, Wave 1		1.465 *** (0.232)			1.264* (0.232)
Peer Network Heterogeneity, Wave 1			0.779 ** (0.238)		0.895 (0.245)
Neighborhood Disadvantage, Wave 1				1.386* (0.436)	1.200 (0.458)
Violence Perpetration, Wave 1					1.611 *** (0.252)
-Pseudo log-likelihood	1,359	1,329	1,334	1,328	1,293
Pseudo R^2	0.229	0.234	0.232	0.231	0.238
Outcome: Criminal Justice System Contact, Wave 4					
Phenotype: Lighter than the Sibling	0.714 *** (0.229)	0.730 *** (0.233)	0.738 ** (0.240)	0.734 *** (0.243)	0.885 (0.259)
Violent Peer Association, Wave 1		1.527 *** (0.227)			1.314* (0.250)
Peer Network Heterogeneity, Wave 1			0.821* (0.234)		0.934 (0.262)
Neighborhood Disadvantage, Wave 1				1.458 ** (0.425)	1.213 (0.472)
Violence Perpetration, Wave 1					1.573 *** (0.247)

	Model 1	Model 2	Model 3	Model 4	Model 5
-Pseudo log-likelihood	1,366	1,332	1,338	1,336	1,315
Pseudo R^2	0.227	0.232	0.229	0.230	0.237

Note: All estimates are weighted and adjust for design effects. Coefficients of control variables are not shown.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Table 4. Odds Ratios of the Key Predictors and Their Standard Errors (In Parenthesis); Asians (N=621).

	Model 1	Model 2	Model 3	Model 4	Model 5
Outcome: Violence Perpetration, Wave 1					
Phenotype	0.721 *** (0.252)	0.784 ** (0.256)	0.745 *** (0.264)	0.751 *** (0.277)	0.795* (0.302)
Violent Peer Association, Wave 1		1.603 *** (0.341)			1.289** (0.325)
Peer Network Heterogeneity, Wave 1			0.771 ** (0.358)		0.825* (0.365)
Neighborhood Disadvantage, Wave 1				1.561 *** (0.442)	1.315 *** (0.472)
-Pseudo log-likelihood	1,139	1,107	1,115	1,109	1,074
Pseudo R^2	0.224	0.229	0.226	0.231	0.238
Outcome: Violence Perpetration, Wave 4					
Phenotype	0.715 *** (0.233)	0.769 ** (0.257)	0.736 *** (0.262)	0.721 *** (0.276)	0.822* (0.287)
Violent Peer Association, Wave 1		1.520 *** (0.315)			1.177* (0.325)
Peer Network Heterogeneity, Wave 1			0.827* (0.341)		0.908 (0.348)
Neighborhood Disadvantage, Wave 1				1.404** (0.440)	1.222 (0.463)
Violence Perpetration, Wave 1					1.327** (0.356)
-Pseudo log-likelihood	1,173	1,142	1,147	1,141	1,106
Pseudo R^2	0.226	0.230	0.228	0.229	0.240
Outcome: Criminal Justice System Contact, Wave 4					
Phenotype	0.742 *** (0.234)	0.760 *** (0.251)	0.778 ** (0.252)	0.774** (0.274)	0.914 (0.293)
Violent Peer Association, Wave 1		1.742 *** (0.327)			1.314* (0.350)
Peer Network Heterogeneity, Wave 1			0.821* (0.334)		0.945 (0.368)
Neighborhood Disadvantage, Wave 1				1.373* (0.429)	1.185 (0.472)

	Model 1	Model 2	Model 3	Model 4	Model 5
Violence Perpetration, Wave 1					1.489*** (0.350)
-Pseudo log-likelihood	1,180	1,138	1,151	1,150	1,126
Pseudo R^2	0.223	0.227	0.225	0.225	0.234

Note: All estimates are weighted and adjust for design effects. Coefficients of control variables are not shown.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Table 5. Odds Ratios of the Key Predictors and Their Standard Errors (In Parenthesis); Blacks (N=2,205).

	Model 1	Model 2	Model 3	Model 4	Model 5
Outcome: Violence Perpetration, Wave 1					
Phenotype	0.712*** (0.186)	0.728*** (0.210)	0.745*** (0.211)	0.731** (0.223)	0.767*** (0.246)
Violent Peer Association, Wave 1		1.355*** (0.321)			1.250* (0.325)
Peer Network Heterogeneity, Wave 1			0.716*** (0.337)		0.764** (0.365)
Neighborhood Disadvantage, Wave 1				1.614*** (0.389)	1.426*** (0.428)
-Pseudo log-likelihood	1,531	1,492	1,494	1,489	1,462
Pseudo R^2	0.226	0.230	0.230	0.231	0.243
Outcome: Violence Perpetration, Wave 4					
Phenotype	0.684*** (0.205)	0.736** (0.226)	0.736*** (0.230)	0.699*** (0.243)	0.771** (0.258)
Violent Peer Association, Wave 1		1.417*** (0.306)			1.272** (0.314)
Peer Network Heterogeneity, Wave 1			0.747*** (0.329)		0.908 (0.348)
Neighborhood Disadvantage, Wave 1				1.362* (0.427)	1.185 (0.439)
Violence Perpetration, Wave 1					1.298** (0.344)
-Pseudo log-likelihood	1,528	1,496	1,498	1,493	1,454
Pseudo R^2	0.230	0.235	0.234	0.232	0.244
Outcome: Criminal Justice System Contact, Wave 4					
Phenotype	0.692*** (0.219)	0.753** (0.223)	0.745*** (0.244)	0.751*** (0.247)	0.877 (0.248)
Violent Peer Association, Wave 1		1.572*** (0.327)			1.328** (0.336)
Peer Network Heterogeneity, Wave 1			0.782** (0.321)		0.897 (0.353)

	Model 1	Model 2	Model 3	Model 4	Model 5
Neighborhood Disadvantage, Wave 1				1.328*	1.142
				(0.412)	(0.453)
Violence Perpetration, Wave 1					1.396***
					(0.336)
-Pseudo log-likelihood	1,535	1,499	1,505	1,503	1,475
Pseudo R^2	0.229	0.236	0.235	0.233	0.245

Note: All estimates are weighted and adjust for design effects. Coefficients of control variables are not shown.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Table 6. Odds Ratios of the Key Predictors and Their Standard Errors (In Parenthesis); Hispanics (N=1,615).

	Model 1	Model 2	Model 3	Model 4	Model 5
Outcome: Violence Perpetration, Wave 1					
Phenotype	0.706***	0.720***	0.737***	0.725**	0.750***
	(0.221)	(0.237)	(0.238)	(0.259)	(0.252)
Violent Peer Association, Wave 1		1.539***			1.337***
		(0.326)			(0.312)
Peer Network Heterogeneity, Wave 1			0.719***		0.792*
			(0.344)		(0.350)
Neighborhood Disadvantage, Wave 1				1.418***	1.262*
				(0.424)	(0.463)
-Pseudo log-likelihood	1,507	1,471	1,477	1,475	1,445
Pseudo R^2	0.227	0.232	0.231	0.231	0.240
Outcome: Violence Perpetration, Wave 4					
Phenotype	0.701***	0.744**	0.721***	0.717***	0.779*
	(0.220)	(0.232)	(0.242)	(0.241)	(0.272)
Violent Peer Association, Wave 1		1.390*			1.153
		(0.302)			(0.325)
Peer Network Heterogeneity, Wave 1			0.810*		0.894
			(0.337)		(0.345)
Neighborhood Disadvantage, Wave 1				1.326*	1.198
				(0.422)	(0.444)
Violence Perpetration, Wave 1					1.300*
					(0.342)
-Pseudo log-likelihood	1,502	1,476	1,478	1,474	1,460
Pseudo R^2	0.228	0.230	0.230	0.230	0.236
Outcome: Criminal Justice System Contact, Wave 4					
Phenotype	0.721***	0.784**	0.745***	0.751***	0.914
	(0.232)	(0.236)	(0.244)	(0.247)	(0.263)
Violent Peer Association, Wave 1		1.742***			1.314*
		(0.327)			(0.350)

	Model 1	Model 2	Model 3	Model 4	Model 5
Peer Network Heterogeneity, Wave 1			0.821* (0.334)		0.945 (0.368)
Neighborhood Disadvantage, Wave 1				1.373* (0.429)	1.185 (0.472)
Violence Perpetration, Wave 1					1.489*** (0.350)
-Pseudo log-likelihood	1,510	1,465	1,471	1,479	1,428
Pseudo R^2	0.229	0.234	0.231	0.232	0.239

Note: All estimates are weighted and adjust for design effects. Coefficients of control variables are not shown.

* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Figure 1. Selected Pathways Linking Phenotype, Violence Perpetration and Contextual Factors.

