EXAMINING THE MATURITY GAP: YOUTH SELF-PERCEIVED PHYSICAL DEVELOPMENT AND DELINQUENCY

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ABSTRACT

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Adolescence is a period of rapid physical and social development, however physical maturation often precedes the latter. At the same time, this period is often met with increased rates of antisocial and often delinquent behaviors – accounting for the age-crime curve, a phenomenon that has persisted over decades. Moffitt (1993) suggested that perhaps strain caused by the disconnected social and physical maturation process, the maturity gap, influences a large proportion of adolescents to engage in delinquent behaviors. Empirical testing of the maturity gap often measures both physical and social maturation, however most studies have measured physical development using biomarkers. Fewer studies have examined a subjective measure of physical development, such as how youth perceive their own physical development and its relation to delinquent behaviors. The present study offered theoretical nuance to the maturity gap and suggested that adolescents determine their proximity to adulthood by comparing their physicality to their closest peers and asked the question *do youth who perceive themselves as being 'more developed' than their peers show increased rates of delinquency?* Using secondary data from the National Longitudinal Study of Adolescent to Adult Health, findings suggested that those who perceived themselves as more developed relative to their peers showed increased rates of antisocial and delinquent behaviors. The study expanded by examining group-level differences in self-perceived development relative to peers, and asked *at the aggregate-level are there differences in self-perceived development relative to peers by race.* Findings suggested there were group-level differences by race when coded as white and non-white.

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KEY TO ABBREVIATIONS

ADD Health	National Longitudinal Study of Adolescent to Adult Health
UCR	Uniform Crime Report

INTRODUCTION

It is well understood that near the end of childhood youth undergo a myriad of physical and social changes. This stage in the life course—adolescence – is universally recognized (Scott & Steinberg, 2010) however its significance varies over time, between cultures, and with changing social contexts **(**Swanson, Spencer, Harpalani, Dupree, Noll & Ginzburg, 2003). The overall transformation from child to adult is predictable; however the onset and duration of pubertal changes can vary by gender and race (Kipke, 1999). To community members with limited information about the youth, such as their biological age, one's stage of physical development may act as an indicator of the youth's maturity - sometimes leading to increased benefits associated with adulthood, such as more unsupervised time. Other times, community members might place higher expectations on a more physically developed youth, assuming they are older in age. Most often youth experience increased physical maturation before reaching full social maturity. For example, their bodies begin to look more adult-like yet members of the youths' closer social networks, such as parents and teachers continue to restrict many of the benefits associated with adulthood. Imagine a mother setting a curfew for her teenaged son or how the law prohibits youth from smoking cigarettes or purchasing alcohol. Some suggest as youth feel a disconnect between their physical and social maturity, they seek out alternative ways to express their autonomy and new role in society. In searching for that autonomy, youth might engage in increased antisocial and delinquent behaviors.

Developmental scholars suggest that there is a continuous feedback loop between one's physical characteristics and their environment (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990). Therefore, the physical appearance of an individual influences the way in which the social environment interacts with that individual, and vice versa. During adolescence the body is

becoming more adult-like in appearance, yet youth often receive a contradictory message from the environment indicating they remain immature. In some ways the environment will place social controls on the adolescent to restrict them from the 'perks' of adulthood (e.g. increased unsupervised time, operating a vehicle, or buying or consuming alcohol). However many of the changes to their physical development indicate they are maturing into adults (e.g. males develop facial hair, and females develop breasts), and therefore should be deserving of the perks associated with adulthood. For instance, imagine a mother attempting to implement a curfew for her 17-year-old son who towers over her in height and has recently grown a mustache. Physically the 17-year-old appears to have reached adulthood, yet the social structures around him (his mother's supervision and mechanisms of control via the implementation of a curfew) reinforce his role as a child in society. This illustrates the contradictory experiences as one develops physically and socially from child to adult.

At the same time, when rates of offending are plotted by age, a sharp uptick in offending occurs during late adolescence and early adulthood. Most youth will desist from crime as they enter adulthood and the sharp uptick in crime begins to steadily decline with age. This is referred to as the age-crime curve, where offending peaks during adolescence and declines as youth enter adulthood (Farrington, 1986; National Research Council, 1986). Some scholars have offered theoretical explanations for the well-documented relationship between age and crime (Matza, 1964; Hirschi and Gottfredson, 1983). Other developmental theories attempt to deepen our understanding of *who* is under the age-crime curve (i.e. the different types of adolescent offenders) and what factors influence youth to engage in delinquent behaviors at an increased rate during adolescence. That is, is there something unique taking place during adolescence that fuels the peak in the age-crime curve?

One such theory is Moffitt's Developmental Taxonomy (1993), in which the theoretical argument suggests there are two distinct types of offenders, and the reasons for engaging in delinquent behaviors are different. Relevant to this study, Moffitt suggested that *most youth* only offend for a brief period of time during adolescence (adolescent-limited offenders). She further suggests their engagement with delinquency is a result of a 'maturity gap'; that youth perceive a disconnection or gap between their physical and social maturation such that they feel physically mature but restricted by social controls. Moffitt suggests youth partake in antisocial and delinquent behaviors to demonstrate their autonomy and independence in society, or as a means to obtain some restricted perk of adulthood. Take the analogy provided above in which a mother sets a curfew for her physically adultlike son. According to Moffitt, the son may disobey the rules of his mother and sneak out past curfew to 'take' what he perceives to be his right as an adult, unsupervised time. This analogy illustrates how youth might navigate the maturity gap using antisocial or delinquent behaviors as a means to possessing a benefit afforded to adults.

To date, most studies examining Moffitt's theoretical explanation of a maturity gap have used biological markers to measure the physical maturity of adolescents (e.g. see Barnes & Beaver, 2010; Galambos, Barker & Tilton-Weaver, 2003). This proves beneficial in measuring physical development from an objective perspective. However, fewer studies have included a subjective measure of physical development. As it relates to youth involvement in antisocial and delinquent behaviors, perhaps a critical measure is how adolescents' perceive their own physical development? This study builds on Moffitt's explanation of a maturity gap by suggesting the strain experienced during adolescence – resulting from a perceived disconnect between one's physical and social development – is informed as youth estimate their proximity to adulthood *using peers as the reference group*. That perhaps, youth engage in delinquent behaviors because

when they compare their physicality to that of their peers, they perceive themselves as more developed and thus, closer to adulthood. This realization exacerbates the strain they feel between the physical and social maturity, and thus, leads to increased antisocial and delinquent behaviors. The present study tests a subjective measure of physical development and adds to the developmental literature by providing greater insight into *why* we see a peak in offending during adolescence.

LITERATURE REVIEW

Adolescent Development

Adolescence is conventionally understood as the period between the onset of puberty and the establishment of social independence (Steinberg, 2014). During this period, youth experience changes to their physical appearance and their role in society. When youth begin adolescence they are children, but as they exit adolescence they are adults.

The process of physical maturation follows a predictable pattern, but does not development uniformly between individuals. Often the physical changes occurring during adolescence display great variation in both their onset and duration amongst youth (Kipke, 1999; Marceau, Ram, Houts, Grimm & Susman, 2011). For example, most girls will experience their first menstrual cycle between 12 and 14 years old (Planned Parenthood, 2018). Yet, not all young girls will start menstruation at the same moment in their development; rather, the onset of this particular physical change varies by individual. The duration of physical changes also varies as some youth experience rapid physical development, appearing to have changed appearance overnight, yet others experience a more gradual development that lasts through the late teens (Marceau et al., 2011).

It is important to note that physical development during adolescence does not happen within a vacuum. Rather, it is met with concordant responses from actors within the youths' social environment (e.g., peers and law enforcement). As youth begin to grow into more adult-like bodies, actors in the environment begin seeing them as more adult-like. In some ways the environment may try to keep the adolescent in childhood through increased social controls and supervision, but in other ways the environment might expect the youth to exhibit more adult-like behaviors as a result of their physical appearance. Therefore, as youth begin to mature

physically, the messages they receive from their environment are often contradictory. Additionally, because the environmental response is often dependent upon the youth's physical development, which varies in onset and duration, youth might receive different messages from their environment than their same-aged peers might receive. This creates additional sources of disconnect in the adolescents' social network as they perceive themselves as different than their same-aged peers. This illustrates the importance of the environment and the role their messages have on adolescent behavior.

Physical Changes. The period of physical development during adolescence is most commonly referred to as puberty and is the process through which children physically mature into adults (Simmons, 2017). The physical changes described refer to changes in the sexual characteristics of adolescents. The term 'sex' is used to indicate the biological differences between males and females, such as their reproductive organs, whereas gender refers to the social identification of the individual, for example being identified as masculine or feminine (Nobelius, 2004). The changes to adolescents' masculinity or femininity during adolescence would be more appropriately categorized as a social change.

During puberty youth experience changes to their physical appearance and become capable of sexual reproduction. Many of the physical changes will happen for both sexes, for example most youth will experience an increase in the amount of sweat they produce during adolescence and, consequently, experience increased body odor. Further, most youth will experience changes to their body hair, including hair growth under the arm and in the pubic region, as well as the hair becoming darker. Youth also grow taller during adolescence, often accompanied by pains in the arms and legs, commonly identified as "growing pains" (Planned Parenthood, 2018b).

Differences by Sex. Differences in adolescent development amongst various groups can be drawn, but perhaps most pronounced are those between male and female development. The following is a description of the physical changes experienced by males and females that are unique to their sex. It is important to highlight differences between male and female development during the pubescent period because the changes often vary between individuals and groups. Therefore, when interacting with their environment, youth at different developmental stages may have a different experiences within their environment.

The average age for the onset of puberty is around 11 years old (APA, 2002), however males often begin and complete puberty later than females, usually between 9 and 15 years old. Males typically do not experience their growth spurt until two years after female youth, usually between 12-14 years old (APA, 2002). Males also experience a deepening of their voice, often going through a period of 'cracking' or squeaking between the former higher pitch and the newfound lower pitch. Additionally, the male genitalia become larger, they grow hair on their face, chest, and back, and experience a widening of the shoulders (Planned Parenthood, 2018b).

On average, the onset of puberty is earlier for girls than it is for boys, with the onset being between 7 and 13 years old (APA, 2002). During puberty, females will develop breasts, experience a widening of their hips, and start their menstrual cycle. These changes indicate the sexual characteristics of the female have matured and are capable of sexual reproduction. Females also experience a 'growth spurt' during adolescence, often happening much sooner than their male counterparts between 10 and 12 years old (Planned Parenthood, 2018b).

Differences by Race. Various studies have indicated that the onset of puberty begins earlier for black youth than it does for white youth (Harlan, Grillo, Cornoni-Huntley and Leaverton, 1979; Harlan, Harlan and Grillo, 1980; Herman-Giddens, Slora, Wasserman, 1997;

Emmanuel and Bokor, 2017). Adolescent physical development is often measured using biomarkers identified in the Tanner-Stages, or Sexual Maturity Rating, of development. In short, the Tanner-Stages are three separate scales designed to measure the development of secondary sexual characteristics in adolescents. The first scale measures the development of pubic hair, the second measures breasts in females, and the third measures external male genitalia. Each scale ranges from Stage 1 to Stage 5, with Stage 1 indicating the youth has not entered the pubescent period and Stage 5 indicating the youth has reached full maturation. Using the Tanner-Stages, a study of adolescent males (N=2395) examined adolescent development across race using data from a cross-sectional survey from the National Health and Nutrition Examination Survey III (NHANES III), 1988-1994. Researchers found that the mean age of onset for the development of pubic hair was significantly older for white males than it was for black males, with the mean age of development being 12 and 11.2-years-old, respectively (Herman-Giddens, Wang, & Koch, 2001). Additionally, there were significant differences by race with regard to the age in which youth completed their genital development (i.e. reached full development of their reproductive organs). The mean age of white youth having reached full genital maturation was 15.9-years-old, while the mean age for black youth was 14.9. This highlights that although all youth will experience similar changes to their physicality, the timing of those changes were significantly different between black and white youth. Similar to the differences between males and females, the variability in physical change between individuals and groups can influence how they interact with their environment.

Social Changes. As demonstrated by the physical changes, adolescence is a time in which youth become more adult-like in appearance. Consequently, the youth's environment responds to the youth's changing appearance. Developmental scholars suggest that perhaps the interaction

between a person's physical characteristics and their environment is bidirectional, where physical characteristics influence the environmental response and vice versa (Bouchard, Lykken, McGue, Segal, & Tellegen, 1990). For example, twin studies designed to disentangle the influence of biological and environmental factors find that twins reared apart (having different environments) tended to develop similar personality traits. Bouchard and colleagues mention the possibility of a bidirectional relationship between biological and environmental factors that could explain the similarities of outcomes in twins reared apart. The idea of a bidirectional relationship between the environment and the individual has since been expanded to suggest that people are fluid creatures and, therefore, the relationship between the person and the environment is interdependent (see Lerner & Castellino, 2002).

For most of the life cycle one's physical development aligns with their social status as either 'adult' or 'child', and therefore those appearing to be children are, in fact, children. Likewise, those who appear to look like adults are, in fact, adults. During adolescence, however, the physical appearance and the social status of the youth are disconnected. The physical characteristics of the youth indicate they have reached adulthood, yet various social controls limit their behavior and send a message to the youth that they are still, in fact, children. The social controls experienced by youth might include laws that prevent youth from certain activities, a teacher's supervision during school, or a parent's supervision and rules at home. Physical and social development during adolescence, therefore, often produces a contradictory period in the life cycle where the individual's physical development indicates they have reached adulthood, yet socially they remain restricted from many of the 'perks' of adulthood.

The perception of the youth's physical development has a direct impact on the way in which society interacts with the youth. Especially considering that often times those interacting

with the youth are not aware of their biological age, and therefore are required to estimate the age of the youth based on what they see. However, given the great variability in the onset and duration of physical development during adolescence, estimating the youth's age can be rather difficult. In most situations an incorrect estimation of age will be irrelevant; however, in some instances it can be pivotal to the outcome of the situation. For example, consider the unfortunate story of Tamir Rice, a 12-year-old boy shot and killed by a Cleveland law enforcement officer in 2014. After shots had been fired, one of the officers radioed in "Shots fired, male down, um, black male, *maybe 20*" (Izadi & Holley, 2014). Did the officer's estimation of age have any influence on their decision to shoot that day? How one perceives another's physicality informs the response they have to that person, but it also influences how youth view themselves.

Some developmental theories suggest that adolescents express antisocial and delinquent behaviors as a result of the disjuncture between their physical and social development during adolescence (Moffitt, 1993). Moffitt (1993) further adds that the expression of delinquent behaviors is a mechanism through which youth assert their migration into adulthood. This participation in delinquent behaviors explains increased rates in offending during late adolescence and early adulthood.

Age and Crime

The relationship between age and crime is one of the most widely accepted phenomena amongst scholars of criminal behavior and life-course development. When plotting the relationship between age and crime, where offense data is distributed across age, it consistently illustrates a peak in offending during late adolescence and early adulthood. The height of the curve is determined by the prevalence of offending by age group, and usually peaks during teenaged years and early twenties. The right side of the curve illustrates the steady decline in

offending as individuals desist from crime as they mature into adulthood (Loeber and Farrington, 2014). The relationship between age and crime, referred to as the ”age-crime curve,” where crime peaks during late adolescence is persistent across various aggregate-level characteristics. For example, consider its continuity through historical periods (Figure 1.1) and between genders (Figure 1.2 and 1.3) (Loeber and Farrington, 2011).

Figure 1.1 illustrates the most prevalent offender age or age group in the age-crime curve for 1995, 2005, and 2015. Figure 1.2 and 1.3 builds upon Figure 1.1 by examining differences by sex in the age-crime curve where 1.2 represents male arrests and 1.3 represents female arrests. Official arrest data from the Uniform Crime Report (UCR) describing the rate of arrest per 100,000 was plotted on the Y axis (United States Department of Justice, Federal Bureau of Investigation, 1995; 2006; 2015) and ages were plotted in age-groups by year from under 10 years old to over 50 years old. The ages in middle adolescence (15 through 19 years of age) have been left ungrouped for a closer examination into the increased offending during adolescence. Each of the three graphs display an asymmetrical right-skewed distribution where those in late-adolescence and early adulthood represented the peak in the curve. Using that distribution, the percent of the total distribution was calculated for each age or ‘age group’ (e.g. children under the age of 10, adults over the age of 50, etc.). The right-skewed distribution appearing in each figure is plotted with the percent of the distribution along the y-axis and age along the x-axis. The blue line represents 1995, the red line 2005, and the black line 2015.

Translating the arrest rates by age into a percent of the total distribution by age was done so (1) the age group with greatest contribution to the curve can be easily identified, and (2) comparing the contributions by age can be drawn across time and gender, regardless of actual

arrest rates. The peak in each figure represents the age or age group with the most pervasive offending, or, in other words, the group with the largest percent of the arrest distribution.

Figure 1.1 examines the age-crime curve by plotting the percent of the arrest distribution accounted for by each age or age group in 1995, 2005, and 2015. The graph suggests those aged 20-24 have consistently represented the largest percent of the arrest distribution, making up about 15-20% in each year examined. Furthermore, the figure shows a nearly steady increase in those arrested from about 15 to 19-years-old, eventually peaking in the early twenties. This supports prior studies that point to increased offending during adolescence (Steffensmeier, Allan, Harer & Streifel, 1998; Steffensmeier and Allan, 2000), eventually leading to increased attention from law enforcement and arrests. For the most part however, as individuals mature into adulthood they begin to desist from crime and, as depicted in Figure 1.1, represent a smaller percent of the total arrest distribution.

Figure 1.1: Percentage of the Arrest Distribution Accounted for by Age in 1995, 2005, and 2015

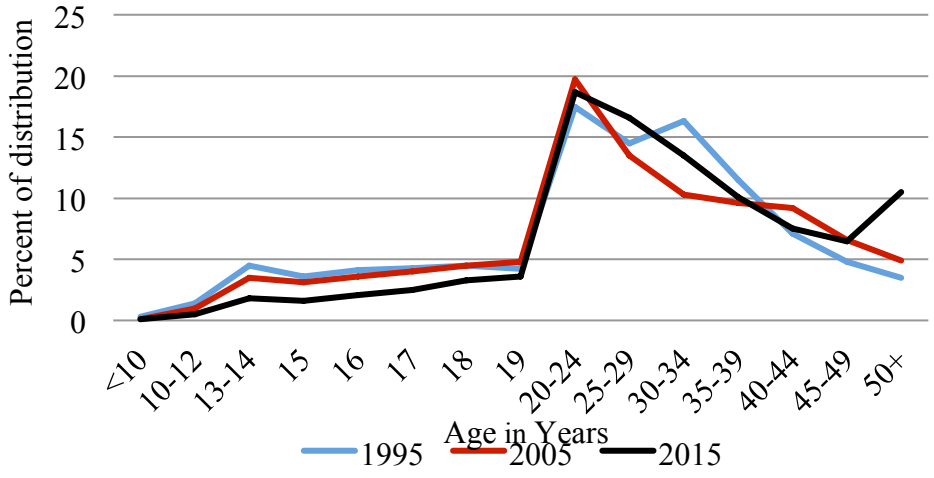


Figure 1.2 examines only male arrests for 1995, 2005, and 2015. All other components of the graph are identical to Figure 1.1. The pattern displayed in this graph is nearly identical to the graph produced in Figure 1.1 where the peak in arrests occurs in the early twenties.

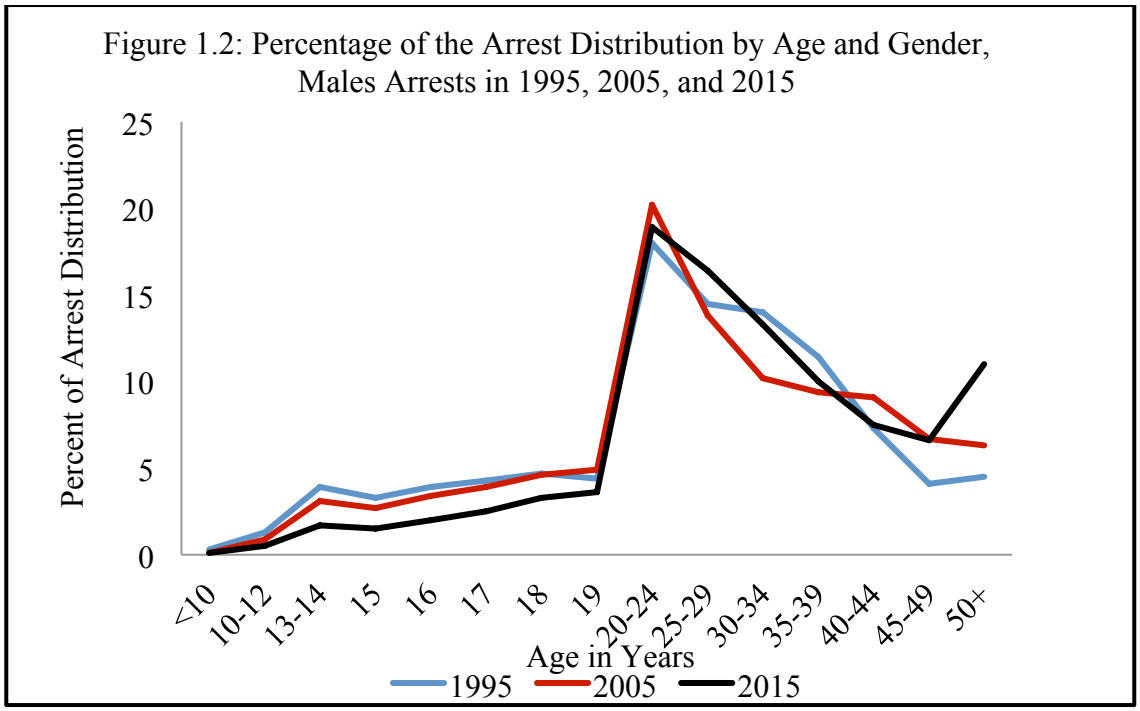
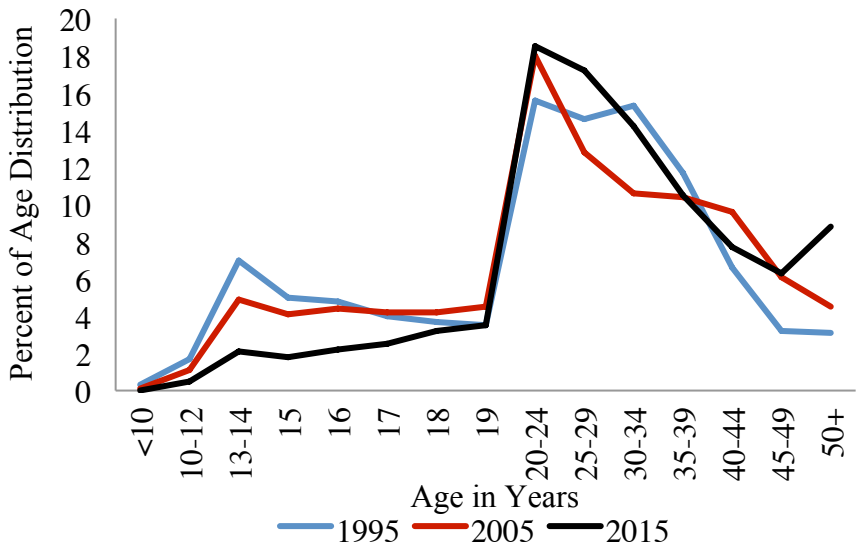


Figure 1.3 plots female arrest rates. Still, the peak in arrests occurs in the early twenties.

Figure 1.3: Percentage of the Arrest Distribution by Age and Gender, Female Arrests in 1995, 2005, and 2015

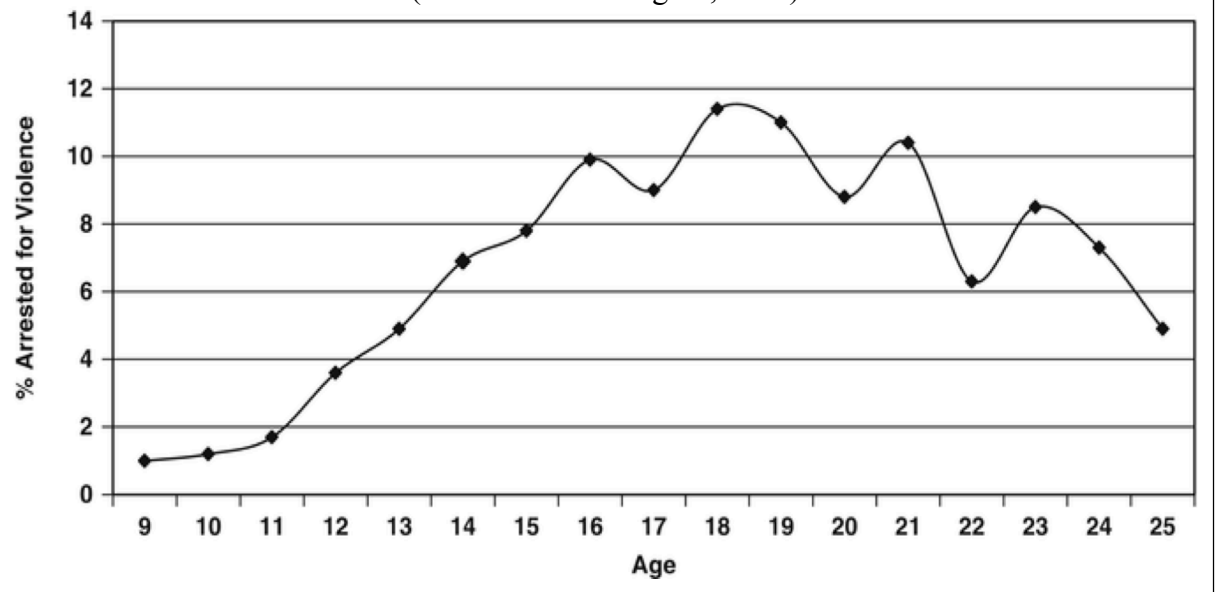


As previously mentioned the graphs produced in Figure 1.1 – 1.3 utilizes arrest data from the Uniform Crime Report. It should be noted that there are several limitations to examining the age-crime relationship using arrest data. The first being that arrest data does not capture most offenses committed by juveniles because low-risk youth (the majority of juvenile offenders) are often diverted away from the juvenile justice system. Therefore, much of the interface between youth and law enforcement is informal. A study conducted by the San Diego Association of Governments found that within San Diego County 50 percent of juvenile offenders were referred to probation – indicating that the other 50-percent was provided a more informal approach, for example being referred to a counseling agency or being driven home by an officer (Alvarez, 2013). Given that UCR data uses only 'official' records to measure crime, much of the juvenile crime is not included. Additionally, the UCR data does not include status offenses (acts that are considered illegal only if committed by a juvenile), and it is limited to crimes that are detected by police. However, most offending goes *undetected* by law enforcement (Truman and Langton,

2014). Therefore, the use of self-reports of offending can be useful in estimating the prevalence of crime (Thornberry and Krohn, 2000).

To better understand the offending that goes undetected by police, Loeber and Farrington (2014) plotted the percent arrested for violence across age using *self-reports and official records* from the Pittsburgh Youth Study (**Figure 2**). The graph shows an asymmetrical bell-curve similar to the ones obtained using only UCR data (e.g. see figures 1.1 – 1.3). However, the most prevalent group of offenders tends to be younger when self-reports are plotted with official data than when official arrest data is plotted alone. This illustrates that although the peak in offending might vary slightly depending upon the measure of offending, adolescence and those in early adulthood tend to be the most prevalent offenders.

Figure 2**:** Self-Reports and Official Records of Offending from the Pittsburgh Youth Study (Loeber and Farrington, 2014)



In sum, *overall* the most prevalent groups of offenders tend to be adolescents and young adults, as participation appears to decrease with age. This remains true when considering both self-reports of offending and official arrest records. Researchers have long theorized about the

physical and social processes occurring during adolescence that influences young people to engage in delinquency.

Adolescent-Limited Offenders and the Maturity Gap

Moffitt (1993) offered a theoretical explanation for the relationship between age and crime and the drastic peak in offending during adolescence. She suggested that beneath the age-crime curve laid two classifications of offenders that were distinct from one another in the onset, duration, and pervasiveness of their antisocial and delinquent behaviors. Importantly, however, both classifications display increased rates of offending during adolescence.

The first type is the life-course persistent offender and represents about 5-10% of all juvenile offenders. Members of this group exhibit antisocial behaviors in early childhood and, perhaps most distinctly from their counterparts, will continue to offend through adolescence and adulthood. The second type is the adolescent-limited offender, which makes up the other 90-95% of juvenile offenders. They engage in antisocial and delinquent behaviors as they enter adolescence and continue throughout their teens (Moffitt, 2006). As aforementioned, the most distinct quality of the adolescent-limited offender is that they begin to *desist* from crime as they enter adulthood. Their offending is often sporadic, non-violent delinquent behaviors that are limited to the adolescent period. Moffitt suggested it is the brief period of time in which the life-course persistent offenders are joined by the more robust group of adolescent-limited offenders that explains the drastic uptick in offending in the age-crime curve.

Moffitt furthered her theory by offering reasons for *why* youth participate in delinquent behaviors at an increased rate during adolescence. For the adolescent-limited offenders, Moffitt suggests they increase participation in delinquent behaviors due to the disconnected timing between physical and social maturation that creates an internal conflict within the youth. That is,

youth recognize a change to their physical appearance as they transition out of childhood and begin developing more adult-like characteristics (e.g. facial hair, breasts, widened shoulders, growing taller). Moffitt refers to the disconnected physical and social maturity of adolescence as the 'maturity gap'; the unique period of time in which youth are nearing physical maturity but have yet to reach social maturity (i.e. adulthood). This means adolescents begin interfacing with society from a physically mature perspective, but still remain prohibited from the various perks associated with adulthood, such as having the right to vote in a democratic election, operate a vehicle, or having a beer with friends. Moffitt suggests this disjuncture between the social and physical development not only makes mimicking antisocial peers an easy task, but also appears lucrative to developing adolescents' eager to establish themselves as adults and gain access to otherwise prohibited perks. Principles of reinforcement suggest that by obtaining the desired item, outcome, or benefit will result in continued behavior, which in this case could be increased frequency or variety of delinquent acts.

In sum, Moffitt suggests youth will engage in delinquent behaviors until they become socially accepted adults and provided alternative means to obtaining the benefits of adulthood that make engaging in delinquent or criminal behaviors less appealing or unnecessary. As youth begin to assume a more adult role in society, and the gap between their physical and social maturation begins to close, the adolescent-limited offender begins desisting from crime. The adolescent-limited offenders' rapid withdrawal from offending explains the drastic decline in offending rates seen in early adulthood.

In testing Moffitt's theoretical maturity gap, studies seek measures of adolescent physical and social development to calculate the difference between the measures and then relate that to youth participation in antisocial and delinquent behaviors. Most studies find support for Moffitt's

(2006) maturity gap, however studies tend to measure physical development using an *objective* measure, such as the onset of menstruation or development of breasts. Other times, age will be used as a proxy for physical development. But because there is great variation in the onset and duration of adolescent physical development, perhaps incorporating a *subjective* measure of physical development could provide a broader understanding of how physical development relates to antisocial and delinquent behaviors.

PRESENT STUDY

The present study builds on the current body of juvenile delinquency literature in two distinct ways. The first is by incorporating a subjective measure of physical development by asking adolescents to self-report their physical development. Physical development has long been measured using objective measures of puberty, such as the onset of menstration (Mrug, Elliott, Gilliland, Grunbaum, Tortolero, Cuccaro & Schuster, 2008), development of pubic hair, or development of male genitalia (Tanner, 1971; Tanner and Whitehouse 1976). Just as subjective measures provided a more robust picture of crime rates and the distribution of the age-crime curve, perhaps including a subjective measure of adolescent physical development might provide a more robust picture of adolescent development and delinquency. The second way in which this study builds to the literature is through broadening Moffitt's theory of the maturity gap and offering that youth measure their proximity to adulthood using the physical development of their peers as an indicator. For example, imagine a 14-year-old male who has begun the physical transition from child to adult. He understands he is not of the same stature of his father, but also recognizes he does resemble his children siblings. Not knowing how close or far away he is to a stature like that of his fathers, perhaps he uses the physical development of his peers as a reference point for where he is developmentally and how close or far he is from adulthood. Given the great influence of peers during adolescence, they are uniquely appropriate to include in a subjective measure of physical development.

The present study uses a self-reported, subjective measure of physical development. That is when youth use their peers as a reference point for physical development, how do they interpret their own development? To the extent that development happens in a bidirectional manner where physical characteristics of an individual influence the environmental response

they receive, the way a youth views his/her own physical development should influence their own behavior (for example, engaging in delinquency). Furthermore, to the extent that Moffitt's theory is correct (i.e., delinquency results from a an attempt to establish oneself as an adult due to the disconnect between physical and social growth), then perhaps it is not any objective biological changes experienced during puberty, but rather the *youth's perception of their overall development compared to those around them* that encourages the maturity gap. Therefore, the study asks the following research question:

RQ1: Do youth who perceive themselves as being 'more developed' than their peers show increased rates of delinquency?

Hypothesis1: Those who perceive themselves as being more developed than their peers will have increased rates of delinquency.

The present study also examines aggregate-level differences by race in adolescent perceptions of their physical development. Recent studies cite evidence that law enforcement officers estimate the age of black youth greater than their true age (Goff et al., 2014). This highlights how the actors in the youth's environment are informed by the youths' physical characteristics. And although the conclusion drawn may be inaccurate, it informs the way they interact with the individual. And if black youths are receiving signals from community members that they are older than their true age, perhaps that might influence the way they view their own development. Therefore, the following research question has been offered:

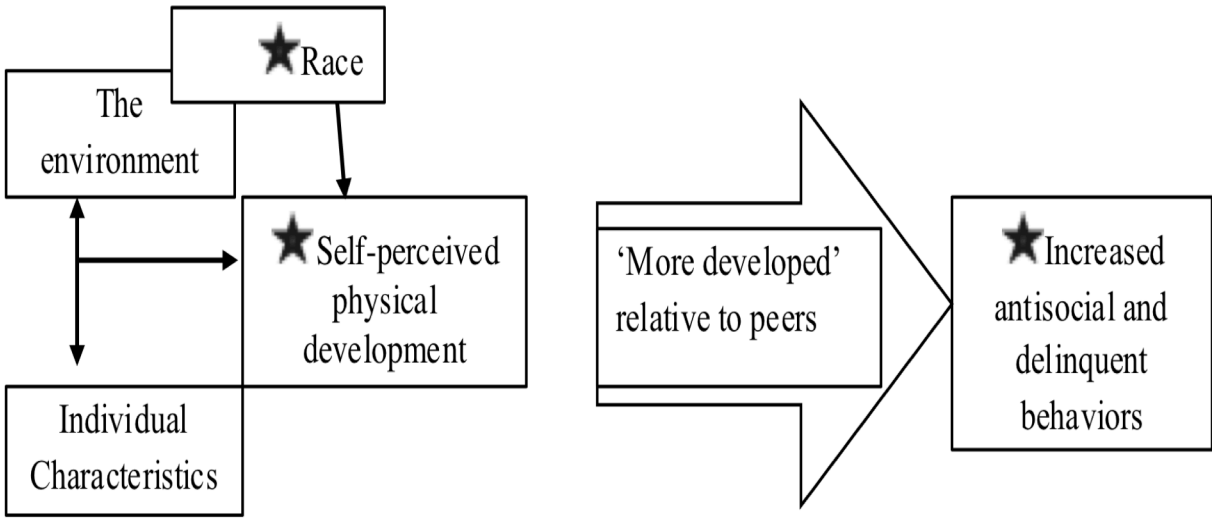
RQ2: At the aggregate level, do youth of color perceive themselves as more physically developed relative to their peers than white youth?

Hypothesis2: At the aggregate level, youth of color will perceive themselves as 'more developed' relative to their peers than white youth.

Theoretical Model

The present study proposes a theoretical model to build upon Moffitt's maturity gap (Figure 3). The model is illustrated below. The concepts being measured in this study have been identified with a star.

Figure 3: Theoretical Model



The far left of the model represents the bidirectional relationship between the environment and the characteristics of the individual. The interaction between the environment and the individual influences youth-perceived physical and social maturity. This is indicated by the arrow going to "self-perceived physical development" from the bidirectional arrow between the environment and the individual characteristics. Adolescent self-perceived development might cause them to experience a maturity gap (disconnected physical and social maturity) using peers as their reference group. This possibility has been indicated by the dotted arrow leaving self-perceived physical development. The large arrow labeled "'more developed' relative to peers" and pointing towards "increased antisocial and delinquent behaviors" is the model for the first

research question. That is, youth who view themselves as ‘more developed’ than their peers will have higher rates of antisocial and delinquent behaviors. “Race” has been added with an arrow leading to “Self-perceived physical development” to account for the second research question in which race is predicted to influence self-perceived development.

METHODS

Data Source

The National Longitudinal Study of Adolescent to Adult Health (Add Health; led by Drs. Harris and Udry) was designed to gather information on adolescent health, behaviors, and socio-contextual factors to gain a better understanding of adolescent development. Of particular interest was how adolescent health and socio-contextual factors influenced adolescent behavior, and the extent to which behaviors expressed during adolescence were related to outcomes in adulthood. The study utilized a longitudinal research design; data were collected over four waves between 1994 and 2008 using both in-home and in-school questionnaires. To date this is the largest survey of adolescents, and has been supported by funders including the National Science Foundation, the National Institute of Health, Centers for Disease Control and Prevention, Office of Public Health and Science, and the Office of the Assistant Secretary for Planning and Evaluation. The dataset is distributed and accessed through the Inter-University Consortium for Political and Social Research (ICPSR; www.icpsr.umich.edu), and was most recently updated it on March 12, 2018.

Add Health uses a nationally representative sample of adolescents between grades 7 and 12 living in the United States during the 1994/1995 school year. After selecting eighty high schools to participate, the study requested that they refer "feeder" schools (a school having sent at least five graduates to the high school) resulting in 80 pairs. Students were eligible for the in-school questionnaire if they attended one of the 132 schools included in the study. The roster of students from the in-school questionnaire was used as the sampling frame for the Wave 1 in-home questionnaire. The in-home questionnaire was administered to a nationally representative

core sample and special oversamples of ethnic groups, disabled persons, social networks, and siblings (Carolina Population Center, 2018).

Analytic Sample

The present study uses data from the public Wave 1 in-home questionnaire of Add Health, collected between April and December of 1995 (Harris and Udry, 2008). The public Wave 1 in-home questionnaire data included 6,504 cases (N=6504). Cases with missing age (N=3), race (N=7), sex (N=1), or peer grade information (N=2214) were dropped from the analysis as these variables will be predictors in the model and informative to the analysis. Participants' who reported being over 17 years old (N=1073) were dropped from the analysis as several of the variables capturing delinquent behaviors or the use of drugs and alcohol are status offenses, and thus only considered a delinquent behavior if committed by youth age 17 or younger. To answer research question one, youth who reported their closest peers being in a different grade-level than themselves (N=1812) were dropped from the analysis so that participants' peer group were uniform. This resulted in an analytic sample of 1858 cases (N=1858) to answer research question one. Note that some cases were missing more than one value and therefore the sum of the missing/refused values does not reflect the number of dropped cases.

For the second research question, cases with missing age (N=3), race (N=7), sex (N=1) were dropped from the analysis, and youth who reported peers in a different grade-level than themselves (N=1812) were included back into the sample so that peer grade could be added as a covariate in the model. This resulted in an analytic sample of 3760 cases (N=3760). Data were analyzed using SPSS Version 25.

Measures

Age. The Add Health data available for public use includes the month, day, and year in which the questionnaire was administered as well as the birth month and year of the participants. To determine the participants' age, two variables were created; 'interview date' and 'birth date'. Subtracting the participants' birth date from their interview date, using month and year, created an age variable that captured their age on the day they were administered the in-home questionnaire. After subtracting the values, the results were truncated such that participants falling below the half-year mark were rounded down in age, and those above the half-year mark were rounded up in age. For example, a youth that was 14.25 years old on the day of their interview would be considered 14 years old in the analytic sample. A youth that was 14.75 years old on the day of their interview would be rounded up to 15 years old in this sample. Truncating age allowed each participant to be designated into a distinct age group. Several items measuring delinquent behaviors are exclusively delinquent to persons under 18, therefore youth over 17 years of age were excluded from the analytic sample (N=1073). The youngest participant identified as 11 years old and the oldest identified as 17 years old. The average age was 14.83 (*SD* = 1.468). For more information, see Table 1.

Race. Computing youth race was informed by the Carolina Population Center at the University of North Carolina-Chapel Hill (a distributor of the Add Health dataset). Youth were asked if they were of Hispanic or Latinx origin (Q: Are you of Hispanic or Latin origin?). If youth indicated 'yes' the participant was categorized as 'Hispanic/Latino' and they were eliminated from the remaining race categories. Following, participants were asked to self-report race using the options 'White', 'Black or African American', 'American Indian or Native American', 'Asian or Pacific Islander', and 'Other" (Q: What is your race?). For each race listed

the participant could indicate either 'yes' or 'no', therefore allowing youth to report being of multiple races. If youth reported their race as 'Black or African American' they were categorized as 'Black or African American' and eliminated from all the following race categories. For example, if a participant reported their race as 'Black or African American' *and* 'White', they would be designated as 'Black or African American' within the race variable. This process was repeated in the following order: Asian, Native American, Other, and White. Youth identifying as 'Hispanic', 'American Indian', 'Asian' and 'Other' were combined into a single category ('Other') as inadequate statistical power precluded the possibility of conducting inferential statistics on these groups separately. Over two thirds of sample youth self-reported their race as 'white' (N=1303), less than one quarter reported being 'Black/African American' (N=350), and the remaining reported being another race (N=205). More detailed information can be found in Table 1.

Because the onset and completion of physical development in Black and Latinx youth happens earlier than their white peers (Emmanuel and Bokor, 2017), an additional race variable was created to account for the varying experiences between white and non-white youth. Youth race was coded as white and non-white where (white=1) and (non-white=0). Youth were designated as 'white' if they reported being *only* white. Youth indicating being from another race or who reported being multi-racial were coded as 'non-white'. When coded as 'White' and 'Non-white', those identifying as 'White' represented over two-thirds of participants (N=1303) and the remaining identified as 'Non-white" (N=555) (see Table 1). When perceived development was tested with the categorical race variable as a covariate in the model, results were not different from another model in which the dichotomous white/non-white was used as the covariate in

predicting antisocial and delinquent behaviors. For interpretation and reporting purposes, the dichotomous race variable (white/non-white) was used for all analyses.

Sex. Youth self-reported their sex as either 'male' or 'female'. Males represent 48.9% of the sample (N=909) and females represent 51.1% (N=949) (Table 1).

Peer Characteristics. The independent variable in this study is 'perception of physical development *relative to peers.*' Therefore, analyses account for the age of the participants' peer group, because the way in which an individual views their physical development might be influenced by a significantly older or younger peer group. Although the Add Health data does not ask participants to identify the age(s) of their peer group, the survey asks participants to identify their best male friend and their best female friend, and later request that the participant report the grade level of these friends, as well as the grade level of the participant (during the 1994/1995 school year). To approximate the age difference between the participant and their closest peers, the average grade-level of their best male and female friend was calculated. The average was calculated by adding the male and female friends grade-level and then dividing by two. The average was then subtracted from the grade-level of the participant. A negative score indicates the peers of the youth averaged a grade-level below the participant, while a positive score indicates the participants' peers averaged a grade-level above the participant. For example, a score of -1 would indicate that the peers of the participant averaged one grade-level below the participant, whereas a score of 1 would indicate the participant's peers averaged one grade-level above the participant. Scores ranged from -5.5 (N=1) to four (N=3) with a mean peer grade-level of.123 (*SD* = .74; see Table 1). Nearly half of the participants reported having peers in their same grade level (N=1858). When engagement in antisocial and delinquent behaviors was tested using peer grade as a covariate, the results were similar to when the model was tested using only youth

who reported peers of the same grade-level. To ease the interpretation of analyses, participants who reported having an older peer group (N=1161) or younger peer group (N=741) were excluded from analyses in research question one. When the second research question was tested using peer grade as a covariate, the model was a better predictor of self-perceived development compared a second model in which youth who reported peers in a different grade-level were excluded from the sample. Therefore, to address the second research question those with peers in a different grade level were added back into the sample, and peer grade difference was included as a covariate.

Perception of Physical Development Relative to Peers. The measure of physical development relative to peers asked participants how advanced their physical development is compared to other youth their age. Female participants were asked "How advanced is your physical development compared to other girls your age?" and male participants were asked "How advanced is your physical development compared to other boys your age?" Youth were asked to report their development using a 5-point Likert scale with options 'I look younger than most, 'I look younger than some', 'I look about average', 'I look older than some', and 'I look older than most'. Male and female responses were combined to produce an overall measure of perceived development compared to peers. There were 15 cases with missing information (N=15), resulting in 1843 valid cases (N=1843). The mean score was 3.25 (*SD* = 1.09; see Table 1).

Table 1:

Descriptive Statistics for Research Question 1, Independent Variables

Variables	*N*	Minimum	Maximum	Mean	SD	%
Age (years)						

Table 1 (cont'd)

Total	1858	11	17	14.83	1.468	100
11	1	-	-	-	-	0.1
12	72	-	-	-	-	3.2
13	352	-	-	-	-	15.5
14	372	-	-	-	-	18.4
15	393	-	-	-	-	21.2
16	353	-	-	-	-	21.9
17	315	-	-	-	-	19.8
Sex						
Male	909	-	-	-	-	48.9
Female	949	-	-	-	-	51.1
Race						
Black	350	-	-	-	-	18.8
White	1303	-	-	-	-	70.1
Other	205	-	-	-	-	11
Race (white/non-white)						
White	1303	-	-	-	-	70.1
Non-White	555	-	-	-	-	29.9
Peer Grade-Level Difference						
Total	3670	-5.5	4	0.123	0.74	100
-5.5	1	-	-	-	-	0
-4	2	-	-	-	-	0.1

Table 1 (cont'd)

-3.5	3	-	-	-	-	0.1
-3	6	-	-	-	-	0.2
-2.5	8	-	-	-	-	0.2
-2	22	-	-	-	-	0.6
-1.5	66	-	-	-	-	1.8
-1	191	-	-	-	-	5.1
-0.5	442	-	-	-	-	11.8
0	1858	-	-	-	-	49.4
0.5	575	-	-	-	-	15.3
1	341	-	-	-	-	9.1
1.5	136	-	-	-	-	3.6
2	77	-	-	-	-	2
2.5	17	-	-	-	-	0.5
3	9	-	-	-	-	0.2
3.5	3	-	-	-	-	0.1
4	3	-	-	-	-	0.1
Perception of Physical Development						
Look younger than most	156	-	-	-	-	8.4
Look younger than some	212	-	-	-	-	11.4
Look about the same	734	-	-	-	-	39.5
Look older than some	506	-	-	-	-	27.2
Look older than most	235	-	-	-	-	12.6

Delinquency. Twenty-four items measured adolescents' engagement in antisocial and delinquent behaviors, including the use of drugs and alcohol. Items were categorized by type of behavior being measured. This resulted in four categories: antisocial behaviors (three items), the use of drugs and alcohol (five items), non-violent delinquent behaviors (eight items), and violent delinquent behaviors (eight items). Per each category, the item responses were combined to create a proportion scale. A fifth proportion scale captured all twenty-four antisocial and delinquency items. A full list of survey items can be found in Appendix A. Participant scores per each item can be found in Table 2.

The *antisocial behaviors proportion scale* included three items and asked questions such as, "In the past 12 months, how often did you lie to your parents or guardians about where you had been or whom you were with?" Antisocial behaviors included lying to parents about whereabouts, running away from home, and being loud or rowdy in public. Youth were asked to report how often they had participated in the activity during the past 12 months using a 4-point Likert scale with options '0 times', '1 or 2 times', '3 or 4 times', and '5 or more times'. Participant responses were recoded such that '1' represented *any participation* in the behavior and '0' represented *no participation* in the behavior. The scores from each item were combined for each participant, resulting in scores that ranged from zero (indicating not having engaged in any of the three items) to three (indicating having participated in each of the three antisocial items). Eleven cases had missing information (N=11); the remaining 1847 cases had valid information (N=1847). Scores ranged from zero (no engagement in any of the behaviors), to three (engagement in each of the three behaviors). The mean score was 1.1 (*SD* = .88; Table 2).

The *use of drugs and alcohol proportion scale* included five items and asked questions such as, "During your life, how many times have you used marijuana". Substances included the

use of cigarettes, alcohol, marijuana, and cocaine. The fifth item asked youth to report how often they have used any other type of illegal drugs, such as LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, or pills without a doctor's prescription. For drug use, participants were asked to report the number of times they used the substance in their lifetime, ranging from zero to 900 times. Participant responses were recoded such that '1' represented *any use of the substance* and '0' represented *no use of the substance*. For cigarette use, participants were asked if they have ever smoked a cigarette, and responses were coded such that '1' represented *has smoked cigarette(s)* and '0' represented *has not smoked.* For alcohol use, the questionnaire asked participants to report if they have had a drink of beer, wine, or liquor more than two or three times in their lifetime. Responses were coded such that '1' represented *have used the substance* and '0' represented *has not used the substance.* The scores from each item were combined for each participant, resulting in scores that ranged from 0 (indicating not having used any of the substances) to 5 (indicating having used each of the substances). Forty-four cases were missing information (N=44), leaving 1814 with valid information (N=1814). Scores ranged from zero (no engagement in any of the behaviors), to five (engagement in each of the behaviors). The mean score was 1.256 (*SD* = 1.2; Table 2).

The youth's *participation in non-violent delinquent behaviors proportion scale* included eight items and asked questions such as, "In the past 12 months, how often did you deliberately damage property that didn't belong to you?" Non-violent delinquent behaviors included graffiti, property damage, stealing something worth less than $50, stealing something worth more than $50, shoplifting, joyriding, burglary, and selling marijuana or other drugs. Youth were asked to report how often they had participated in the activity during the past 12 months using a 4-point Likert scale with options '0 times', '1 or 2 times', '3 or 4 times', and '5 or more times'. When

recoded, a '1' represented *any participation* in the behavior and '0' represented *no participation* in the behavior. Fourteen cases were missing information (N=14), leaving 1844 with valid information (N=1844). Scores ranged from zero (no engagement in any of the behaviors), to eight (engagement in each of the eight behaviors). The mean score was .95 (*SD* = 1.55; Table 2).

The youth's *participation in violent delinquent behaviors* included eight items and asked questions such as, "How often did you hurt someone badly enough to need bandages or care from a doctor or nurse?" Violent delinquent behaviors included pulling a gun or knife on someone, shooting or stabling someone, using a weapon in a fight, carrying a weapon at school, participating in a serious physical fight, participating in a group fight, causing serious harm to another during a fight, and threatening to use a weapon to get something from another. Youth were asked to report how often they had participated in the activity during the past 12 months using a 4-point Likert scale with options '0 times', '1 or 2 times', '3 or 4 times', and '5 or more times'. When recoded, a '1' represented *any participation* in the behavior and '0' represented *no participation* in the behavior. Thirteen cases were missing information (N=13), leaving 1845 with valid information (N=1845). Scores ranged from zero (no engagement with violent delinquency behaviors), to eight (engagement in each of the eight behaviors). The mean score was .87 (*SD* = 1.34; Table 2).

The four aforementioned proportion scales were combined to create an *overall delinquency scale* consisting of 24 items. Participant scores could range from zero (indicating no participation in delinquent and antisocial behaviors) to 24 (indicating having participated in each of the behaviors. Fifty-four cases were missing information (N=54), leaving 1,804 with valid information (N=1804). Scores ranged from zero (no engagement with the antisocial and

delinquent behaviors), to 21 (engagement in twenty-one of the behaviors). The mean score was 4.1 (*SD* = 3.67; Table 2).

Table 2:

Descriptive Statistics Research Question 1, Dependent Variables

Variables	*N*	Minimum	Maximum	Mean	SD	%
Antisocial Behaviors						
Being Rowdy or Loud in Public						
Did not participate	943	-	-	-	-	50.8
Did participate	909	-	-	-	-	48.9
Lie to Parents about Whereabouts						
Did not participate	884	-	-	-	-	47.6
Did participate	965	-	-	-	-	51.9
Runaway from Home						
Did not participate	1746	-	-	-	-	94
Did participate	109	-	-	-	-	5.9
Proportion of Antisocial Behaviors						
Total	1847	0	3	1.07	0.881	99.4
Did not participate	582	-	-	-	-	31.3
Participated in 1 item	622	-	-	-	-	33.5
Participated in 2 items	571	-	-	-	-	30.7
Participated in all items	72	-	-	-	-	3.9
Use of Drugs and Alcohol						
Use of Cigarettes						

Table 2 (cont'd)

Did not use	908	-	-	-	-	48.9
Did use	945	-	-	-	-	50.9
Use of Alcohol						
Did not use	920	-	-	-	-	49.5
Did use	931	-	-	-	-	50.1
Use of Marijuana						
Did not use	1475	-	-	-	-	79.4
Did use	348	-	-	-	-	18.7
Use of Cocaine						
Did not use	1809	-	-	-	-	97.4
Did use	33	-	-	-	-	1.8
Use of other drugs						
Did not use	1745	-	-	-	-	93.9
Did use	95	-	-	-	-	5.1
Proportion of Drug and Alcohol Use						
Total	8414	0	5	1.256	1.2	97.6
Did not use	646	-	-	-	-	34.8
Used 1 item	442	-	-	-	-	23.8
Used 2 items	436	-	-	-	-	23.5
Used 3 items	215	-	-	-	-	11.6
Used 4 items	56	-	-	-	-	3
Used all items	19	-	-	-	-	1

Table 2 (cont'd)

Nonviolent Delinquent Behaviors						
Property damage						
Did not participate	1495	-	-	-	-	80.5
Did participate	355	-	-	-	-	19.1
Graffiti						
Did not participate	1676	-	-	-	-	90.2
Did participate	177	-	-	-	-	9.5
Steal something worth less than $50						
Did not participate	1480	-	-	-	-	79.7
Did participate	373	-	-	-	-	20.1
Steal something worth more than $50						
Did not participate	1762	-	-	-	-	94.8
Did participate	90	-	-	-	-	4.8
Shoplifting						
Did not participate	1429	-	-	-	-	76.9
Did participate	418	-	-	-	-	22.5
Joyriding						
Did not participate	1700	-	-	-	-	91.5
Did participate	155	-	-	-	-	8.3
Burglary						
Did not participate	1764	-	-	-	-	94.9
Did participate	90	-	-	-	-	4.8

Table 2 (cont'd)

Selling Drugs						
Did not participate	1759	-	-	-	-	94.7
Did participate	95	-	-	-	-	5.1
Proportion of Non-Violent Delinquent Behaviors						
Total	1844	0	8	0.95	1.554	99.2
Did not participate	1127	-	-	-	-	60.7
Participated in 1 item	267	-	-	-	-	14.4
Participated in 2 items	186	-	-	-	-	10
Participated in 3 items	104	-	-	-	-	5.6
Participated in 4 items	64	-	-	-	-	3.4
Participated in 5 item	53	-	-	-	-	2.9
Participated in 6 items	27	-	-	-	-	1.5
Participated in 7 items	12	-	-	-	-	0.6
Participated in all items	4	-	-	-	-	0.2
Violent Delinquent Behaviors						
Shot or Stabbed Someone						
Did not participate	1835	-	-	-	-	98.8
Did participate	20	-	-	-	-	1.1
Pulled a Knife or Gun on Someone						
Did not participate	1785	-	-	-	-	96.1
Did participate	70	-	-	-	-	3.8
Used a Weapon in a Fight						

Table 2 (cont'd)

Did not participate	1761	-	-	-	-	94.8
Did participate	93	-	-	-	-	5
Carried a Weapon at School						
Did not participate	1702	-	-	-	-	91.6
Did participate	152	-	-	-	-	8.2
Participated in a Group Fight						
Did not participate	1513	-	-	-	-	81.4
Did participate	340	-	-	-	-	18.3
Participated in a Serious Fight						
Did not participate	1289	-	-	-	-	69.4
Did participate	563	-	-	-	-	30.3
Participated in a Fight Causing Harm						
Did not participate	1539	-	-	-	-	82.8
Did participate	310	-	-	-	-	16.7
Threaten to use a weapon to get something						
Did not participate	1788	-	-	-	-	96.2
Did participate	67	-	-	-	-	3.6
Proportion of Violent Delinquent Behaviors						
Total	1845	0	8	0.87	1.34	99.3
Did not participate	1055	-	-	-	-	56.8
Participated in 1 item	371	-	-	-	-	20
Participated in 2 items	212	-	-	-	-	11.4

Table 2 (cont'd)

Participated in 3 items	113	-	-	-	-	6.1
Participated in 4 items	44	-	-	-	-	2.4
Participated in 5 item	23	-	-	-	-	1.2
Participated in 6 items	11	-	-	-	-	0.6
Participated in 7 items	14	-	-	-	-	0.8
Participated in all items	2	-	-	-	-	0.1
Antisocial and Delinquent Behaviors						
Proportion of Antisocial and Delinquent Behaviors						
Total	1804	0	21	4.1	3.67	97.1
Did not participate	244	-	-	-	-	13.1
Participated in 1 item	246	-	-	-	-	13.2
Participated in 2 items	247	-	-	-	-	13.3
Participated in 3 items	227	-	-	-	-	12.2
Participated in 4 items	171	-	-	-	-	9.2
Participated in 5 item	170	-	-	-	-	9.1
Participated in 6 items	117	-	-	-	-	6.3
Participated in 7 items	114	-	-	-	-	6.1
Participated in 8 items	54	-	-	-	-	2.9
Participated in 9 item	63	-	-	-	-	3.4
Participated in 10 items	30	-	-	-	-	1.6
Participated in 11 items	24	-	-	-	-	1.3
Participated in 12 items	25	-	-	-	-	1.3

Table 2 (cont'd)

Participated in 13 item	20	-	-	-	-	1.1
Participated in 14 items	22	-	-	-	-	1.2
Participated in 15 items	8	-	-	-	-	0.4
Participated in 16 items	6	-	-	-	-	0.3
Participated in 17 item	6	-	-	-	-	0.3
Participated in 18 items	3	-	-	-	-	0.2
Participated in 19 items	3	-	-	-	-	0.2
Participated in 20 items	2	-	-	-	-	0.1
Participated in all items	2	-	-	-	-	0.1

To address the second research question *(at the aggregate level, do youth of color perceive themselves as more physically developed than white youth)*, race was tested as the independent variable and self-perceived physical development as the dependent variable. Age sex, and peer grade were included in the model as covariates. Participants' indicating their closest peers being in a different grade-level were included in the analysis (N=1812) to provide a more robust analytic sample. Cases with missing age (N=3), race (N=7), or sex (N=1) were dropped from the analysis due to their importance as predictor variables in the model, and, for reasons mentioned above, participants over 17 years of age were excluded from analysis (N=1073). This resulted in an analytic sample of 3760 (N=3760). Descriptive statistics for the dependent and independent variables tested in research question 2 can be found in Table 3.

Table 3:

Descriptive Statistics for Research Question 2, Independent and Dependent Variables

Table 3 (cont'd)

Variables	*N*	Minimum	Maximum	Mean	SD	%
Age (years)						
Total	3760	11	17	15.02	1.452	100
11	2	-	-	-	-	0.1
12	120	-	-	-	-	3.2
13	583	-	-	-	-	15.5
14	693	-	-	-	-	18.4
15	796	-	-	-	-	21.2
16	823	-	-	-	-	21.9
17	743	-	-	-	-	19.8
Sex						
Male	1812	-	-	-	-	48.2
Female	1948	-	-	-	-	51.8
Race (white/non-white)						
White	2590	-	-	-	-	68.9
Non-White	1170	-	-	-	-	31.1
Perception of Physical Development						
Look younger than most	319	-	-	-	-	8.5
Look younger than some	398	-	-	-	-	10.6
Look about the same	1445	-	-	-	-	38.4
Look older than some	1051	-	-	-	-	28
Look older than most	509	-	-	-	-	13.5

Table 3 (cont'd)

Peer Grade-Level Difference						
Total	3670	-5.5	4	0.123	0.74	100
-5.5	1	-	-	-	-	0
-4	2	-	-	-	-	0.1
-3.5	3	-	-	-	-	0.1
-3	6	-	-	-	-	0.2
-2.5	8	-	-	-	-	0.2
-2	22	-	-	-	-	0.6
-1.5	66	-	-	-	-	1.8
-1	191	-	-	-	-	5.1
-0.5	442	-	-	-	-	11.8
0	1858	-	-	-	-	49.4
0.5	575	-	-	-	-	15.3
1	341	-	-	-	-	9.1
1.5	136	-	-	-	-	3.6
2	77	-	-	-	-	2
2.5	17	-	-	-	-	0.5
3	9	-	-	-	-	0.2
3.5	3	-	-	-	-	0.1
4	3	-	-	-	-	0.1

RESULTS

The present study examined the relation between adolescents' perceived physical development using peers as their reference group and their engagement in antisocial and delinquent behaviors. To address the first research question (*do youth who perceive themselves as being 'more developed' than their peers show increased rates of antisocial and delinquent behaviors?*) a series of linear regressions were conducted. First, the overall engagement in antisocial and delinquent behaviors will be reported, followed by four sub-categories in the following order: antisocial behaviors, the use of drugs and alcohol, non-violent delinquent behaviors, and violent delinquent behaviors.

*Overall Engagement in Antisocial and Delinquent Behaviors***.** A linear regression tested perceived physical development relative to peers as the independent variable and the proportion scale of twenty-four antisocial and delinquency items as the dependent variable. Age, race (white/non-white) and sex were added to the model as covariates. Self-perceived physical development was a significant predictor of antisocial and delinquent behaviors [$F(4, 1790)=25.93$), $r^2=.055$, $p < .000$; see Table 3], such that youth who perceived themselves as being 'more developed' than their peers engaged in more antisocial and delinquent behaviors when controlling for age, sex, and race. For each unit increase in self-perceived development, youth engagement with antisocial and delinquent behaviors increased by .435 (B=.435, p<.000). That is, when youth reported seeing themselves as 'more developed' than their peers, they expressed higher rates of antisocial and delinquent behaviors increased. Following youth sex (β= -.160, p <.000), self-perceived development relative to peers was the strongest predictor of antisocial and delinquent behaviors in the model (β=.128, p <.000). Youth age (β=.092, p <.000)

and race (β= -.058, p <.012) were also significant predictors of antisocial and delinquent behaviors.

Table 4:

Linear Regression – Grade difference filtered out, race as white/non-white

	Antisocial and Delinquent Behaviors					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Perceived development relative to peers	.435**	.078	.128	5.57	.000	[.282 - .588]
Sex	-1.173**	.169	-.160	-6.928	.000	[-1.505 - -.841]
Age	.229**	.058	.092	3.967	.000	[.116 - .342]
Race (White/Non-White)	-0.464**	.185	-.058	-2.509	.012	[-.826 - -.101]
Constant	1.4					
R Square	0.055					
R Square SE	3.573					
df	4					

*Note. **p<.05*

Antisocial Behaviors. A linear regression tested perceived physical development relative to peers as the independent variable and the proportion of antisocial behaviors as the dependent variable. Age, race (white/non-white) and sex were added to the model as covariates. Self-perceived physical development was a significant predictor of antisocial and delinquent behaviors [F(4, 1831)=9.226), r^2=.02, p < .000; see Table 4]. As youth reported being more

developed, their rates of antisocial behaviors increased by .069 (B= .069, p< .000). Youth sex and race were not significant predictors in the model.

Table 5:

Linear Regression – Grade difference filtered out, race as white/non-white

	Antisocial Behaviors					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Perceived development relative to peers	.069**	0.019	0.085	3.659	.000	[.032 - .106]
Sex	-0.063	0.045	-0.033	-1.414	.158	[-.151 - .024]
Age	.063**	0.014	0.105	4.517	.000	[.036 - .090]
Race (White/Non-White)	0.028	0.041	0.016	0.688	.492	[-.052 - .108]
Constant	-0.082					
R Square	0.02					
R Square SE	0.873					
df	4					

*Note. *p<.05*

Use of Drugs and Alcohol. A linear regression tested perceived physical development relative to peers as the independent variable and the proportion of drug and alcohol use as the dependent variable. Age, race (white/non-white) and sex were added to the model as covariates. Self-perceived physical development was a significant predictor of the use of drugs and alcohol [F(4, 1799)=44.54), r^2=.09, p < .000; see Table 5], such that for every unit increase in perceived development youth use of drugs and alcohol increased by .128 (B=.128, p<.000).

Table 6:

Linear Regression – Grade difference filtered out, race as white/non-white

	Use of Drugs and Alcohol					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Perceived development relative to peers	0.128**	0.025	0.116	5.12	.000	[-.079 - .178]
Sex	0.129**	0.059	0.049	2.172	.030	[.013 - .245]
Age	0.214**	0.019	0.26	11.513	.000	[.177 - .250]
Race (White/Non-White)	-0.115**	0.054	-0.048	-2.11	.035	[-.221 - -.008]
Constant	-2.24					
R Square	0.09					
R Square SE	1.151					
df	4					

*Note. **p<.05*

Non-Violent Delinquent Behaviors. A linear regression tested perceived physical development relative to peers as the independent variable and the proportion of non-violent delinquent behaviors as the dependent variable. Age, race (white/non-white) and sex were added to the model as covariates. Self-perceived physical development was a significant predictor of non-violent delinquent behaviors [F(4, 1828)=13.995), r^2=.03, p < .000; see Table 6], such that as youth reported being more developed, their rates of antisocial behaviors increased by .138 (B= .138, p< .000). Unique to this test, race was the best predictor of non-violent delinquency (β=-.143, p <.000), followed by perceived development relative to peers (β=.096, p <.000). Non-

white youth were more likely than their white peers to engage in non-violent delinquent behaviors. Youth sex and age were not significant predictors of non-violent delinquent behaviors.

Table 7:

Linear Regression – Grade difference filtered out, race as white/non-white

	Non-Violent Delinquent Behaviors					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Perceived development relative to peers	.138**	0.033	0.096	4.165	.000	[.073 - .203]
Sex	-0.077	0.079	-0.023	-0.977	0.329	[-.231 - .077]
Age	0.009	0.025	0.009	0.376	0.707	[-.039 - .057]
Race (White/Non-White)	-0.446**	0.072	-0.143	-6.205	.000	[-.587 - -.305]
Constant	1.095					
R Square	0.03					
R Square SE	1.534					
df	4					

*Note. *p<.05*

Violent Delinquent Behaviors. A linear regression tested perceived physical development relative to peers as the independent variable and the proportion of violent delinquent behaviors as the dependent variable. Age, race (white/non-white) and sex were added to the model as covariates. Self-perceived physical development was a significant predictor of antisocial and delinquent behaviors [F(4, 1830)=45.047), r^2=.09, p < .000; see Table 7]. Males and non-white

youth were more likely to engage in violent delinquent behaviors. As youth reported being more developed, their rates of antisocial behaviors increased by .133 (B= .113, p< .000). As youth increased in age, they were less likely to engage in violent delinquent behaviors (B=-.052, p<.011).

When antisocial behaviors and drug and alcohol use were tested as the dependent variable, age was the strongest predictor of engagement in antisocial and delinquent behaviors, followed by perception of physical development relative to peers. However in each model tested, perceived physical development was a significant predictor of antisocial and/or delinquent behaviors, suggesting that youth who perceive themselves as 'more developed' relative to their peers do, in fact, show increased rates of antisocial and delinquent behaviors. Youth race was a significant predictor of antisocial and delinquent behaviors in each model tested except for when antisocial behaviors were tested as the dependent variable. Youth sex was only a significant predictor when violent delinquent behaviors and use of drugs and alcohol were tested as the dependent variable.

Table 8:

Linear Regression – Grade difference filtered out, race as white/non-white

	Violent Delinquent Behaviors					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Perceived development relative to peers	.133**	0.028	0.108	4.817	0	[-.079 - .178]
Sex	-.659**	0.06	-0.245	-10.956	0	[-.777 - -.541]
Age	-.052**	0.02	-0.057	-2.551	0.011	[.092 - - .012]
Race (White/Non-White)	-0.445**	0.066	-0.152	-6.774	0	[-.574 - -.3168]

Table 8 (cont'd)

Constant	2.522
R Square	0.09
R Square SE	1.284
df	4

*Note. **p<.05*

To address the second research question *(at the aggregate level, do youth of color perceive themselves as more physically developed than white youth?*) a linear regression tested perceived physical development relative to peers as the dependent variable and race, coded as white and non-white, as the independent variable. Youth sex, age, and peer grade were added to the model as covariates.

Table 9:

Linear Regression, race as white/non-white

	Self-perceived Physical Development					
Predictor	*B*	*SE B*	*Beta*	*t*	*p*	*95% CI*
Race (White/Non-White)	.242**	0.038	0.102	6.297	.000	[.167 - .318]
Sex	.073**	0.036	0.033	2.010	.044	[.002 - .144]
Age	.021	0.012	0.028	1.689	0.091	[-.003 - .045]
Peer Grade	.127**	.025	.085	5.158	.000	[.079 - .175]
Constant	2.670					
R Square	0.019					
R Square SE	0.018					

Table 9 (cont'd)

	df	4
*Note. **p<.05*		

Race was a significant predictor of self-perceived physical development [F(4, 3670)=2.670), r^2=.019, p < .000; see Table 8], such that white youth reported being more developed relative to their peers than did their non-white counterparts (B= .242, p< .000). While race was the strongest model predictor of self-perceived development (β=.102, p <.000), sex of the participant was also significantly associated with self-perceived development, such that females perceived themselves as more physically developed relative to their peers relative to males (β=.073, p <.005). Peer grade-level predicted self-perceived development such that those who reported having peers in a higher grade-level than themselves were more likely to perceived themselves as more developed relative to their peers (β=.127, p <.005). Age was not a significant predictor of self-perceived physical development.

DISCUSSION

This study adds empirical nuance to Moffitt's developmental taxonomy by expanding the present understanding of how adolescents measure their physical development, and how that might relate to antisocial and delinquent behaviors. Moffitt suggests youth feel a disconnect between their physical and social maturity. That is, youth begin seeing themselves as adult-like in appearance yet are restricted from benefits associated with adulthood. As a means to obtaining some benefit, youth engage in antisocial and delinquent behaviors. However, Moffitt's theory suggests that youth are measuring their physicality against an adult physicality to determine their physical maturity. The present study uniquely suggested that perhaps when youth approximate their physical maturity they are not so much comparing their physicality to that of an adult, but rather use peers as the reference group to determine their proximity to adulthood. As youth perceive themselves as 'more developed' than their peers, it indicates they are closer in proximity to adulthood, and thus adds to the strain felt by the adolescent and perhaps results in a youth more inclined to engage in antisocial and delinquent behaviors. To test this idea empirically, a subjective measure of physical development was employed using peers as the reference group.

Self-Perceived Physical Development and Delinquency

The present study tested the relation between self-perceived physical development and self-reported antisocial and delinquent behaviors. The first hypothesis-- that youth who reported being more developed than their closest peers would report increased antisocial and delinquent behaviors-- was supported. The study further tested if self-perceived physical development could predict engagement in different offense types (i.e., antisocial behaviors; use of drugs and alcohol; non-violent delinquency; violent delinquency). Results suggested similar findings. That is,

whether it be a minor offense like running away or more serious violent crime like having shot someone, as youth reported feeling more developed relative to their peers they were more likely to engage with antisocial and delinquent behaviors.

Self-perceived physical development predicted drug and alcohol use, over and above the effects of sex and race. The current state of the literature on adolescent body-image relative to peers and drug and alcohol use is scarce; however some studies suggest that delinquency precedes drug use in adolescence (Kandel, Simcha-Fagen, & Davies, 1986; Kandel, Kessler, & Margulies, 1978; Elliott, Huizinga, & Menard, 2012). The present study argued that self-perceived physical development predicted antisocial and delinquent behaviors, like under-age drinking. However, prior findings raise a theoretical question to be noted. *Could adolescent participation in antisocial and delinquent behaviors influence self-perceived physical development, which then influences adolescent use of drugs and alcohol?* Albeit contrary to the theoretical position of the present study, the idea that antisocial behaviors predict self-perceived physical development might also find empirical support. Imagine an adolescent receives negative attention from family, peers, community members, or law enforcement and court officials after engaging in delinquent behaviors. The community response might indicate the behavior is a benefit reserved for adulthood. As youth gauge their proximity to adulthood using peers as a reference point, adolescents make a determination as to whether they are 'deserving' or 'undeserving' of said benefit. Therefore the mechanism behind self-perceived physical development and delinquency is not that youth compare their development to their peers, estimate the proximity to adulthood, *and then* participate in antisocial and delinquent behaviors as the present study suggested. But rather, a communal response to antisocial behaviors triggers youth to compare their development to similarly-aged peers to approximate their distance to

adulthood, perceive themselves as more physically developed and therefore closer to adulthood, and continue to engage in crime as a means to obtaining the benefit. This could be especially true for court-involved youth because (1) they are met with direct consequences for the antisocial or delinquent behavior, and (2) the court structure and processes feel adultlike. Therefore, court-involved youth might view themselves more mature than their peers who have not been involved with the justice system, although both groups engage in similar antisocial and delinquent behaviors. Further longitudinal studies should look at measures of self-perceived development relative to peers prior to and after engaging in delinquent behaviors to inform the mechanisms of self-perceived physical development and delinquency.

The research presented on delinquency and drug and alcohol use have direct policy implications for implementing drug and alcohol prevention strategies to a targeted population. Studies suggested low-level delinquency and youth who perceived being more physically developed than their peers were more likely to engage in drug and alcohol use. Therefore, drug and alcohol prevention strategists' would benefit by using early antisocial or delinquency behaviors to identify candidates for targeted drug and alcohol prevention. Drug and alcohol prevention programs should consider implementing a measure of self-perceived physical development to determine youth at-risk of using drugs and alcohol and to monitor their progression throughout the program.

Age was tested in the model as a covariate and was the strongest predictor for antisocial behaviors. The three items that measured antisocial behavior (i.e. running away from home; lying to parents about whereabouts; and being loud or rowdy in a public place) captured behaviors that many adolescents exhibit without going on to engage in more serious delinquent behaviors. As youth age, it becomes more likely that they will have engaged in one or more of

the antisocial items measured in the study. As participants reported being older, they were more likely to report engaging antisocial behaviors. Future studies that include more diverse antisocial behaviors or measure the pervasiveness of such behavior might produce different results. Age was also the strongest predictor for the use of drugs and alcohol. Several of the items measuring the use of drugs and alcohol are status offenses (e.g. cigarettes, beer, wine, liquor) and only illegal for persons under the designated age of consumption. As youth near the legal age of consumption, using the substance may be perceived to be less risky. This would align with findings from a longitudinal study conducted between 1975 and 2008 that suggested 12th grade students did not view binge drinking (i.e. having five or more drinks in a row once in the past two weeks) on weekends as having a great risk (Johnston, 2010). For example a 17 year old smoking a cigarette might not have the same anxiety about getting caught by authorities that a 12 year old in the same position might. If youth are more inclined to partake in the activity because they are closer to the legal age, it's a reasonable conclusion that age acts as a predictor of drug and alcohol use. Yet this fails to explain why age would be the strongest predictor the use of illicit drugs measured in the study (i.e. cocaine, LSD, heroin). Future studies should disentangle how well age can predict drug use of different types. Age was *not* a significant predictor for non-violent delinquency. Moffitt's developmental taxonomy suggested adolescent-limited offenders engage in non-violent delinquent behaviors for a short period of time during adolescence and desist into adulthood. She adds that adolescent limited delinquent behavior is sporadic compared to life-course persistent offenders, who tend to have a continuous pattern of offending. That is, an adolescent-limited offender might steal a candy bar from the corner store when they are 11 years old, and then paint graffiti with a group of peers at 16 years old. Both delinquent events are sporadic in the adolescent's life-course, whereas a life-course persistent offender who is more

inclined to engage in violent delinquency might be in a group fight at 12, shoplift at 14, and bring a weapon to school at 16. It might be inferred that when non-violent delinquency was tested as the dependent variable results captured mostly adolescent-limited offenders, who tend to engage in non-violent offending. Thus, due to their sporadic offending, it was expected that age would not be a significant predictor of non-violent delinquent behaviors.

When sex was tested as a covariate in the model, it was the strongest predictor of overall antisocial and delinquent behaviors. This finding aligns with official records from the Department of Justice, which report that 1,543 females and 3,522.6 males per 100,000 persons aged ten to seventeen were arrested in 2016 (OJJDP, 2017). Overall, males tend to engage with delinquency at a higher rate than females. Above all other covariates (i.e. self-perceived physical development; age; race) sex was the strongest predictor in overall self-reported engagement in antisocial and delinquent behaviors. When sex was added as a covariate to test engagement in violent delinquency, sex the *strongest* predictor such that males were more likely to report engaging in violent delinquent acts compared to females. Because males make up the majority of violent adolescent offending, it is not surprising that sex was the strongest predictor for self-reported violent offending. Sex was added as a covariate to the model testing engagement in antisocial behavior. It was not a significant predictor. As aforementioned, this could be a reflection of the limited items used to measure antisocial behaviors, but it is possible it indicated the behaviors measures are typical adolescent behaviors experienced across sexes such that sex could not predict antisocial behaviors. When sex was entered into the model test non-violent behaviors, sex was not a significant predictor. This aligns with prior research which suggested female delinquency is often through non-violent delinquent behaviors, like property offenses (Zahn, Anew, Fishbein, Miller, Winn, Dakoff, & Feld, 2010). Because females engage

with more non-violent delinquency than violent delinquency, we would not expect sex to predict non-violent delinquency. When it came to non-violent offending neither males nor females were more likely to have reported engaging in the behavior. Findings from the present study reaffirmed the need for gender-specific responses from law enforcement, treatment and programming due to male and female distinct offending trends.

The non-violent delinquency scale was the only offense type in which race (white/non-white) was the strongest predictor, and indicated that non-white youth were more likely to report having engaged in non-violent delinquent behaviors. This finding could point to a discrepancy in participants' survey responses such that non-white youth were more likely to report offending than their white counterparts. Further studies should examine difference by race in predicting non-violent delinquency and differences in self-reports by race.

This study also adds methodological nuance to the study of delinquency through Moffitt's theoretical lens. The present study tested and found support for a subjective measure of physical development. Further, the subjective measure applied incorporates the influence of peers in decision-making and self-conceptualization during adolescence. The social and physical aspects of adolescent development call for academics and researchers to consider not only biological markers of physical development but the social components as well. How are youth interpreting this period of rapid physical development, and how might that relate to their outward behavior? Future studies should consider using both objective and subjective measures of adolescent physical development get a more robust picture of the adolescent experience and what influences the peak in the age-crime curve. Additional longitudinal studies should be conducted that capture biological markers *and* subject measures of physical development, such as how youth view their development relative to their peers, to examine how biomarkers and subjective

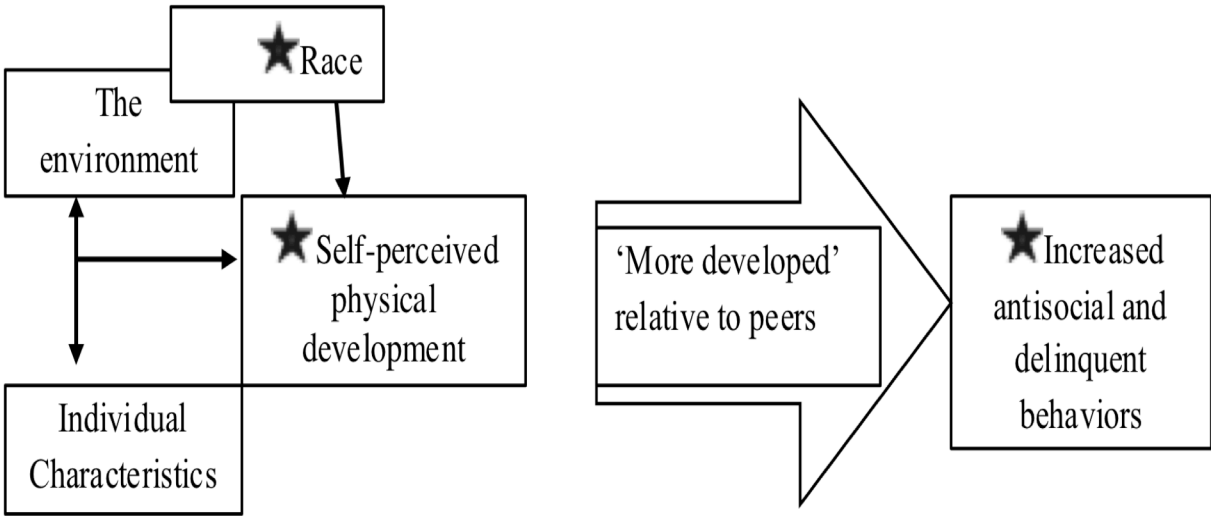
markers interact with one another. Also it might be of interest to measure adolescence self-perceived development relative to their peers as well as relative to other adult figures in their life. This could aid in disentangling the mechanisms behind Moffitt's maturity gap and help decipher the reference group youth consider when determining their physical maturity.

Aggregate-Level Differences by Race

The second research question asked if there were group differences between white and non-white youth in how they view their physical development relative to their peers. Prior research suggests that community members tend to view non-white youth as older than their white counterparts (Goff et al., 2014). Given the bi-directionality between the environment and the individual, it was hypothesized that this would influence how non-white youth view themselves. Because black youth are seen as older by community members when compared to white youth it was hypothesized at the aggregate level that non-white youth would perceive themselves as more developed compared to white youth. The hypothesis was not supported – at the aggregate level white youth viewed themselves as more developed relative to their peers compared to non-white youth. However, race was the strongest predictor of self-perceived development relative to peers. The collapsed race categories could have influenced the results, as less research has been conducted on self-perceptions and community perceptions of Asian, Native American, Lantinx, and other non-white youth.

Theoretical Model

Figure 4: Theoretical Model



A theoretical model was offered for the present study. To the left is the bidirectional relationship between the environment and individual characteristics. The interaction between the environment and the individual influences youth-perceived physical maturity as indicated by the arrow going to "self-perceived physical development" from the bidirectional arrow between the environment and the individual characteristics. Adolescent self-perceived development leads to a maturity gap (disconnected physical and social maturity) using peers as their reference group. The large arrow labeled "'more developed' relative to peers" and pointing towards "increased antisocial and delinquent behaviors" modeled the first research question, *do youth who view themselves as 'more developed' than their peers have higher rates of antisocial and delinquent behaviors*. "Race" was added to "Self-perceived physical development" to account for the second research question in which race is predicted to influence self-perceived development. The pieces of the model tested have been marked with a star.

The model tested if youth who reported their self-perceived physical development as being more developed than their peers would experience increased antisocial and delinquent behavior. The model was supported; youth who reported being more developed relative to their peers did show increased antisocial and delinquent behaviors. When race was tested into the model under research question two – *are there aggregate level differences in how youth view their physical development relative to their peers*, the model was supported, yet the hypothesis was not. There were differences in how white youth and non-white youth reported their physical development relative to their peers.

CONCLUSION

The age-crime curve is a well-documented phenomenon in criminology. The sharp incline in offending that peaks during late adolescence and then declines steadily throughout adulthood has left many theorists wondering who makes up the curve and what influences increased offending during adolescence. Moffitt's developmental taxonomy posited that there are two distinct types of offenders, the adolescent limited and life-course persistent, and their reasons for offending are quite different. Pertaining to this study, Moffitt suggested the adolescent-limited offender engages with delinquency as a result of a maturity gap; in which youth perceive a disconnect between their physical and social maturity. Yet most empirical studies have concentrated the measurement of physical maturity around biomarkers, such as the onset of menstruation or development of facial hair. This study is unique in offering that (1) the conceptualization of the maturity gap is limited in theorizing *how* adolescents relate their physical development to adult physicality and (2) subjective measures of physical development can provide a deeper understanding of the relation between physical development and delinquency than biomarkers can alone.

It is possible that adolescence employ a different mechanism to determine their proximity to adulthood than the mechanism offered by Moffitt. She suggested youth compare their physicality to adult physicality to determine their proximity to adulthood. This study suggested that adolescence use their peers as a reference point to determine their proximity to adulthood. If adolescents' use peers as a reference point for interpreting their physical development, further studies would benefit by including a subjective measure of physical development in which adolescence are asked to report their development relative to their peers. Furthermore, future research should examine differences in how youth perceive their development relative to adults

versus their peers versus other groups in which youth interact. On the other hand, it might be important to examine how different groups in the community perceive the growing adolescent. Does a parent interpret a developing adolescent differently than a stranger would? Additionally, subjective measures of adolescent development should be considered in tandem with biomarkers of physical development to broaden our understanding of the relation between physical development and delinquency. When subjective measures were included in the examination of the age and crime relationship a more robust picture of juvenile crime was produced. In the same way, perhaps adding subjective measures to studies of physical development and delinquency could broaden our understanding of the relation between physical development and delinquency. Lastly, if we are interested in gaining an understanding of *why* self-perceived development might predict delinquent behavior, qualitative studies should be employed. A greater understanding of development and delinquency has the potential for better-informed policies and practices as they relate to antisocial and delinquent youth.

Support for a subjective measure of physical development was found when the present study tested a subjective measure of development – self-perceived physical development –and found it to be a predictor to participation in antisocial and delinquent behaviors. Youth who reported feeling more developed compared to their peers were more likely to engage in antisocial and delinquent behaviors. This was true across offense type. The ability of self-perceived development in predicting antisocial and delinquent behaviors makes a strong argument for including subjective measures of development into our understanding of adolescent development and delinquency.

A central assumption of the present study is that the environment and the individual have a bidirectional relationship. Therefore it was important to consider the different messages youth

might receive from their environment. Perhaps the starkest comparisons result in the community reaction to white and non-white youth, which can be critical to the outcomes of youth. The study took an interest in examining aggregate-level difference by race in how youth perceived their physical development relative to their peers. It was thought that because the environment sends messages to the individual and vice versa, the messages might influence how youth self-perceive their physical development. Results suggest there were aggregate-level differences by race. Further inquiry should disentangle the mechanisms that inform one's self-perceived physical develop.

So, is it worth re-examining the conceptualization of Moffitt's theoretical maturity gap? The present study suggested there is benefit to reconsidering how we operationalize physical development and think about the relation between physical development and delinquency. How do youth perceive their physical development and in relation to whom? What influences this perspective? Answers to these questions might provide a more informed understanding of the relationship between age and crime. What is it about this developmental period that accounts for increased offending? Research is currently restricted to relating biomarkers of physical development to delinquency. As argued here, perhaps a subjective measure of physical development could be useful to understanding the mechanisms through which youth interpret their development and how that relates to their engagement with antisocial and delinquent behaviors.

APPENDIX

Table 10: Questionnaire Items				
Section	**Item #**	**Item**	**Variable**	**Delinquency Category**
1	1	What is your birth date? [month and year]	Birth Date	
1	4	Are you of Hispanic or Latino origin?	H1GI4	
1	6	What is your race? You may give more than one answer.	H1GI6A	
1	20	What grade [ARE/WERE] you in?		
20	1	Asked to nominate 1 male and 1 female friend	FR_FLAG	
20	3	[If SCHOOL YEAR:] What grade is [NAME] in?	H1MF3A	
		[If SUMMER:} What grade was {NAME} in during the 1994-1995 school year?		
20	3	[If SCHOOL YEAR:] What grade is [NAME] in?	H1FF3A	
		[If SUMMER:} What grade was {NAME} in during the 1994-1995 school year?		

Table 10 (cont'd)

28	1	Have you ever tried cigarette smoking, even just 1 or 2 puffs?	H1TO1	Drug/Alcohol Use
28	12	Have you had a drink of beer, wine, or liquor - not just a sip or a taste of someone else's drink - more than 2 or 3 times in your life?	H1TO12	Drug/Alcohol Use
28	31	During your life, how many times have you tried marijuana?	H1TO31	Drug/Alcohol Use
28	35	During your life, how many times have you tried cocaine?	H1TO35	Drug/Alcohol Use
28	40	How old were you when you first tried any other type of illegal drug, such as LSD, PCP, ecstasy, mushroms, speed, ice, heroin, or pills without a doctor's prescription? If you never tried any other type of illegal drug, enter "0".	H1TO40	Drug/Alcohol Use

Table 10 (cont'd)

29	1	In the past 12 months, how often did you paint graffiti or signs on someone else's property or in a public place?	H1DS1	Non-Violent Delinquency
29	2	In the past 12 months, how often did you deliberately damage property that did not belong to you?	H1DS2	Non-Violent Delinquency
29	3	In the past 12 months, how often did you lie to your parents about where you had been or whom you were with?	H1DS3	Antisocial Behavior
29	4	How often did you take something from a store without paying for it?	H1DS4	Non-Violent Delinquency
29	5	How often did you get into a serious physical fight?	H1DS5	Violent Delinquency

Table 10 (cont'd)

29	6	How often did you hurt someone badly enough ot need bandages or care from a doctor or nurse?	H1DS6	Violent Delinquency
29	7	How often did you run away from home?	H1DS7	Antisocial Behavior
29	8	How often did you drive a car without its owner's permissio?	H1DS8	Non-Violent Delinquency
29	9	In the past 12 months, how often did you steal something worth more than $50?	H1DS9	Non-Violent Delinquency
29	10	How often did you go into a house or building to steal something	H1DS10	Non-Violent Delinquency
29	11	How often did you use or threaten to use a weapon to get something from someone?	H1DS11	Violent Delinquency
29	12	How often did you sell marijuana or other drugs?	H1DS12	Non-Violent Delinquency
29	13	How often did you steal something work less than $50?	H1DS13	Non-Violent Delinquency

Table 10 (cont'd)

29	14	In the past 12 months, how often did you take part in a fight where a group of your friends was against another group?	H1DS14	Violent Delinquency
29	15	How often were you loud, rowdy, or unruly in a public place?	H1DS15	Antisocial Behavior
30	25	Have you ever carried a weapon at school?	H1JO25	Violent Delinquency
30	26	Have you ever used a weapon in a fight?	H1JO26	Violent Delinquency
31	7	In the past 12 months, how often did you pull a knife or gun on someone?	H1FV7	Violent Delinquency
31	8	You shot or stabbed someone	H1FV8	Violent Delinquency
32A	6	How advanced is your physical development compared to other boys your age?	H1MP6	
32B	6	How advanced is your physical development compared to other girls your age?	H1FP4	

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