

Same crime, same time? Differences in visual maturity affect opinions of adolescent culpability

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Abstract

Early pubertal maturation is associated with earlier contact with the juvenile justice system. In two studies (Total $N = 782$), we examined whether youth presumed to have committed a crime and who appear physically older than their chronological age were held to different standards of legal responsibility while accounting for race and sex. Participants read a vignette detailing situations in which a crime was committed and decided whether to call the police (Study 1) or make sentencing recommendations (Study 2). Participants were more likely to call the police on youth who appeared more physically developed and on boys. Less visibly mature youth and girls were assigned behavioral explanations that deemphasized agency. White youth were sentenced to more hours of community service than Black youth. We discuss potential implications of these findings in real-world contexts such as police decision-making.

KEY WORDS

adolescence, juvenile justice, puberty, race, sex

1 | INTRODUCTION

First contact experiences with the juvenile justice system begin to increase during early adolescence. Prior work indicates that first arrest rates increase around 12 years of age (Lau et al., 2018). This timing corresponds with the onset of puberty, a developmental transition that creates a period of contrast in which youth of the same age can look extremely different from each other depending on the relative timing of their pubertal changes. Maturing earlier than same-age peers (i.e., early pubertal timing) is associated with increased rates of delinquency and earlier contact with the juvenile justice system (Leve & Chamberlain, 2004; Negriff et al., 2011). Understanding risk for early contact with the juvenile justice system is important because first arrests in earlier life are linked to greater risk of recidivism throughout adolescence and into early adulthood, which in turn may carry long-term consequences including worse physical and mental health in adulthood (Bersani et al., 2022).

While the relationship between early pubertal timing and contact with the juvenile justice system has been examined in concert with family environment, neighborhood effects, and peer influences (Negriff & Susman, 2011), we propose that it may also be possible that greater

visible maturation associated with early pubertal timing may induce a bias such that early-maturers are perceived as more blameworthy because they appear physically older than their chronological age. Such a bias may interact with race and sex, and differences in the average timing of pubertal development across these groups may put Black youth at risk of being perceived as older than same-age White youth. The present studies examined whether maturation bias and perceptions of maturation level interact with race and sex to influence how youth are perceived during different stages of the juvenile justice process. Unlike the majority of research on pubertal timing, which uses behavioral reports from youth or parents, the present paper leverages an experimental design to capture a rarely studied angle: the judgments, beliefs, and attitudes that adults with legal power hold about youth.

1.1 | Mismatched perceptions of early-maturing youth

Youth who experience the onset of puberty earlier than same-age peers are considered to be early-maturers. Since early-maturers look

more physically developed than their same-age peers, they may be perceived as older than their chronological age. The discrepancy between visible physical maturity and chronological age can create opportunities for early-maturers to experience mismatched expectations from adults such that early-maturers are considered more responsible for their actions compared to their later-maturing peers based on a seemingly older visual appearance (Ge et al., 2002; Reynolds & Juvonen, 2011). Prior findings point to multiple social domains that are affected by the mismatched expectations created by pubertal timing, including relationships with parents and expectations from teachers (Carter et al., 2017; Savin-Williams & Small, 1986). In the present article, we seek to extend prior findings by examining whether mismatched expectations contribute to the greater contact rates early-maturers experience with the juvenile justice system.

The idea that adults may perceive more visibly mature youth as older than their chronological age has received little direct empirical testing in recent years. Early empirical work suggested that more mature-looking youth may be perceived differently by peers, parents, familiar and unfamiliar adults, and that parents respond to puberty by treating mature-looking adolescents in a more adultlike manner compared to their less visibly mature counterparts. For instance, Johnson and Collins (1988) found that teachers and parents were more synchronous in how they rated the physical and social maturity of adolescents whom they already knew. However, adults were more likely to estimate that more mature-looking youth were older than their age when considering unfamiliar adolescents. Steinberg (1987) found that parents granted more behavioral autonomy to adolescents who were more advanced in their pubertal development regardless of chronological age and whether or not the youth had earlier or later pubertal timing. This suggests that looking more physically mature may lead adults to perceive youth as more psychosocially mature and independent.

Theoretical work corresponds with empirical support for the influence of physical maturation on others' perceptions. Eichorn (1975) proposed that asynchronies in physical development may create different academic and social experiences for early maturing youth, such as being perceived as more socially mature by peers than is warranted by their chronological age, given that cognitive and emotional maturity do not necessarily correspond with physical development. While this maturity gap may affect early matures' own perceptions of themselves and reactions in their social environments, it may also influence how others in their social environments interact with them.

Studies with mock jurors indicate that adults tend to perceive chronologically older adolescents to be more legally responsible for their actions compared to younger adolescents. Clough (2020) found that culpability outcomes were not impacted by information that indicated whether the adolescent in question had a high or low psychosocial maturity level for their age. Rather, chronologically older adolescents were perceived as more culpable than younger adolescents. Further, Scott et al. (2006) found that facial maturity did not influence mock jurors' likelihood of prosecuting a male adolescent for a violent crime. Rather, mock jurors were likely to be more lenient toward 12-year-old

males than they were toward 15- and 20-year-old males regardless of whether their faces looked "typical" or "mature." Notably, only facial maturity was varied in the experimental stimuli of this study. Body composition was not varied across facial maturity levels or across chronological age groups. Since puberty is associated with sweeping physical changes that include increases in height, weight, and muscle, it is possible that this lack of body variation muddled the effect of physical maturity differences since mock jurors may have perceived both facial maturity conditions to be similar in their physical development.

In addition, precedent for a visible maturation bias in the juvenile justice process can be derived from psycholegal literature on facial maturity bias. Facial maturity bias, or baby-face bias, describes the finding that adults with more baby-like features are perceived by others to have more childlike qualities like kindness and honesty (Berry & Zebrowitz-McArthur, 1988). Adults with more baby-faced features are perceived as less responsible for their actions and as having less malicious intent in certain crime contexts (Zebrowitz & McDonald, 1991). Given the established influence of perceived maturity in adult courts, it is possible that mismatched perceptions of physical maturity relative to chronological age may lead to harsher decisions regarding adolescents in various legal contexts. We propose that perceptions of physical development including the entire body, not just than just the face, may be especially relevant during adolescence given typical differences in the timing and synchrony of physical changes during this period.

1.2 | Maturation bias, race, sex, and the juvenile justice system

Adults' perceptions and expectations regarding adolescents vary by the race and sex of youth, and, further, the timing of pubertal development also varies by race and sex. Black youth may be at an increased risk compared to White youth for mismatched expectations related to their chronological age. Both Black girls and boys tend to enter puberty earlier than White peers (Susman et al., 2010), which may translate to adults perceiving Black youth to be older or more adult-like than is appropriate for their chronological age. Prior findings suggest that Black boys are perceived as older and more likely to be guilty than White boys by the age of 10 years (Goff et al., 2014), and that Black girls between the ages of 10–14 years are perceived as more adult, in less need of protection, and as less innocent than same-aged White girls (Epstein et al., 2017).

These mismatched perceptions and expectations help explain greater contact with the juvenile justice system. Black youth experience a disproportionately greater first arrest rate than White peers by the age of 12 (Lau et al., 2018). Regardless of self-reported delinquent behaviors, Black youth are more likely than White youth to have had police contact by the eighth grade, and this early contact contributes to even greater racial disparities in contact with the juvenile justice system by the 10th grade (Crutchfield et al., 2009; Crutchfield et al., 2012). Since Black youth are already perceived as older than same-age White peers, Black youth who experience early pubertal

maturity may be at increased risk for bias at multiple stages of the juvenile justice process due to the double burden of being perceived as both older and less innocent.

Patterns of sex and juvenile justice decisions have been mixed in the psycholegal literature. Much of the pubertal timing literature has focused on explaining why early maturing girls may be at increased risk for delinquent behavior, which may give the impression that girls may be more likely to be penalized for a more mature physical appearance. However, first contact rates are higher for boys than girls at puberty and throughout adolescence (Lau et al., 2018). Therefore, it is possible that the girls who do experience contact may be early maturers, but that sex effects supersede maturation effects.

While some studies have found that girls are treated more leniently than boys, other studies have found no sex differences and even instances where girls are treated more harshly than boys (e.g., Bishop & Frazier, 1992; Carr et al., 2008; Odem, 1995). These discrepant results have been explained by two theories: (1) juvenile justice officials may treat females more harshly than males in an attempt to enforce stereotypical notions of proper female behavior, and (2) juvenile justice officials, especially male officials, may believe they need to protect girls or have a hard time imaging girls committing crime due to paternalistic or stereotypical beliefs (reviewed in Carr et al., 2008). Inconsistent patterns may also be explained by the stage of the juvenile justice process and confounding influences of race (Horowitz & Pottieger, 1991). For instance, girls tend to be more harshly punished for status offenses (i.e., activities that would otherwise not be illegal at an older age, such as curfew) than boys (e.g., Spivak et al., 2014).

Sex effects may also vary according to race. Some research suggests that court officials may perceive White girls' delinquency as a stronger violation of sex-role expectations and in turn punish them more harshly than non-White girls (Guevara et al., 2006). Accordingly, paternalism or chivalry explanations may only be appropriate for White girls in instances of less serious criminal offenses rather than for all girls across all kinds of status offenses. It is unclear how this might interact with maturation because research indicates that girls who engage in "troublesome" behavior at younger ages tend to be considered more difficult than boys similarly situated (e.g., Belknap & Holsinger, 2006), which may result in harsher justice treatment.

1.3 | Stage differences in the juvenile justice process

Given the mixed and complex findings for both race and sex across juvenile justice studies depending on context, it is important to examine the effect of a maturation bias at different stages of the juvenile justice process. Each stage of the juvenile justice process has different concerns and individuals responsible for decision-making (Bishop et al., 2010). Accordingly, effects of race or sex at one stage would not be expected to be identical to effects at another. Stages that allow for greater individual discretion, like intake, may increase the likelihood that decision makers rely more heavily on stereotypes. In

contrast, stages like adjudication involve more constraint on individual discretion, which may result in any reliance on stereotyping negated by a greater reliance on legal criteria, like crime severity. This would result in greater disparity in outcomes for similarly situated youth at stages with greater discretion and more similar outcomes for similarly situated youth in stages with less discretion.

2 | THE PRESENT STUDIES

We examined whether crime reporting and sentencing decisions were influenced by variations in pubertal maturation, race, and sex across two studies. We manipulated the maturation level, race, and sex of youth in two experimental vignettes across crime reporting (Study 1) and sentencing (Study 2) scenarios. We addressed four primary research questions:

1. *Are decisions regarding whether to report a crime or how long to sentence youth influenced by a youth's visual maturity?* We predicted that youth who appeared more physically mature would be more penalized by adult decision-makers in both Studies 1 and 2 compared to less physically mature youth.
2. *How do youth race and sex influence adults' decisions regarding crime reporting and sentencing?* In addition to analyzing the direct effect of maturation level, we were also interested in the direct effects of youth race and sex in the experimental conditions. We expected Black youth conditions to be treated more punitively by adult decision-makers in Studies 1 and 2. Given that our experimental vignettes did not pertain to status offenses, we predicted that male youth conditions would be more penalized than female youth conditions in both Studies 1 and 2.
3. *How do the effects of youth physical maturation level, race, and sex interact to affect adults' decisions regarding crime reporting and sentencing?* We predicted that youth maturation level would intersect with race and sex such that more visibly mature Black male conditions would be treated most punitively by adult decision-makers in Studies 1 and 2. Conversely, we expected that low maturation White female conditions would receive the most lenient treatment.
4. *Do youth maturation level, race, and sex influence how youth behavior is described?* Stereotypes are often communicated and perpetuated in subtle and indirect ways. Accordingly, we also implemented content-coding to capture potential stereotypes attributed to youth across maturation level, race, and sex. Drawing on findings from the facial maturity bias literature, we predicted that participants' explanations of youth behaviors would reflect lower perceived responsibility or fault for low than high maturation youth conditions in Study 1. We predicted a similar pattern of explanations for female compared to male youth conditions in line with findings on paternalism and justice outcomes regarding female youth. Finally, we predicted that behaviors in Black youth conditions would be described as more aggressive than behaviors in White youth conditions.



FIGURE 1 Maturational level, race, and sex manipulations in Studies 1 and 2.

3 | METHOD

3.1 | Pilot studies

We conducted two pilot studies to ensure that our experimental materials captured the intended constructs, including a photo manipulation pilot study and a developmental age anchor task. All studies were approved by the Institutional Review Board at Cornell University, Protocol # 1807008141.

3.1.1 | Photo manipulation pilot study

Experimental tasks in Studies 1 and 2 used images of youth who varied by physical maturation (high or low), race (Black or White), and sex (male or female) for a total of eight variations. Physical maturation was manipulated using Adobe Photoshop to make the same youth look more or less physically developed by adjusting height and body composition (e.g., high maturation females were taller and had more advanced breast development than low maturation females). These adjustments corresponded with relevant items on the Pubertal Development Scale for ecological validity (Petersen et al., 1988). Youth were depicted as the same height and size for their corresponding sex and maturation category (i.e., all high maturation males were the same height and size). We obscured the faces of youth presented in our experimental scenarios to disentangle an effect of physical maturation bias from facial maturity bias and visual attractiveness. All youth were depicted wearing the same school uniform to control for differences in clothing (see Figure 1).

To determine that the images of youth were representative of our target ages in Studies 1 and 2, a convenience sample of undergraduates ($N = 44$, $M_{age} = 20$ years, 77.27% female) were randomly shown four of the eight variations of youth (across maturation level, race, and sex) and were asked to indicate the likely range of ages they perceived the youth to be. Across all variations, the mean perceived

age of each youth condition fell between the ages of 10.64 years old to 14.27 years old (see Supplementary Materials for full table). We examined perceived age differences across all youth conditions using ANOVA and Tukey's method for pairwise mean comparison in R (R Core Team, 2021). We found that the high maturation White female, high maturation Black male, and high maturation Black female youth conditions were all perceived as older on average than their low maturation counterparts in post-hoc testing, $F(7, 175) = 14.40$, $p < .001$. While the high maturation White male youth was descriptively perceived as older ($M = 10.95$ years, $SD = 1.79$) on average than the low maturation White male condition ($M = 10.68$ years, $SD = 1.73$), this difference was not statistically significant, which is a limitation of this manipulation. We note that the age range of all conditions included 12 years, which was the target age in the experimental scenarios. Accordingly, the images were deemed an appropriate representation of the target ages depicted in Studies 1 and 2.

3.1.2 | Developmental age anchor pilot study

Prior to the experimental tasks, all participants in both Studies 1 and 2 completed a developmental age anchor task to ensure participants had adequate knowledge and expectations of early adolescence. Literature suggests adults may overestimate the age of adolescents with whom they are not familiar (e.g., Johnson & Collins, 1988), and that participants more proximal in chronological age to adolescence (i.e., college-aged students) may have an easier time remembering what a typical 12-year-old may look and act like versus older adults.

The developmental age anchor consisted of a transcript of closing arguments from an academic debate regarding the influence of television on healthy habits that was adapted from a real middle school debate to demonstrate cognitive complexity and physical development of typical 12-years-old. The debate transcript was accompanied by a stock photo of Black and White middle school students to demonstrate typical physical development. Participants reviewed the

debate transcript to determine the winner (see Supplemental Materials). The winner of the debate was not considered relevant to the results of the present study and was not included in analyses; the task was only employed to familiarize participants with adolescent development.

The developmental age anchor was piloted prior to use in the present study to determine that participants perceived the depicted youth as middle school students. A sample of adults ($N = 109$, $M_{age} = 36.14$ years, 50.46% female) recruited from MTurk were presented with the debate transcript and asked to indicate what grade they believed the students were in based on the cognitive complexity of the transcript. Pilot results indicated that participants perceived the median grade of the debate students to be the 7th grade ($M = 7.49$, $SD = 1.70$). We determined that this was an acceptable representation of the target ages to be depicted in Studies 1 and 2.

4 | STUDY 1

4.1 | Participants

Participants were adults ($N = 396$, $M_{age} = 28.64$ years, $SD = 11.50$) recruited via a university participant pool and MTurk. Participants self-reported as 60.51% female and their race and ethnicity as White (56.57%); Asian (23.48%); Black or African American (8.84%); biracial (7.58%); Latino (3.03%); and American Indian or Alaska Native (0.25%). One participant declined to answer. Participants recruited via MTurk reported their highest level of education attained as bachelor's degrees (48.85%), high school diplomas (24.23%), associate's degrees (17.53%), graduate or professional degrees (8.76%), some high school (0.52%), and one declined to answer.

We were interested in understanding potential decision-making patterns in jury-eligible adults. Participants were deemed jury-eligible if they indicated that they were at least 18 years of age, a United States citizen, proficient in English, never convicted of a felony, and not subject to felony charges punishable by imprisonment for more than 1 year. Participants either received course credit (university sample) or \$1.25 (Mturk sample) in exchange for their responses. Participants recruited from MTurk needed to have completed more than 5000 HITs and have a HIT approval rating of 95% or greater as a protection against non-human workers (i.e., bots) and poor-quality work. Research suggests that samples from MTurk meet common psychometric standards and experimental results for framing effects and decision-making biases have been replicated with MTurk samples (e.g., Buhrmester et al., 2011; Weinberg et al., 2014). Further, research suggests levels of careless responding may be similar among student and community (e.g., MTurk) samples (More et al., 2022).

To improve sensitivity to effects, we merged MTurk and university student samples as both represented our target population of jury-eligible adults and did not significantly differ from each other on main study variables.¹ Sensitivity analysis using G*Power suggested that our sample size provided 80% power to detect a small-sized effect ($f^2 = .02$) when examining maturation level, race, and sex as

main effects in multiple regression (Cohen, 2013; Faul et al., 2009). Due to its nonlinear nature, sensitivity analysis for logistic regression was more complex and we approximated that our sample size provided 80% power to detect an odds ratio of 1.77 when examining maturation level, race, and sex as main effects (Hsieh et al., 1998).

4.2 | Design

The current study employed a 2 (Physical maturation: high vs. low) \times 2 (Race: Black vs. White) \times 2 (Sex: male vs. female) between-subjects design.

4.3 | Manipulations

Participants read a scenario in which they were told they heard a loud noise and witnessed a youth walking away from a car with a shattered windshield. There was no clear indication that the youth was involved in the windshield becoming shattered. Youth were always described as students in the 7th grade in the scenario. Participants also viewed a picture depicting the experimental scenario. In the picture, youth varied by physical maturation (high or low), race (Black or White), and sex (male or female) for a total of eight vignette/photo pairings (see Supplemental Materials for full scenario).

4.4 | Measures

4.4.1 | Police reporting and perceptions

Participants answered several scenario-related questions, including "Would you call the police in this scenario?" (binary choice of yes or no); "How confident are you in your decision to call the police?" (7-point Likert-type scale where 1 = not at all confident and 7 = very confident); "How blameworthy do you think the youth is?" (7-point Likert-type scale where 1 = very non-blameworthy and 7 = very blameworthy); and "Do you think the youth will engage in criminal activity in the future?" (5-point Likert-type scale where 1 = definitely not and 5 = definitely yes).

4.4.2 | Retributive justice endorsement

We used the 5-item retribution subscale from the Sentencing Goals Scale (McKee & Feather, 2008) to assess participant goals and strategies when making judgments about punishment for criminal offenders. We included this measure to adjust for individuals who had more punitive approaches to justice in general regardless of experimental condition. Participants responded on a Likert scale ranging from 1 (disagree) to 7 (agree) to items such as "The purpose of punishment should be to make offenders pay for the wrongs that they have done." Scores ranged from 5 to 35 ($M = 22.61$, $SD = 6.23$) and internal reliability

was good ($\alpha = .87$). There was no statistical difference in endorsed retributive justice levels based on participant sex, $F(1, 394) = .34, p = .56$. However, participants who were White had lower rates of endorsed retributive justice beliefs ($M = 21.62, SD = 6.52$) than participants who did not self-report as White, $M = 23.59, SD = 6.41, F(1, 395) = 8.59, p < .01$.

4.5 | Procedure

After consenting to participate in the study, participants reviewed the developmental age anchor materials and selected a debate winner. They were then randomly presented with one version of the experimental scenario containing a brief summary of the event accompanied by a photo of a youth (see Supplemental Materials). After reviewing the scenario and photo, participants made scenario-related judgments and answered questions regarding their perceptions of the youth. Participants were also asked to generate as many explanations as they could think of for the youth's behavior in an open-ended text response. Finally, participants completed the retributive justice endorsement scale and demographic questions. Average completion time was 9.52 min.

5 | STUDY 1 RESULTS

5.1 | Police reporting and decision confidence

Across conditions, 63.86% of participants reported that they would call the police in the scenario. Response frequency by main effects indicated greater percentages for calling the police for Black, high maturation, and male youth conditions (see Table 1). We performed Pearson's Chi-squared tests to evaluate these group differences and found that high maturation conditions were more likely to have the police called than low maturation conditions, $\chi^2 (1, 396) = 4.01, p < .05$, and male conditions were more likely to have the police called than female conditions, $\chi^2 (1, 396) = 4.01, p < .05$, but there was no significant difference between White and Black conditions.

We further examined the main effects of maturation level, race, and sex on participants' likelihood to call the police (*would not call* = 0, *would call* = 1) with logistic regression while simultaneously adjusting for participant sex, race, and sense of retributive justice. All analyses were conducted in R. Results indicated that the main effect model accounted for a significant variance in calling the police, likelihood ratio

$\chi^2 (7, 396) = 19.45, p < .01$. At the predictor level, maturation level ($B = .44, SE = .22, p < .05$) and sex ($B = .51, SE = .22, p < .05$) conditions significantly affected likelihood of calling the police while race condition did not. The odds of participants calling the police increased by 55% (Odds Ratio (OR) = 1.55, Wald's 95% CL [1.01, 2.38]) for high versus low maturation youth conditions, and odds increased by 67% (OR = 1.67, Wald's 95% CL [1.09, 2.56]) for male compared to female youth conditions.

We used hierarchical linear modeling (HLM) to examine two-way and three-way interaction models that accounted for all interactions between maturation level, race, and sex. This hierarchical approach is often employed in intersectional analyses to account for the effects of multiple identities at one time (Veenstra, 2013). However, two-way and three-interaction models did not yield significant interactions between focal predictors ($p \geq .14$), nor did they improve model fit beyond the main effects model.

We conducted OLS regression to examine participant confidence in their decision to call the police, $F(6, 246) = 3.04, p < .01$. We found a small effect ($f^2 = .03$) for maturation level ($B = .34, SE = .13, p < .05$) such that participants being more confident in their decision to call police when the youth was more visually mature ($M = 5.63, SD = .96$) versus less visually mature ($M = 5.25, SD = 1.13$). Neither youth race nor sex condition significantly predicted participant confidence in calling the police (see Supplementary Materials for tables).

5.2 | Perceived blameworthiness and likelihood of recidivism

We conducted OLS regression to examine the main effects of maturation level, race, and sex on participant perceptions of

TABLE 2 Examples of free response behavioral explanations given by participants.

Explanation type	Example responses
Accident	Accident; accidentally hit the car with a ball
Act of anger/revenge	Angry with someone; might have pent up anger
Fear	Afraid of noise; witnessed somebody else smashing the windshield and got scared
Peer influence	Friends were doing it; peer pressure
Theft	Stealing money from a car; stole something valuable

TABLE 1 Response frequency of calling the police by race, maturation level, and sex main effects.

	Race condition		Maturation condition		Sex condition	
	White	Black	Low	High	Female	Male
Would call police	123 (61.2)	124 (63.6)	118 (58.1)	129 (66.8)	114 (57.9)	133 (66.8)
Would not call police	78 (38.8)	68 (34.9)	85 (41.9)	61 (31.6)	83 (42.1)	63 (31.7)

Note: Percentages reported in parentheses.

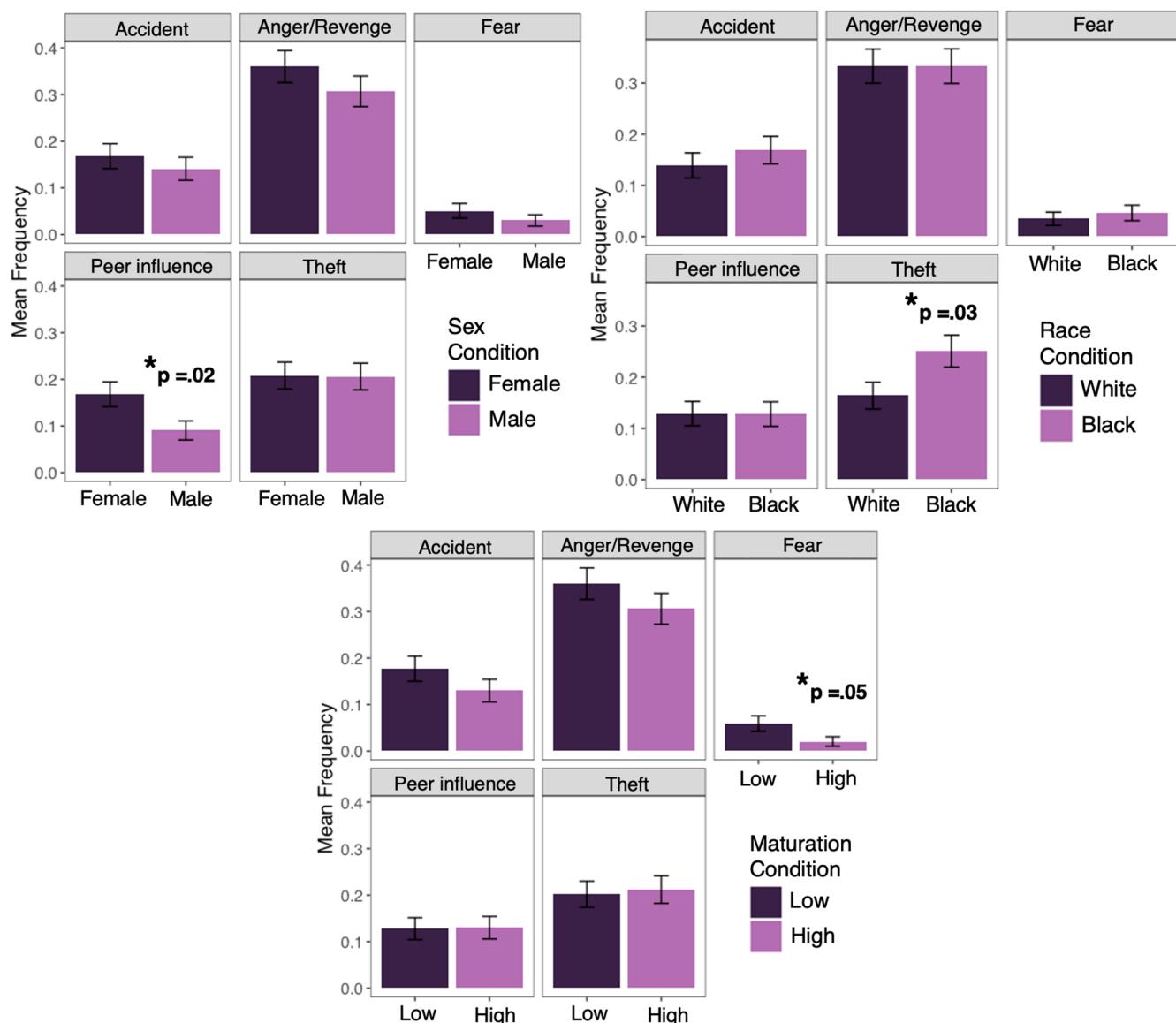


FIGURE 2 Mean frequency of behavioral explanations by sex, race, and maturation conditions with standard error bars.

youth blame and likelihood that the youth would offend again in the future. All regressions included participant sex, race, and sense of retributive justice as covariates. Youth maturation level, race, and sex did not significantly predict perceptions of youth blameworthiness or likelihood to offend in the future, nor did their interactions ($ps \geq .12$).

5.3 | Behavioral explanations

We conducted sentiment analysis using R to assess whether the proportion of positive and negative words in the participants' open-ended behavioral explanations differed by maturation level, race, and sex. We used the Bing dictionary, which is a commonly used sentiment lexicon wherein negative words (e.g., "hate") are assigned a sentiment weight of "-1" and positive words (e.g., "happy") are assigned a sentiment weight of "1" (Hu & Liu, 2004). Each participant received

a sum score for negative word usage and sum score for positive word usage. Participants tended to use more negative than positive words in general, $t(395) = 18.39, p < .001$. Results indicated that there were no meaningful differences in the usage of positive and negative words in behavioral explanations between the conditions.

We conducted content-coding to examine the behavioral explanations offered for each condition. We employed a bottom-up process in which we determined five of the most common behavioral explanations in the data. These behavioral explanations included (1) belief that the damage was an accident, (2) acts of anger or revenge, (3) fear, (4) peer influence, and (5) theft (see Table 2). Subsequently, two independent coders were trained to reliability and coded all responses for these five explanation types. Responses were coded for the presence (1) or absence (0) of each explanation type. Explanations were not mutually exclusive as participants were asked to list as many as they could. Interrater reliability was substantial across the explanation types: accident ($\kappa = .99$), anger/revenge ($\kappa = .98$), fear

($\kappa = .81$), peer influence ($\kappa = .89$), and theft ($\kappa = .95$). Explanations were usually brief, and often included direct words or phrases (e.g., “she wanted revenge”). Discrepancies were resolved through discussion before finalizing codes.

Anger/revenge was the most common explanation type, with 33.30% of the sample providing such an explanation. The next most common explanation types were theft (20.70%), accident (15.40%), peer influence (12.9%), and fear (4.04%). Participants provided approximately one explanation type on average ($M = .86$, $SD = .80$, Range = 0–3). We conducted ANOVAs for condition main effects predicting explanation types using R, and our sample size provided 80% power to detect a small-sized effect ($f = .14$) when examining maturation level, race, and sex group differences using ANOVA (Cohen, 2013; Faul et al., 2009). Participants provided more explanations for the female ($M = .95$, $SD = .84$) compared to the male condition ($M = .77$, $SD = .74$, $F(1, 394) = 4.71$, $p < .05$, $f = .11$), but no differences were found among the race or maturation condition. In particular, participants assigned more peer influence explanations for the female conditions ($M = .17$, $SD = .37$) than male conditions, ($M = .09$, $SD = .29$, $F(1, 394) = 5.28$, $p < .05$, $f = .12$). Further, participants assigned more theft explanations for Black ($M = .25$, $SD = .44$) compared to White youth conditions ($M = .16$, $SD = .37$, $F(1, 394) = 4.60$, $p < .05$, $f = .11$). In addition, participants assigned more fear explanations for the low ($M = .06$, $SD = .27$) compared to high maturation conditions ($M = .02$, $SD = .14$, $F(1, 394) = 3.77$, $p = .05$, $f = .10$). Anger/revenge explanations were most frequent across all conditions (see Figure 2). There were no statistically significant differences according to sex, race, or maturation level for the anger/revenge or accident explanation types.

6 | STUDY 1 DISCUSSION

In Study 1, we observed that participants were more likely to call the police for more mature looking youth than their less mature looking counterparts. Content-coding captured a contrast in the ways in which participants explained the actions of youth according to sex, race, and maturation level as due to peer influence, theft, or fear. Taken together, results suggest that greater visible maturation may play a meaningful role in how youth are treated and perceived in crime reporting contexts.

Participant explanations of youth behavior represent a possible pattern of influence between maturation level, race, and sex. First, less visibly mature youth and girls were assigned behavioral explanations that deemphasized agency. Not only did participants attempt to generate more explanations for female youth conditions, but female youth conditions were also more frequently assigned explanations characterizing them as acting out of peer influence. This finding tracks with previous work that girls may be treated more leniently in the justice process due to stereotypical or paternalistic beliefs that girls are in need of protection or incapable of committing crime (Carr et al., 2008). Paternalism may also help explain the trend toward ascribing more fear-based explanations to less visibly mature youth conditions as participants may have viewed youth in low maturation conditions as more in need of protection than older looking youth. However, fear explanations were relatively infrequent in the present sample, so further research is needed to

fully disentangle potential paternalistic or protective attitudes toward less physically mature youth.

Contrary to our hypothesis, the Black youth condition was not more likely to be assigned anger/revenge explanations compared to the White condition. However, Black youth conditions were assigned more theft explanations than White youth conditions. This pattern may still suggest a race effect such that participants may have offered greater benefit of the doubt in an ambiguous situation to White youth conditions than to the Black youth conditions. These findings are tentatively supported by prior research that suggests legal decision-makers may attribute youth crime to negative internal attributions for Black youth whereas they attribute crime among White youth to negative external attributions (e.g., Bridges & Steen, 1998). However, more research is needed to fully understand this relationship and how these characterizations translate to differences in outcomes or experiences with the juvenile justice process. Effects of maturation level, race, and sex on outcomes were further explored in a sentencing scenario in Study 2.

7 | STUDY 2

7.1 | Participants

Participants were adults ($N = 386$, $M_{age} = 29.02$ years, $SD = 11.31$) who self-reported as 57.96% female and as White (60.10%); Asian (16.58%); biracial (11.22%); Black or African American (7.51%); Latino (3.03%); American Indian or Alaska Native (0.78%); and Native Hawaiian or Pacific Islander (0.26%). Two participants declined to answer. Participants recruited via MTurk reported their highest level of education attained as a bachelor's degree (47.42%), high school (23.20%), associate's degree (15.46%), graduate or professional degree (12.37%), and some high school (1.55%).

Participants either received course credit (student sample) or \$1.25 (MTurk sample) in exchange for their responses. In addition to needing to meet the participation requirements from Study 1 (i.e., jury-eligible; 5000 HITs; 95% HIT approval rating), both university and MTurk participants were only eligible to participate in Study 2 if they had not already participated in Study 1. We merged MTurk and university student samples because they represented our target population of jury-eligible adults and did not significantly differ from each other on main study variables, to improve sensitivity to effects.² A sensitivity analysis using G*Power suggested that our sample size provided 80% power to detect a small-sized effect ($f^2 = .02$) when examining maturation level, race, and sex as direct effects (Faul et al., 2009). We approximated that our sample size provided 80% power to detect an odds ratio of 1.78 when examining maturation level, race, and sex as main effects (Hsieh et al., 1998).

7.2 | Design

The current study employed a 2 (Physical maturation: high vs. low) \times 2 (Race: Black vs. White) \times 2 (Sex: male vs. female) between-subjects design.

7.3 | Manipulations

Participants read a scenario in which they were told an implicated youth was caught vandalizing a clothing store in the local mall, which resulted in \$1200 of property damage before they were taken into custody by the police. In the scenario, youth were always described as being in the 7th grade. Participants also reviewed a still photo of security camera footage of the vandalism as it was committed by a youth. In the still photo, youth varied by physical maturation (high or low), race (Black or White), and sex (male or female) for a total of eight variations. Depicted youth were the same youth as in Study 1 materials, but the scene depicted differed between Study 1 and Study 2 (see Supplemental Materials for full scenario).

7.4 | Measures

7.4.1 | Retributive justice endorsement

We used the same 5-item retribution subscale from the Sentencing Goals Scale (McKee & Feather, 2008) to assess participant goals and strategies when making judgments about punishment for offenders as in Study 1. Scores ranged 5 to 35 ($M = 22.61$, $SD = 6.24$) and internal reliability was good ($\alpha = .86$). There was no statistical difference in endorsed retributive justice levels based on participant racial identity, $F(1, 385) = 2.79$, $p = .10$. However, male participants had greater rates of endorsed retributive justice ($M = 23.63$, $SD = 6.08$) than female participants ($M = 21.79$, $SD = 6.25$), $F(1, 382) = 8.29$, $p < .01$.

7.4.2 | Sentencing decisions and perceptions

Participants answered several scenario-related questions: “*How many hours of community service should the youth be sentenced to for committing property damage?*” (sliding scale choice of 0–200 h; participants were informed the average sentence is 100 hours); “*Do you think another type of punishment would be more appropriate?*” (0 = community service/no change, 1 = warning, 2 = monetary fine, 3 = detention at a juvenile offender facility); “*How blameworthy do you think the youth is?*” (7-point Likert-type scale where 1 = very non-blameworthy and 7 = very blameworthy); and “*Do you think the youth will engage in criminal activity in the future?*” (5-point Likert-type scale where 1 = definitely not and 5 = definitely yes).

7.5 | Procedure

Participants reviewed the developmental age anchor materials and selected a debate winner. They were then randomly shown one version of the experimental scenario (see Supplemental Materials). After reviewing the scenario, participants were asked questions about their legal decisions and perceptions. Finally, participants completed the

retributive justice endorsement scale and demographic questions. Average completion time was 8.29 min.

8 | STUDY 2 RESULTS

8.1 | Sentencing decisions

Across conditions, the mean level of hours sentenced was 93.81 ($SD = 33.07$, Range = 10–200). We conducted OLS regression examine the main effects of maturation level, race, and sex on how many hours of community service to which youth were sentenced while also including participant sex, race, and sense of retributive justice as covariates, $F(6, 382) = 4.70$, $p < .001$. Results indicated a small main effect ($f^2 = .02$) of race condition ($B = -7.15$, $SE = 3.29$, $p < .05$) such that White youth were assigned more community service hours ($M = 98.33$, $SD = 33.75$) than Black youth ($M = 89.20$, $SD = 31.80$). Two-way and three-interaction models did not yield significant interactions between focal predictors ($p \geq .10$), nor did they improve model fit beyond the main effects model (see Supplementary Materials).

We further examined the main effects of maturation level, race, and sex conditions on participants' likelihood to assign a monetary fine (*another punishment* = 0, *monetary fine* = 1) with logistic regression while simultaneously adjusting for participant sex, race, and sense of retributive justice. Results indicated that the main effect model accounted for a significant variance in assigning a monetary fine, likelihood ratio $\chi^2(7, 381) = 21.61$, $p < .01$. At the predictor level, maturation ($B = .48$, $SE = .22$, $p < .05$) and race ($B = -.43$, $SE = .22$, $p < .05$) conditions significantly affected assignment of monetary fine while sex condition did not. The odds of high maturation youth receiving a monetary fine instead of community service increased by 61% compared to low maturation youth ($OR = 1.61$, Wald's 95% CI [1.05, 2.47]). The odds of Black youth receiving a monetary fine instead of community service decreased by 35% compared to White youth ($OR = .65$, Wald's 95% CI [.42, .99]). Two-way and three-interaction models did not yield significant interactions between focal predictors ($p \geq .21$), nor did they improve fit beyond the main effects model. There were no condition differences in the likelihood that a warning or juvenile detention were assigned instead of community service.

8.2 | Perceived blameworthiness and likelihood of recidivism

We conducted OLS regression to examine the main effects of maturation level, race, and sex on how blameworthy participants perceived the youth to be and how likely it was that the youth would offend again in the future. All regressions included participant sex, race, and sense of retributive justice as covariates. There were no significant condition differences or interactions for perceptions of youth blameworthiness or likelihood to offend in the future ($p \geq .13$).

9 | STUDY 2 DISCUSSION

In Study 2, we observed that White youth were assigned to more hours of community service for the same crime than Black youth conditions. We did not observe any direct replication or extension of Study 1 in terms of maturation level or sex effects on outcome leniency. In real world contexts, research has shown that the greatest leniency in juvenile court is given to youth in the range of 11–13 years of age regardless of sex or racial identity (Evangelist et al., 2017). Further, Mears et al. (2014) suggested that youth at the bottom of a court's age jurisdiction may be treated with more leniency than youth in the middle of the age jurisdiction. This pattern of prior research may inform Study 2 results such that participants may have opted for more leniency in their sentencing decisions regardless of maturation level due to the young chronological age of the youth.

The only difference in sentencing outcomes by maturation level in the present study was that more mature looking youth were more likely than low maturation youth conditions to receive a monetary fine instead of another punishment, despite being described as equal in chronological age. In addition, White youth conditions were more likely to receive a monetary fine instead of another punishment compared to Black youth conditions. One explanation for this pattern of results is that participants may have assigned greater financial responsibility to more mature looking youth for the amount of damage they caused in the scenario perhaps because they may look old enough to be employed in order to pay the fine themselves. Similarly, White youth conditions may have been perceived as more likely to have the financial means to pay a monetary fine. Finally, although it is unclear whether participants viewed the monetary fine as harsher than community service, this result may also reflect a small boomerang effect wherein participants are recently more attuned with racial injustice and/or white privilege and are trying to take those into account.

10 | GENERAL DISCUSSION

Maturing earlier than peers has been linked to earlier and greater contact rates with the juvenile justice process, which may in turn expose youth to greater risk of contact in the future (Bersani et al., 2022). While many studies have examined characteristics of early-maturing youth that contribute to this contact rate, no study to our knowledge has examined whether appearing more physically mature than same-age peers leads to different perceptions of legal responsibility from adults, who tend to be the ones making juvenile justice decisions. Present findings are the first to provide support for a maturation bias in decisions to report youth crime to the police.

Previous work has argued that early maturing youth are at greater risk for delinquency because, in looking older than their chronological age, they may have more contact with older, delinquent peers who may put them in risky situations (e.g., Caspi et al., 1993). Present findings extend this theory by showing that adults are also likely to treat youth who look older than their same-age peers differently. In an ambiguous scenario, participants were more likely and more confident

in their decision to call the police on a more mature looking middle school student compared to a less mature looking middle school student of the same chronological age. This empirical study has real world consequences: youth who are more physically developed may find themselves more frequently exposed to delinquent situations and, as a consequence, contact with the police than same-age peers who are less physically developed because of a mismatch between perceived and actual age. Notably, participants did not perceive more mature looking youth to be any more blameworthy or likely to offend again in the future than less mature looking youth in making the crime reporting decision. This suggests that it is not that more mature looking youth are perceived as more delinquent than same-age peers, but that there may be a stronger expectation for more mature looking youth to be responsible for their actions.

However, maturation level effects did not emerge uniformly across referral and sentencing scenarios. While more mature looking youth were more likely to have the police called and more likely to receive a monetary fine than less mature looking youth, they did not receive harsher sentencing decisions. Given that prior work has shown a pattern of discrepant effects of sex and race on decision-making depending on the stage of the juvenile justice process (e.g., Horowitz & Pottieger, 1991), it is perhaps not surprising that a direct maturation effect did not translate to sentencing severity in Study 2. Crime reporting decisions may allow for greater individual discretion in decision-making than sentencing decisions, and such individual discretion has been associated with greater reliance on stereotyped inferences about others' physical appearance (Bishop et al., 2010). In addition, we posit that calling the police may be a scenario with more ecological validity for participants in the present research. Participants were laypeople rather than legal decision-making professionals (e.g., judges). Accordingly, in their everyday lives, participants in Studies 1 and 2 may be more likely to be faced with a decision to call the police than to determine a sentencing decision. Therefore, choices in Study 1 may be more indicative of how the perceptions and decisions of laypeople may affect more mature looking youth.

It is important to highlight that participants were given the age and grade of youth in the present scenarios and were allowed time to reason out their decisions. In addition, we required participants to review developmentally salient information in our anchor task. We made these decisions to ensure that any results were not simply artifacts of differences in individual developmental knowledge or familiarity, and to pinpoint evidence of visible maturation effects. In real world scenarios, it is likely that individuals will lack some or all developmental information about youth before needing to react (i.e., chronological age) and will only leverage visual information in their decision making. This would be consistent with the theory that individuals draw on stereotyped or biased thinking when they lack information (e.g., assuming bigger means older). Consequently, it is possible that scenarios in which participants are not informed about or are asked to automatically react to the youth's age might show amplified maturation bias relative to the present study.

Such legal scenarios happen all the time. In fact, outside the research context, police discretion to make individual judgments about adolescents' visual maturity is codified into law by Supreme Court ruling. In the 2011 case *J.D.B. v. North Carolina*, the Court ruled that police officers must abide by the additional custody protection offered to juveniles, given that they are more likely to feel coerced by police and be affected by police tactics. However, the Court also ruled that this additional protection only needs to be offered when an officer knows the age of the suspect. In the event that age is unknown, additional protection is only required if the suspect looks like a child to a "reasonable" officer. This means that police officers have the discretion to treat youth who appear older than their chronological age as legal adults so long as age is not confirmed (Garavito & Koch, 2023). Based on present findings, chronological age cannot be reasonably assumed from appearance during adolescence, especially during the high visual contrast period of puberty. Even when participants were informed that youth were a certain age, greater levels of physical maturation were still associated with greater likelihood of contacting the police. Therefore, it is not only possible that more mature looking youth will be treated with mismatched expectations by police, but also that they may be put in such contact with the police more often. Further, this ruling may inadvertently disadvantage Black youth compared to their White peers since Black boys and girls tend to start puberty earlier than their White boys and girls, and be perceived as more adultlike (Epstein et al., 2017; Susman et al., 2010). Although present studies did not indicate that the crime reporting or sentencing decisions of laypeople were influenced by the interaction of maturation level and race, it is worth considering if such a relationship does exist in real world interactions with police.

10.1 | Limitations and future directions

It is important to acknowledge limitations of the present research before extrapolating what these findings may mean for developmental biases in legal contexts. First, we address two potential limitations of our study design: (1) stimulus sampling and (2) statistical power. While we controlled for similarity in multiple ways across stimulus conditions (e.g., identical uniforms and obscured faces), we note that we only included one example for each stimulus condition. This may represent a potential deficiency in stimulus sampling. Future work should explore the effects of including multiple examples for each condition, especially if full facial information is included in future stimuli. In addition, future work should prioritize data collection that provides greater power to the effects of maturation, race, and sex at the interaction level. Present findings offer an initial exploration of these effects and their interplay given constraints of sensitivity.

Second, all youth in our studies were depicted in the identical school uniforms. While this choice was useful for limiting additional information about youth and standardizing clothing across conditions, we note that school uniforms themselves carry potential for bias or assumption. It is possible that participants perceived school uniforms as indicators of higher socioeconomic status, which may have led to

more lenient decisions or perceptions of the youth. In addition, the clothing youth wear in real world contexts are an important part of how they are viewed and judged. For instance, prior work has shown that clothing is an important contextual factor in police decisions to deploy weapons, particularly for Black males (Kahn & Davies, 2017). Future extensions of present research may examine how perceptions of clothing interact with differences in physical development (e.g., wearing more adult clothing and being more physically developed may increase the likelihood of any influence of maturity bias).

Another experimental design choice worth considering is that the youth in our scenarios were always depicted by themselves. Yet substantial research indicates that peer relationships become increasingly salient to youth during adolescence and that peers play a significant role in whether adolescents engage in delinquent behavior (e.g., Chung & Steinberg, 2006; Simons et al., 1994). While some adolescents might be delinquent on their own, many primarily engage in antisocial or criminal behavior while they are with other youth. Incorporating the presence of peers into scenarios would provide additional visual information to adults about how comparatively old youth might be, and the kinds of stereotypes they have about the peers may influence their legal decisions and perceptions. For example, adults may view the culpability of youth who look less physically mature but are surrounded by peers who look older than them differently than those of youth who look older than their surrounding peers.

We also note that the present research does not account for potential differences in setting or neighborhood effects. Spruill and Lewis Jr (2022) found that adults in metropolitan settings tended to perceive the police more negatively than adults in nonmetropolitan settings. Although we cannot account for participant location beyond that they were located in the United States, we note that participant setting may have affected willingness to call the police in Study 1. Some participants noted that they would call the police out of concern for the youth's safety. This may seem like a reasonable function of calling the police to participants in nonmetropolitan settings with positive perceptions of the police whereas participants in metropolitan areas may have used very different reasonings to reach their decisions. In addition to accounting for adults' settings to contextualize decision-making, future work should also examine the effects of varying whether youth are depicted in the city or suburbs in experimental scenarios.

Finally, evidence of a maturation bias in naturalistic data may be especially compelling. Psycholegal studies often demonstrate effects of race and sex on juvenile justice outcomes through archival studies of real-world arrest and sentencing data. While measures of pubertal development are not typically collected in the juvenile justice process, many juvenile justice sites do collect and retain intake photographs of adolescents. Future research might consider examining these intake photographs for age-graded differences in physical maturity.

11 | CONCLUSION

We provide initial evidence that youth who appear more physically mature than same-age peers may be held to different standards of

legal responsibility. Such a maturation bias may contribute to understanding why early maturing youth have earlier and greater contact rates with the juvenile justice system. Although intersections of race and sex did not emerge in crime reporting and sentencing decisions, textual analysis captured meaningful differences such that White girls who were less visibly mature were more likely to be described as acting out of fear or due to peer influence than more visibly mature Black boys. These findings offer important implications for legal decision-making as youth should be treated according to their chronological and psychosocial age and not based on their apparent visual maturity.

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CONFLICT OF INTEREST STATEMENT

The authors report there are no conflicting interests to declare.

DATA AVAILABILITY STATEMENT

The data and code that support the findings of this study are openly available on OSF at https://osf.io/f3pbr/?view_only=be4ed97498684908b6462a401d901f06.

INFORMED CONSENT

All persons provided informed consent prior to inclusion in the study.

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ENDNOTES

¹ Samples did not meaningfully differ on endorsement of retributive justice ($t(394) = 1.44, p = .15$), or the main outcome of calling the police in Study 1, $\chi^2(1, 394) = 2.65, p = .10$.

² Samples did not meaningfully differ on endorsement of retributive justice ($t(384) = 1.64, p = .10$), or the main outcome of hours sentenced, $t(384) = -.48, p = .63$.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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