
Are Adolescents Less Mature Than Adults?

Minors' Access to Abortion, the Juvenile Death Penalty, and the Alleged

APA "Flip-Flop"

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The American Psychological Association's (APA's) stance on the psychological maturity of adolescents has been criticized as inconsistent. In its Supreme Court amicus brief in Roper v. Simmons (2005), which abolished the juvenile death penalty, APA described adolescents as developmentally immature. In its amicus brief in Hodgson v. Minnesota (1990), however, which upheld adolescents' right to seek an abortion without parental involvement, APA argued that adolescents are as mature as adults. The authors present evidence that adolescents demonstrate adult levels of cognitive capability earlier than they evince emotional and social maturity. On the basis of this research, the authors argue that it is entirely reasonable to assert that adolescents possess the necessary skills to make an informed choice about terminating a pregnancy but are nevertheless less mature than adults in ways that mitigate criminal responsibility. The notion that a single line can be drawn between adolescence and adulthood for different purposes under the law is at odds with developmental science. Drawing age boundaries on the basis of developmental research cannot be done sensibly without a careful and nuanced consideration of the particular demands placed on the individual for "adult-like" maturity in different domains of functioning.

Keywords: adolescents, abortion, juvenile death penalty, Supreme Court, APA

In its landmark 2005 decision abolishing the juvenile death penalty (*Roper v. Simmons*, 2005), the U.S. Supreme Court held that the inherent immaturity of adolescents relative to adults mitigated teenagers' criminal responsibility to the extent that it barred the imposition of capital punishment for crimes committed under the age of 18, regardless of their heinousness. Prior to this decision, in the United States, individuals could be executed for capital crimes committed at the age of 16 or older. By a 5-to-4 vote, the Court ruled that this age boundary should be set at 18, rather than 16.

Developmental science was front and center in the Court's ruling, which drew extensively on an amicus curiae brief submitted by the American Psychological Association

(APA, 2004) and was informed by a recent summary of relevant research on psychological development during adolescence that was published in this journal (Steinberg & Scott, 2003). Writing for the majority, Justice Anthony Kennedy drew attention to three specific aspects of adolescents' immaturity that diminished their criminal culpability: their underdeveloped sense of responsibility (and difficulty controlling their impulses), their heightened vulnerability to peer pressure, and the unformed nature of their characters. As Justice Kennedy wrote,

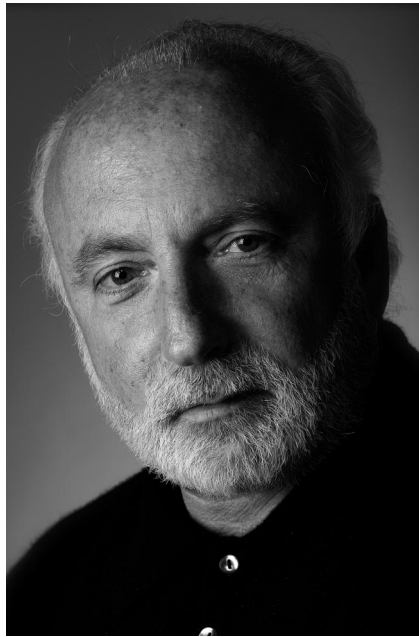
First, as any parent knows and as the scientific and sociological studies respondent and his amici cite tend to confirm, "[a] lack of maturity and an underdeveloped sense of responsibility are found in youth more often than in adults and are more understandable among the young. These qualities often result in impetuous and ill-considered actions and decisions." . . . The second area of difference is that juveniles are more vulnerable or susceptible to negative influences and outside pressures, including peer pressure. . . . The third broad difference is that the character of a juvenile is not as well formed as that of an adult. The personality traits of juveniles are more transitory, less fixed. . . . These differences render suspect any conclusion that a juvenile falls among the worst offenders. (*Roper v. Simmons*, 2005, pp. 15–16)

The position taken by APA in its brief—that adolescents are inherently less blameworthy than adults as a consequence of their developmental immaturity—was noteworthy not only because it proved so influential to the Court's decision but because it appeared, on its face, to contradict a stance taken by APA in a previous U.S. Su-

Editor's note. June P. Tangney served as the action editor for this article.

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preme Court case, *Hodgson v. Minnesota* (1990). In that case, which concerned a minor's right to obtain an abortion without parental notification, APA had argued that because adolescents had decision-making skills comparable to those of adults, there was no reason to require teenagers to notify their parents before terminating a pregnancy (APA, 1987, 1989). Thus, in *Roper*, APA argued that science showed that adolescents were not as mature as adults, whereas in *Hodgson*, it argued that the science showed that they were.

The apparent contradiction in these views did not go unnoticed. Justice Kennedy explicitly asked at oral argument in *Roper* if the APA had "flip-flopped" between 1989 (when its final amicus brief was filed in the abortion case) and 2004 (when its brief was filed in the juvenile death penalty case). The flip-flop issue also was raised by those who disagreed with the Court's decision to abolish the juvenile death penalty. Indeed, in his dissenting opinion in *Roper v. Simmons* (2005), Justice Antonin Scalia drew unambiguous attention to this issue:

[T]he American Psychological Association (APA), which claims in this case that scientific evidence shows persons under 18 lack the ability to take moral responsibility for their decisions, has previously taken precisely the opposite position before this very Court. In its brief in *Hodgson v. Minnesota*, 497 U. S. 417 (1990), the APA found a "rich body of research" showing that juveniles are mature enough to decide whether to obtain an abortion without parental involvement. . . . The APA brief, citing psychology treatises and studies too numerous to list here, asserted: "[B]y middle adolescence (age 14–15) young people develop abilities similar to adults in reasoning about moral dilemmas, understanding social rules and laws, [and] reasoning about interpersonal relationships and interpersonal problems." (Justice Scalia, dissenting, pp. 11–12)

The petitioner in *Roper*, the State of Missouri, made a similar point in its brief:

Ultimately, Simmons wants the Court to declare that [drawing the age boundary for purposes of death penalty eligibility at 16] is now "without penological justification" not based on research that uniformly reaches that conclusion, but based on inconsistent research, viewed through the lense [sic] of a stereotype that the American Psychological Association decried in *Hodgson*: "[T]he assumption that adolescents as a group are less able than adults to understand, reason and make decisions about intellectual and social dilemmas is not supported by contemporary psychological theory and research." (*Roper*, 2004, p. 11)

Concerns about reconciling the scientific arguments offered in the two cases were also raised by abortion rights advocates, but in a different context. Indeed, after Laurence Steinberg met with the Executive Committee of the Society for Research on Adolescence, asking for the organization's endorsement of the APA stance in *Roper*, the committee decided not to sign on to the APA brief, fearing that the argument that adolescents were not as mature as adults (and thus ineligible for capital punishment) would come back to haunt those who had worked so hard to secure the abortion rights of young women. As it turns out, these worries were not unfounded. Within two years of the *Roper* decision, the U.S. Supreme Court heard *Ayotte v. Planned Parenthood of Northern New England* (2006), which, like *Hodgson*, concerned minors' access to abortion without parental involvement. Opponents of adolescents' autonomous abortion rights had taken the Court's characterization of adolescent immaturity in the juvenile death penalty case and used it to argue in favor of parental involvement requirements. Citing the *Roper* decision, they argued,

Parental involvement is critical to ensure not only that the adolescent's choice is informed, but that it is freely made and not the result of coercion or duress. . . . These concerns are heightened for adolescents who, as this Court has recently observed, are more susceptible than adults to "outside pressure" and other "negative influences," and more likely than adults to make decisions that are "impetuous and ill-considered." *Roper v. Simmons*, 125 S.Ct. 1183, 1195 (2005). (*Ayotte v. Planned Parenthood of Northern New England*, 2006, p. 15)

It is easy to see why many criticized the APA for its apparently contradictory positions. On the face of it, the APA position in the juvenile death penalty case was in direct opposition to the stance it took in *Hodgson*. In its amicus brief arguing for adolescents' abortion rights, for example, APA stated,

[B]y age 14 most adolescents have developed adult-like intellectual and social capacities [italics added] including specific abilities outlined in the law as necessary for understanding treatment alternatives, considering risks and benefits, and giving legally competent consent. (APA, 1989, p. 20)

However, in its amicus brief arguing against the juvenile death penalty, APA stated,

Given that 16- and 17-year-olds as a group are less mature developmentally than adults [italics added], imposing capital punishment on such adolescents does not serve the judicially recognized purposes of the sanction. (APA, 2004, p. 13)

APA responded to accusations that developmental psychologists were trying to have their scientific cake and

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eat it too—spinning the science for the sake of youth advocacy—by pointing out that the type of decision under consideration in *Roper* was not the same as that at issue in *Hodgson*:

We [APA] took note of the Hodgson brief in the approval process for APA's brief in [Roper] but concluded that the two cases were distinguishable in several respects. [Roper] and Hodgson, while both dealing with adolescent decision-making, involved very different legal issues and different types of decisions. Therefore the research, which was different in each of the two cases, addressed distinct aspects of adolescent behavior and attributes. (Gilfoyle, 2005, p. 1)

There is no question that the legal issues in *Hodgson* and *Roper* differed. The abortion rights case was a 14th Amendment case involving the amendment's due process clause. The central question considered in *Hodgson* was whether the state had a compelling interest in mandating that an adolescent seeking an abortion be required to first notify both her parents. Several legal issues were relevant, including whether the notification requirement placed an undue burden on adolescents (especially those whose parents were divorced or estranged) and whether providing for a judicial hearing as an alternative to parental notification (known as a "judicial bypass") was acceptable, but the most relevant for the present discussion concerned the competence of adolescents to make informed and sound health care decisions on their own. If it could be concluded that adolescents were sufficiently competent to make an informed decision about whether to terminate a pregnancy, the state's interest in requiring parental notification would be rendered less compelling. Ultimately, the Court ruled that requiring parental notification *was* constitutional so long as a bypass provision was part of the law.

The juvenile death penalty case was an 8th Amendment case involving the amendment's cruel and unusual punishments clause. A central issue in *Roper* was whether adolescents were mature enough to be held to adult levels of criminal blameworthiness and, in particular, to a level of blameworthiness that potentially warranted capital punishment; if they were not, the juvenile death penalty was excessively cruel. Under a bedrock principle of American criminal law known as "penal proportionality," the punishment a guilty party receives should be in proportion to his or her culpability for the criminal act, and certain factors are accepted as mitigating the actor's culpability. These mitigating factors include diminished decision-making capability (e.g., decision making that is impulsive or shortsighted), exposure to coercion, and evidence of the offender's otherwise good character (Steinberg & Scott, 2003). As noted earlier, the Court ruled that the inherent immaturity of adolescents, with respect to the impetuosity of their decision making, their susceptibility to coercion, and their unformed characters, made them categorically less blameworthy than the average criminal and therefore not eligible for a punishment that was reserved for only the most culpable offenders.

Whether APA in fact "flip-flopped" or, worse yet, tried to have it both ways, as its critics have contended, is an exceedingly important question, both with respect to the decisions about where to draw legal boundaries between adolescents and adults for various purposes and with respect to APA's scientific credibility more generally. As some of us have written elsewhere, "scientists' authority to enter the policy arena rests largely on the credibility of their research findings" (Grisso & Steinberg, 2005, p. 620). If APA's statements about the state of scientific knowledge are seen as advocacy masquerading as research, the integrity of the Association's scientific mission is threatened. After all, in both *Hodgson* and *Roper*, APA took a position that could be fairly characterized as, at the very least, friendly to youth advocates. It is crucial, therefore, to examine the issue empirically. That is the focus of the present article.

For the past several years, as members of the MacArthur Foundation Research Network on Adolescent Development and Juvenile Justice, we have been studying age differences in many of the cognitive and psychosocial capacities that have been at issue in the Supreme Court cases discussed above. We have been studying basic intellectual abilities, such as working memory and verbal fluency, but also aspects of psychosocial development, including impulse control (Steinberg et al., 2008), future orientation (Steinberg et al., 2009), reward sensitivity (Cauffman et al., in press), sensation seeking (Steinberg et al., 2008), and susceptibility to peer influence (Steinberg & Monahan, 2007). To our knowledge, ours is the first study to include both cognitive and psychosocial measures administered to the same sample, to include an ethnically and socioeconomically diverse group of individuals, and to span the period from preadolescence through young adulthood.



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On the basis of this work, some of which we summarize in the pages that follow, we believe that APA's seemingly contradictory positions in *Hodgson* and *Roper* are in fact quite compatible with research on age differences in cognitive and psychosocial capacities. More specifically, our findings, as well as those of other researchers, suggest that whereas adolescents and adults perform comparably on cognitive tests measuring the sorts of cognitive abilities that were referred to in the *Hodgson* brief—abilities that permit logical reasoning about moral, social, and interpersonal matters—adolescents and adults are not of equal maturity with respect to the psychosocial capacities listed by Justice Kennedy in the majority opinion in *Roper*—capacities such as impulse control and resistance to peer influence. Not only were the legal issues different in the two cases, but so are the circumstances surrounding abortion decisions and criminal behavior, and therefore, the relevant dimensions along which adolescents and adults should be compared differ as well. Unlike adolescents' decisions to commit crimes, which are usually rash and made in the presence of peers, adolescents' decisions about terminating a pregnancy can be made in an unhurried fashion and in consultation with adults.

We recognize that not all abortion decisions are deliberative, rational, and autonomous and that not all criminal decisions are impulsive, emotional, and influenced by others. After all, any decision about whether to abort a pregnancy or carry it to term has an emotional component, involves both immediate and long-term consequences, and may be influenced by the opinions of family and friends. By the same token, adolescents' crimes are occasionally strategic, planned in advance, and executed alone. In general, though, when contemplating an abortion, an adolescent has time to deliberate before making a final choice and

has an opportunity to consult with an adult expert, whereas the circumstances leading up to the typical adolescent criminal offense—robbing a convenience store, for instance—are characterized by heightened emotional arousal, time pressure, and peer influence.

For example, studies indicate that about half of all pregnant adolescents contemplating an abortion whose parents are unaware of the situation consult with a nonparental adult other than medical staff (e.g., a teacher, school counselor, clergy person, older relative, or adult friend of the family); this figure is the same among younger (under age 16) and older adolescents (Henshaw & Kost, 1992). Moreover, 35 states require all women seeking an abortion to receive some type of counseling from the abortion provider before the procedure is performed, usually including information about the specific procedure as well as the health risks of abortion and pregnancy (Guttmacher Institute, 2009). Twenty-four states mandate a waiting period of at least 24 hours between the counseling and the medical procedure (Guttmacher Institute, 2009). Thus, it does not appear as if a high proportion of pregnant teenagers decide to terminate a pregnancy under circumstances that are rushed or in the absence of adult advice. In contrast, studies indicate that adolescents' crimes are more often than not impulsive and unplanned (Farrington, 2003) and typically committed with peers (Reiss & Farrington, 1991). Thus, while some of the capabilities relevant to both decision-making contexts no doubt overlap, the circumstances that define "mature" behavior in each are clearly different. Resisting peer influence, thinking before making a decision, and considering the future consequences of one's actions are clearly more important in criminal decision making than abortion decision making, in part because society structures the latter context to promote consultation with adults and avoid hasty decision making.

The importance of maintaining a distinction between cognitive and psychosocial maturity in discussions of the legal status of adolescents is supported by other research that has examined age differences in each of these domains. Studies that have examined logical reasoning abilities in structured situations and basic information-processing skills, for instance, have found no appreciable differences between adolescents age 16 and older and adults; any gains that take place in these domains during adolescence occur very early in the adolescent decade, and improvements after this age are very small (Hale, 1990; Kail, 1997; Keating, 2004; Overton, 1990). The results of the MacArthur Foundation Research Network's earlier study of age differences in competence to stand trial, which depends on individuals' ability to understand facts about a court proceeding and to reason with those facts in a rational fashion, also were consistent with these findings. We found significant differences between the competence-related abilities of adults and those of adolescents who were 15 and younger, but no differences between the abilities of adults and those of adolescents who were 16 and older (Grisso et al., 2003). This general pattern, indicating that adolescents attain adult levels of competence to stand trial somewhere around age 15, has been reported in similar studies of



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decision making across a wide variety of domains (e.g., Grisso, 1980; Jacobs-Quadrel, Fischhoff, & Davis, 1993) and in many studies of age differences in individuals' competence to provide informed consent (Belter & Grisso, 1984; Grisso & Vierling, 1978; Gustafson & McNamara, 1987; Weithorn & Campbell, 1982).

In contrast, the literature on age differences in psychosocial characteristics such as impulsivity, sensation seeking, future orientation, and susceptibility to peer pressure shows continued development well beyond middle adolescence and even into young adulthood (Scott, Repucci, & Woolard, 1995; Steinberg & Cauffman, 1996), although few studies have gone much beyond adolescence (but see Cauffman & Steinberg, 2000, for an exception). Consistent with this literature, and in contrast to the pattern of age differences seen in the information-processing, logical reasoning, and informed consent literatures, studies of age differences in the sorts of risky behavior likely to be influenced by the psychosocial factors listed above—such as reckless driving, binge drinking, crime, and spontaneous unprotected sex—indicate that risky behavior is significantly more common during late adolescence and early adulthood than after (Steinberg, 2007). In other words, although adolescents may demonstrate adult-like levels of maturity in some respects by the time they reach 15 or 16, in other respects they show continued immaturity well beyond this point in development.

The MacArthur Juvenile Capacity Study

Participants

The MacArthur Juvenile Capacity Study was designed to examine age differences in a variety of cognitive and

psychosocial capacities that are relevant to debates about the relative maturity of adolescents and adults, especially as they affect judgments of criminal blameworthiness. There were five data collection sites in the study: Los Angeles; Irvine, CA; Denver; Philadelphia; and Washington, DC. Data for the present study come from 935 individuals ranging in age from 10 to 30 years ($M = 17.84$ years). Participants were recruited via newspaper advertisements and flyers posted at community organizations, Boys & Girls Clubs, churches, community colleges, and local places of business in neighborhoods targeted to have an average household education level of "some college" according to 2000 U.S. Census data. Because we were interested in characterizing the capacities of "average" adolescents and adults, we did not target individuals on the basis of their involvement with the legal system but sought instead to survey an ethnically and socioeconomically diverse sample of individuals in the age range of interest.

Individuals who were interested in the study were asked to call the research office listed on the flyer. Members of the research team described the nature of the study to prospective participants over the telephone and invited those interested to participate. Given this recruitment strategy, it is not possible to know how many potential participants saw the advertisements, what proportion responded, and whether those who responded were different from those who did not, although the education level of the sample is comparable to that of the people in the neighborhoods from which it was drawn.

Data collection took place either at one of the participating university's offices or at a convenient location in the community. Before beginning, participants were provided verbal and written explanations of the study, their confidentiality was assured, and their written consent or assent was obtained. For participants who were under the age of 18, informed consent was obtained from either a parent or a guardian.

Procedure

Prior to data collection, all site project directors and research assistants met at one location for several days of training. The project coordinators and research assistants conducted on-site practice protocol administrations prior to enrolling participants. Participants took part in a two- to two-and-one-half-hour interview that included three sets of measures: (a) a series of computerized tasks designed to assess a range of executive functions (not discussed in this report); (b) a series of questionnaires designed to measure a variety of psychosocial capacities relevant to discussions of how adolescents should be treated by the legal system; and (c) tests of basic intellectual functioning. The tasks and questionnaires were administered on a laptop computer in individual interviews. Research assistants were present to monitor the participant's progress, reading aloud the instructions as each new task was presented and providing assistance as needed. To keep participants engaged in the computer tasks, we told the participants that they would receive \$35 for participating in the study and that they could obtain up to a total of \$50 (or, for participants who



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were under 14, an additional prize) depending on their performance. In actuality, we paid all participants ages 14–30 the full \$50, and all participants ages 10–13 received \$35 plus a prize (approximately \$15 in value). This strategy was used to increase the motivation to perform well on the tasks but also to ensure that no participants were penalized for their performance. All procedures were approved by the institutional review board of the university associated with the data collection site.

Measures

Of interest in the present report are the demographic measures and IQ (which were used to ensure that the various age groups had comparable social and intellectual backgrounds), the measures of psychosocial capacities, and the tests of basic intellectual functioning.

Demographic variables. Participants provided information about their age, gender, ethnicity, and highest level of education within their household. For youths 17 years of age and younger, household education was based on parents' level of education, as research has indicated that parental education may be the most stable component of a family's social class (Steinberg, Mounts, Lamborn, & Dornbusch, 1991). For participants 18 years of age and older, their own educational attainment was used to index this construct. In order to have cells with sufficiently large and comparably sized subsamples for purposes of data analysis, we created age groups as follows: 10–11, 12–13, 14–15, 16–17, 18–21, 22–25, and 26–30 years. The age groups did not differ with respect to gender or ethnicity but did differ, albeit modestly, with respect to household education. Accordingly, all subsequent analyses controlled for this variable. Demographic characteristics of the sample are presented in Table 1.

IQ. The Wechsler Abbreviated Scale of Intelligence (WASI) Full-Scale IQ Two-Subtest (FSIQ-2) (Psychological Corporation, 1999) was used to produce an estimate of general intellectual ability based on two (Vocabulary and Matrix Reasoning) of the four subtests. The WASI can be administered in approximately 15 minutes and is correlated with the Wechsler Intelligence Scale for Children ($r = .81$) and the Wechsler Adult Intelligence Scale ($r = .87$). It has been normed for individuals between the ages of 6 to 89 years. Because there were small but significant differences between the age groups in mean IQ, this variable was controlled for in all subsequent analyses.

Psychosocial maturity. The battery of instruments contained self-report measures of five capacities frequently mentioned in discussions about age differences in maturity and their relevance to legal policy. Table 2 lists these measures and provides sample items from each.

Three widely used and well-validated Likert-scale-type instruments were used to assess *risk perception* (the extent to which one perceives a potentially dangerous or harmful activity as risky), *sensation seeking* (the extent to which one actively seeks experiences that provide thrills), and *impulsivity* (the extent to which one acts without thinking or has difficulty controlling impulses). Risk perception was assessed using a modified version of a widely used measure developed by Benthin, Slovic, and Severson (1993). The respondent is presented with eight potentially dangerous activities (e.g., riding in a car with a drunk driver, having unprotected sex) and asked to indicate how risky the activity is ($\alpha = .82$).¹ Sensation seeking was assessed using a subset of six items ($\alpha = .70$) from the Sensation Seeking Scale (Zuckerman, Eysenck, & Eysenck, 1978).² Impulsivity was assessed using all 18 items ($\alpha = .73$) from three six-item subscales of the Barratt Impulsiveness Scale (Patton, Stanford, & Barratt, 1995): Motor Impulsivity, Inability to Delay Gratification, and Lack of Perseverance. All three self-report measures have been shown to be significantly correlated with behavioral indices of their associated constructs. In our sample, scores on the impulsivity self-report measure were significantly negatively related to the amount of time participants waited before making their first move on a Tower of London task, and scores on the sensation-seeking questionnaire were significantly correlated with sensation-seeking behavior in a video driving game (Steinberg et al., 2008). In addition, individuals who were less likely to perceive potentially risky behaviors as risky were more likely to report engaging in high-risk behavior.

¹ The original Benthin et al. (1993) measure also contains an item concerning alcohol use. Our analyses indicated that including this item in the scale's construction adversely differentiated the reliability of the scale among the younger and older participants, most likely because the use of alcohol is risky for minors but not necessarily for adults. As a consequence, we dropped that item from our scale computation.

² Many of the items on the full Zuckerman et al. (1978) scale appear to measure impulsivity, not sensation seeking (e.g., "I often do things on impulse.") Because we have a separate measure of impulsivity in our battery, we used only the Zuckerman et al. items that clearly indexed thrill or novelty seeking (see Table 2).

Table 1
Demographic Characteristics of the Sample (N = 935)

Characteristic	Percentage
Age (in years)	
10–11	12.5
12–13	14.7
14–15	13.8
16–17	15.2
18–21	15.9
22–25	14.6
26–30	13.2
Gender	
Male	49.2
Female	50.8
Ethnicity	
African American	29.2
Asian American	15.1
Hispanic	21.2
White	24.0
Other/biracial	9.9
Household education	
High school	11.9
High school graduate	22.8
Some college	34.1
College graduate	21.4
Postcollege	9.7

Two additional psychosocial capacities, *resistance to peer influence* and *future orientation*, were assessed using new self-report measures developed for this program of work. Each used a response format introduced by Harter (1982) in which respondents are presented with two oppos-

ing statements that are both phrased in a socially acceptable fashion, asked to indicate which best describes them, and then asked whether the descriptor is “very true” or “sort of true.” (This format is presumed to reduce social desirability bias.) Resistance to peer influence (Steinberg & Monahan, 2007) was assessed using a 10-item scale ($\alpha = .76$) designed to measure the extent to which individuals change their behavior or opinions in order to follow the crowd. We have no data on the validity of this measure in the current sample, but we do in analyses of data from a large study of serious juvenile offenders. There we found that the presence of antisocial peers in an individual’s network is more highly correlated with the individual’s own criminal behavior among those who report a low ability to resist peer influence on this measure than among those who have equally antisocial peers but score high in self-reported resistance to peer influence (Monahan, Steinberg, & Cauffman, 2007). Studies of the neural underpinnings of resistance to peer influence using this measure have found neurobiological differences between same-age individuals who vary in their resistance to peer influence in ways consistent with the notion that higher scores on this instrument reflect better coordination of affect and thinking (Grosbras et al., 2007; Paus et al., 2008), a key component of psychosocial maturity in our conceptualization of the construct. Future orientation was assessed using a 15-item scale ($\alpha = .80$) that measures the anticipation of future consequences, planning ahead, and thinking about the future. The validity of this measure is supported by our finding that individuals who score high on this scale are more likely to choose a larger delayed reward over an immediate smaller one in a delay discounting task (Steinberg et al., 2009).

A composite measure of *psychosocial maturity* was formed by reverse-scoring the measures of impulsivity and

Table 2
Indices of Psychosocial Maturity

Construct	Measure	Sample item
Risk perception	Benthin et al., 1993	“If you did this activity (e.g., had unprotected sex), how much are you at risk for something bad happening?”
Sensation seeking	Zuckerman et al., 1978	“I sometimes like to do things that are a little frightening.”
Impulsivity	Patton et al., 1995	“I do things without thinking.”
Resistance to peer influence	Steinberg & Monahan, 2007	“Some people think it’s better to be an individual even if people will be angry at you for going against the crowd. BUT Other people think it’s better to go along with the crowd than to make people angry at you.”
Future orientation	Steinberg et al., 2009	“Some people take life one day at a time without worrying about the future. BUT Other people are always thinking about what tomorrow will bring.”

sensation seeking so that higher scores indicated greater maturity (i.e., more impulse control and less thrill seeking), standardizing all five measures, and averaging the standardized scores. Thus, individuals who score relatively lower on the composite characterize themselves as less likely to perceive dangerous situations as risky, more impulsive, more thrill seeking, more oriented to the immediate, and more susceptible to peer influence. This is very similar to the portrait of adolescents described by Justice Kennedy in his majority opinion in the juvenile death penalty case. A confirmatory factor analysis indicated that the composite model fit the data well (comparative fit index = .95, root mean square error of approximation = .075). The five indicators are modestly, but significantly, intercorrelated (r s range from .14 to .38; average $r = .26$).

Cognitive capacity. The test battery included several widely used tests of basic cognitive skills, including a test of resistance to interference in working memory (Thompson-Schill et al., 2002), a digit-span memory test, and a test of verbal fluency. The resistance to interference in working memory test was one in which participants saw four probe letters on the screen and then a target. They were then asked whether the target was among the four probes. On test trials, two of the four letters presented had appeared in the previous trial, providing interference with recall on the present trial. An overall accuracy score was computed by averaging the number of correct responses across all test trials. The digit-span memory test was similar to that in the Wechsler scales. Participants heard a series of 13 sequences of digits (beginning with two digits and increasing to eight) that they were asked to recall forwards and 13 sequences that they were asked to recall backwards. A memory score was computed by averaging the total number of forward trials and backward trials recalled correctly. Finally, the measure of verbal fluency asked participants to generate, in one minute, as many words as possible that either began with a specific letter (three trials) or were members of a category (e.g., fruits; three trials). A verbal fluency score was computed by averaging the number of words generated for each of the six lists.

Because the composite consisted of only three items, it was not possible to derive a reliable estimate of internal consistency. However, after examining the intercorrelations among the tests, we found them to be significant (fluency and working memory, $r = .29$; working memory and digit span, $r = .39$; digit span and verbal fluency, $r = .40$). Accordingly, scores on each of the measures were standardized, and the standard scores were averaged to create an index of *general cognitive capacity*. Not surprisingly, our composite measure of general cognitive capacity is significantly correlated with IQ ($r = .46$, $p < .001$). Unlike IQ scores, however, which are adjusted for chronological age, the measure of cognitive capacity is not. More important, because we controlled for IQ in all analyses, any observed age differences in general cognitive capacity are not due to age differences in intelligence.

In its original amicus brief in *Hodgson*, the APA (1987) made reference to the “cognitive capacity” (p. 6) of

adolescents and cited sources that referred to both information-processing abilities (Keating, 1980) and logical reasoning (Inhelder & Piaget, 1958) in support of its argument that adolescents are as cognitively competent as adults. We acknowledge that our index, which tilts heavily toward measuring how many pieces of information an individual can process or produce, does not measure logical or moral reasoning and as such is an incomplete measure of cognitive capacity as conceptualized in the APA *Hodgson* brief. Our measure assesses cognitive ability in a highly structured manner and as such does not tap aspects of executive function that may be important in novel situations. It is also important to note that our measure of general cognitive capacity does not include tests of higher order executive functioning, such as comparing short- versus long-term consequences, coordinating affect and cognition, or balancing risk and reward. Many such executive functions have both cognitive and psychosocial aspects to them, however, and given that our interest was in maintaining a distinction between general cognitive and psychosocial capacities so as to better examine their distinct developmental timetables, it was important not to conflate the two. The measures of psychosocial maturity and cognitive capacity are very modestly correlated once age is controlled, $r(922) = .15$, $p < .001$. Although our operationalization of general cognitive capacity is not identical to that used by APA in its argument, it is very clear that the authors of the *Hodgson* brief (APA, 1987) were referring to cognitive abilities and not psychosocial maturity and that the authors of the *Roper* brief (APA, 2004) were referring to psychosocial maturity and not cognitive capacity.

Results

Two analyses of covariance were conducted in order to examine age patterns in psychosocial maturity and general cognitive capacity; as noted earlier, both analyses controlled for IQ and household education.

The results of the two analyses are shown in Figures 1 and 2. Each figure presents the age group means for the standardized composites, with a value of 1.0 added to each

Figure 1
Psychosocial Maturity (Standardized Composite Scores) as a Function of Age (in Years)

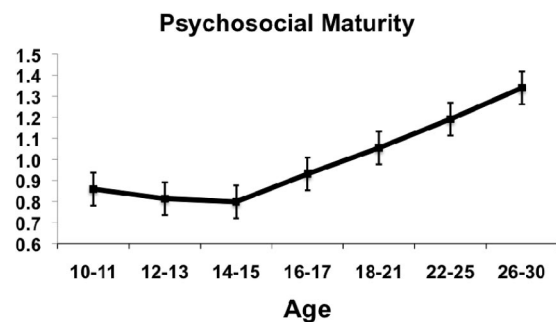
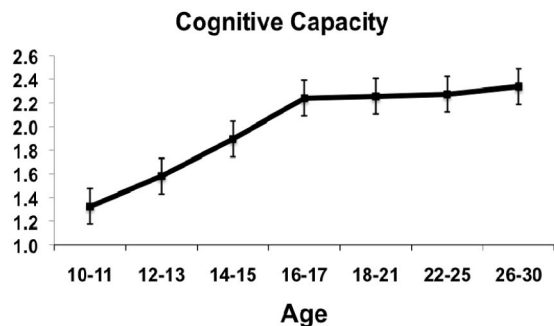


Figure 2
General Cognitive Capacity (Standardized Composite Scores) as a Function of Age (in Years)



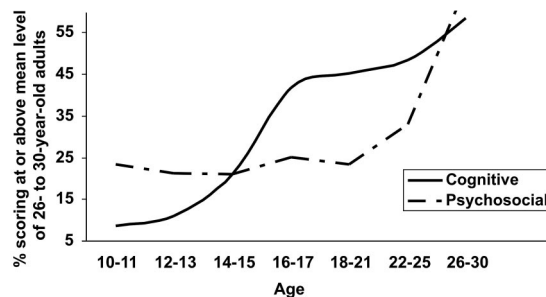
group's mean for ease of presentation (i.e., to make all values positive numbers). The analysis of age differences in psychosocial maturity indicates a significant age effect, $F(6, 900) = 12.577, p < .001$. As Figure 1 indicates, age differences in psychosocial maturity, as assessed in this study, did not emerge until mid-adolescence but were present throughout late adolescence and early adulthood. Indeed, pairwise comparisons, using a Bonferroni correction, revealed no significant differences in psychosocial maturity among the first four age groups (10–11, 12–13, 14–15, and 16–17 years) but significant differences between the 16–17-year-olds and those 22 and older, and between the 18–21-year-olds and those 26 and older. In neither case was there a significant interaction between age and gender, indicating that the patterns were the same among males and females.

The analysis of age differences in cognitive capacity shows a very different pattern. As with psychosocial maturity, there is a highly significant age effect, $F(6, 901) = 58.246, p < .001$. However, as Figure 2 indicates, age differences in cognitive capacity were evident during the first part of adolescence but not after age 16—just the opposite from the pattern seen with respect to psychosocial maturity. Pairwise comparisons using a Bonferroni correction indicated significant differences in general cognitive capacity between each of the first four age groups but no age differences after age 16.

Figure 3 presents these data in a somewhat different way. Here we show the proportion of individuals in each age group who scored at or above the mean level of the 26- to 30-year-olds in our sample on the psychosocial and cognitive composites, graphed in the same figure. As the figure indicates, general cognitive capacity reaches adult levels long before the process of psychosocial maturation is complete.

Although our measure of cognitive capacity included several of the information-processing skills noted in the APA (1987) *Hodgson* brief but did not include indices of the sort of reasoning to which APA referred, it is important to ask whether the pattern of age differences we found on this measure resembles that observed using measures of more sophisticated cognitive abilities of the sort believed to

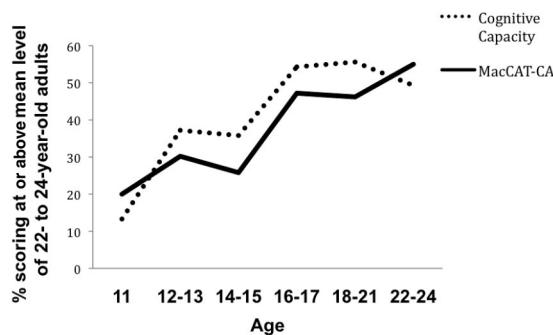
Figure 3
Proportion of Individuals in Each Age Group Scoring at or Above the Mean for 26- to 30-Year-Olds on Indices of Cognitive Capacity and Psychosocial Maturity



influence abortion decision making. As we noted earlier, in addition to the present study, the MacArthur Network also conducted a study of age differences in capacities related to competence to stand trial (Grisso et al., 2003). The main instrument used to assess these capacities was the MacArthur Competence Assessment Tool—Criminal Adjudication (MacCAT-CA), a standardized interview that measures respondents' understanding of and reasoning about their legal situation (Poythress et al., 1999). Although the abilities necessary for competence to stand trial are not identical to those necessary for competent decision making about abortion, they are conceptually similar in that both involve being able to understand and reason with facts and appreciate the nature of one's situation.

Figure 4 presents data from the present study alongside data from the Grisso et al. (2003) study in a way

Figure 4
Proportion of Individuals in Each Age Group Scoring at or Above the Mean for 22- to 24-Year-Olds on Index of Cognitive Capacity and on a Measure of Abilities Relevant to Competence to Stand Trial



Note. MacCAT-CA = MacArthur Competence Assessment Tool—Criminal Adjudication, Understanding and Reasoning subscales. MacCAT-CA data are from Grisso et al (2003).

comparable to that used in Figure 3, that is, in terms of the proportion of individuals of different ages who performed at or above the mean level of the adults in the sample. The Grisso et al. study included participants ages 11 to 24, drawn equally from the community and the justice system. In order to make the appropriate comparison of these data to those of the present study, we excluded the justice system subsample from the analyses (the average IQ of that subsample was 85, substantially lower than that of the present study), categorized individuals into chronological age groups that paralleled those used in the present study (11, 12–13, 14–15, 16–17, 18–21, and 22–24 years), and used the oldest group as the adult reference category. Similarly, we reanalyzed the cognitive capacity data from the present study after dropping the 10-year-olds, excluding individuals who were older than 24, and using 22- to 24-year-olds as the adult reference category.

As Figure 4 illustrates, the pattern of age differences in abilities relevant to competence to stand trial is virtually identical to the pattern seen with respect to general cognitive capacity as assessed in the present study. On both indices, scores increased between ages 11 and 16 and then leveled off, with no improvement after this age. This gives us greater confidence that the absence of age differences in cognitive capacity after age 16 observed in our study is not merely a function of the fact that our index included only measures of basic information-processing abilities. Rather, our reanalysis of the Grisso et al. (2003) data supports the argument that adolescents reach adult levels of cognitive maturity several years before they reach adult levels of psychosocial maturity.

Discussion

Developmental psychologists with expertise in adolescence are frequently called on to provide guidance about the appropriate treatment of young people under the law and about the proper placement of legal age boundaries between those who should be treated as adults and those who should not. The results of the present study suggest that it is not prudent to make sweeping statements about the relative maturity of adolescents and adults, because the answer to the question of whether adolescents are as mature as adults depends on the aspects of maturity under consideration. By age 16, adolescents' general cognitive abilities are essentially indistinguishable from those of adults, but adolescents' psychosocial functioning, even at the age of 18, is significantly less mature than that of individuals in their mid-20s. In this regard, it is neither inconsistent nor disingenuous for scientists to argue that studies of psychological development indicate that the boundary between adolescence and adulthood should be drawn at a particular chronological age for one policy purpose and at a different one for another.

Whether and how these findings should inform decisions about adolescents' treatment under the law depends on the specific legal issue under consideration. To varying degrees, such decisions rely on value judgments (e.g., about what aspects of maturity are relevant to a particular decision or about what is mature "enough" to warrant

autonomy and/or culpability), which science alone cannot dictate. Nevertheless, the legal treatment of adolescents should at the very least be informed by the most accurate and timely scientific evidence on the nature and course of psychological development. On the basis of the present study, as well as previous research, it seems reasonable to distinguish between two very different decision-making contexts in this regard: those that allow for unhurried, logical reflection and those that do not. This distinction is also in keeping with our emerging understanding of adolescent brain maturation, which suggests that brain systems responsible for logical reasoning and basic information processing mature earlier than those that undergird more advanced executive functions and the coordination of affect and cognition necessary for psychosocial maturity (Steinberg, 2008).

When it comes to decisions that permit more deliberative, reasoned decision making, where emotional and social influences on judgment are minimized or can be mitigated, and where there are consultants who can provide objective information about the costs and benefits of alternative courses of action, adolescents are likely to be just as capable of mature decision making as adults, at least by the time they are 16. Three domains of decision making that would seem to fit into this category are medical decision making (where health care practitioners can provide information and encourage adolescents to think through their decisions before acting), legal decision making (where legal practitioners, such as defense attorneys, can play a comparable role), and decisions about participating in research studies (where research investigators, guided by institutional review boards, can function similarly). Although adults in these positions cannot and should not make the decision for the adolescent, they surely can take steps to create a context in which adolescents' decision-making competence will be maximized. The position taken by APA in *Hodgson v. Minnesota* (1990), in favor of granting adolescents' access to abortion without the necessity of parental involvement, therefore seems to us to be consistent with the available scientific evidence, so long as youngsters under the age of 16 have the opportunity to consult with other, informed adults (e.g., health care practitioners, counselors).

In contrast, in situations that elicit impulsivity, that are typically characterized by high levels of emotional arousal or social coercion, or that do not encourage or permit consultation with an expert who is more knowledgeable or experienced, adolescents' decision making, at least until they have turned 18, is likely to be less mature than adults'. This set of circumstances likely characterizes the commission of most crimes perpetrated by adolescents (which are usually committed in groups and are seldom premeditated; Farrington, 2003; Zimring, 1998) and may also be typical of other situations where adolescents are emotionally aroused, in groups, absent adult supervision, and facing choices with apparent immediate rewards and few obvious or immediate costs—the very conditions that are likely to undermine adolescents' decision-making competence (Steinberg, 2007). These conditions often prevail in situa-

tions involving the purchase of alcohol and tobacco, driving, and other potentially health-compromising behaviors, such as having unprotected sex. In these cases, adolescents' relative immaturity should be acknowledged either by imposing greater restraints on their behavior than are imposed on adults (e.g., prohibiting the purchase of alcohol, restricting driving to certain hours of the day or certain conditions) or by providing added protections (e.g., prohibiting capital punishment, making condoms easily accessible). Thus, APA's argument that adolescents should not be subject to capital punishment owing to their impulsivity and susceptibility to peer pressure is consistent with the results of our own research and with other scientific studies of psychosocial development that show continued maturation of these capacities well into young adulthood (Steinberg & Scott, 2003).

In our view, then, the seemingly conflicting positions taken by APA in *Roper v. Simmons* (2005) and *Hodgson v. Minnesota* (1990) are not contradictory. Rather, they simply emphasize different aspects of maturity, in accordance with the differing nature of the decision-making scenarios involved in each case. The skills and abilities necessary to make an informed decision about a medical procedure are likely in place several years before the capacities necessary to regulate one's behavior under conditions of emotional arousal or coercive pressure from peers.

Science alone cannot dictate public policy, although it can, and should, inform it. Our data can neither "prove" nor "disprove" the appropriateness of requiring parental involvement before a teenager can obtain an abortion, but they do inform the debate. Nor do our data "prove" or "disprove" whether it is appropriate to apply the death penalty to individuals who are inherently more impulsive than adults and whose characters are not yet fully formed—although, again, they are informative. But our findings do demonstrate how the positions taken by APA in *Hodgson v. Minnesota* (1990) and in *Roper v. Simmons* (2005) are compatible with each other and consistent with the rapidly growing body of scientific evidence indicating that intellectual maturity is reached several years before psychosocial maturity.

Developmental science can and should contribute to debates about the drawing of legal age boundaries, but research evidence cannot be applied to this sort of policy analysis without a careful and nuanced consideration of the particular demands placed on the individual for "adult-like" maturity in different domains of functioning. Jurists, politicians, advocates, and journalists seeking a uniform answer to questions about where we should draw the line between adolescence and adulthood for different purposes under the law need to consider the asynchronous nature of psychological maturation, especially during periods of dramatic and rapid change across multiple domains of functioning.

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