No. 19-8712

IN THE

Supreme Court of the United States

BILLY JOE WARDLOW,

Petitioner,

v.

STATE OF TEXAS,

Respondent.

ON PETITION FOR A WRIT OF CERTIORARI TO THE COURT OF CRIMINAL APPEALS OF TEXAS

BRIEF OF AMICI CURIAE PROFESSIONAL ORGANIZATIONS, PRACTITIONERS, AND ACADEMICS IN THE FIELDS OF NEUROSCIENCE, NEUROPSYCHOLOGY, AND OTHER RELATED FIELDS IN SUPPORT OF PETITIONER

ALAN E. SCHOENFELD
JARED D. HOFFMAN
SIMON B. KRESS
WILMER CUTLER PICKERING HALE AND DORR LLP
7 World Trade Center
250 Greenwich Street
New York, NY 10007
(212) 230-8800

SETH P. WAXMAN
Counsel of Record
WILMER CUTLER PICKERING HALE AND DORR LLP
1875 Pennsylvania Ave., NW
Washington, DC 20006
(202) 663-6000
seth.waxman@wilmerhale.com

TABLE OF CONTENTS

TABLE OF AUTHORITIES

CASES

OTHER AUTHORITIES

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

TABLE OF AUTHORITIES—Continued

INTERESTS OF AMICI CURIAE[1]

Amici are professional organizations, practitioners, and academics with expertise in the fields of developmental neuroscience, neuropsychology, brain imaging, and other related fields. This Court has repeatedly looked to scientific submissions like those offered here when drawing conclusions about adolescent development and the role that the unique attributes of youth play in constitutional decision-making.[2]

---

[1] No counsel for a party authored this brief in whole or in part, and no entity or person, other than amici curiae, their members, and their counsel, made a monetary contribution intended to fund the preparation or submission of this brief. Counsel of record for the parties received timely notice of the intent to file this brief and consented to its filing.

[2] *See Miller* v. *Alabama*, 567 U.S. 460, 471 (2012) ("Our decisions rested not only on common sense—on what 'any parent knows'—but on science and social science as well."); *J.D.B.* v. *North Carolina*, 564 U.S. 261, 273 n.5 (2011) ("Although citation to social science and cognitive science authorities is unnecessary to establish these commonsense propositions, the literature confirms what experience bears out."); *Graham* v. *Florida*, 560 U.S. 48, 68 (2010) ("[D]evelopments in psychology and brain science continue to show fundamental differences between juvenile and adult minds."); *Roper* v. *Simmons*, 543 U.S. 551, 569 (2005) ("[A]s 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.'"); *Stanford* v. *Kentucky*, 492 U.S. 361, 384 (1989) (Brennan, J., dissenting) ("The views of organizations with expertise in relevant fields … merit our attention."); *Thompson* v. *Oklahoma*, 487 U.S. 815, 835 n.42 (1988) (plurality opinion) (citing "a professional evaluation of 14 juveniles condemned to death in the United States which was accepted for presentation to the American Academy of Child and Adolescent Psychiatry").

Based on the well-developed body of research distinguishing the developmental characteristics of adolescents and emerging adults from those of adults, as well as amici's collective professional experience, amici write to explain to the Court that no technology or methodology available now or at the time of Mr. Wardlow's sentencing makes it possible reliably to predict whether someone who commits a crime at the age of 18 will remain dangerous in the future.

The American Academy of Pediatric Neuropsychology (AAPdN) is a voluntary nonprofit scientific and professional organization with approximately 150 members. An integral part of AAPdN's mission is to promote an understanding of the developing brain through interdisciplinary collaboration and targeted scientific development. AAPdN's members work to improve the neuropsychological health of children and adolescents by implementing research-informed clinical practices and by setting discipline-specific competencies to encourage all pediatric neuropsychologists to adopt best practices.

The Center for Law, Brain and Behavior (CLBB) is a nonprofit academic center based at Massachusetts General Hospital. CLBB's mission is to promote the responsible, ethical, and scientifically sound translation of neuroscientific research into the legal arena. CLBB has a distinguished faculty of neuroscientists and legal scholars, and it pursues translational research, cross-disciplinary fellowship training, and the dissemination of sound science through public symposia and scholarly writings. A central part of CLBB's mission is to be of service to the bar and the judiciary with respect to promoting a useful understanding of rapidly emerging neuroscientific data.

The Society for Adolescent Health and Medicine (SAHM) is a multidisciplinary professional society with 1,200 members. Since 1968, SAHM has been committed to the promotion of optimal health and well-being of all adolescents and young adults by supporting adolescent health and medicine professionals through the advancement of clinical practice, care delivery, research, advocacy, and professional development.

Dr. Jason Chein is a Professor of Psychology at Temple University and the Director of the Temple University Brain Research and Imaging Center (TUBRIC). Dr. Chein's overarching research focus is on the use of fMRI and other tools of cognitive neuroscience to understand human cognition and, in particular, executive functioning, learning, problem solving, and decision-making, the development of which are all hallmarks of adolescence.

Dr. John Edens is a Professor of Psychology at Texas A&M University where he formerly served as the Director of Clinical Training for the doctoral program in Clinical Psychology. His research is focused on the development and improvement of psychological assessment methods in correctional settings, including predictive tools for future conduct and risk of violence.

Dr. Adriana Galván is a Professor of Psychology at the University of California, Los Angeles and the Jeffrey Wenzel Term Chair in Behavioral Neuroscience. She holds the position of Director of the Galván Laboratory for Developmental Neuroscience at UCLA. Her research focuses on characterizing the neural mechanisms underlying adolescent behavior. Dr. Galván is a Board Member and on the Leadership Team of the Center for the Developing Adolescent.

Dr. Scott A. Huettel is the Chair of Duke University's Department of Psychology and Neuroscience and a Senior Advisor to the Director of The Duke-UNC Brain Imaging and Analysis Center. His research uses a combination of behavioral, genetic, physiological, and neuroscience techniques to discover the neural mechanisms that underlie higher cognition, with a focus on economic and social decision-making and the application of new analysis methods for fMRI data. Dr. Huettel is the lead author of the most commonly used textbook on fMRI.

Dr. William Kelly is the Director of the Center for Criminology and Criminal Justice Research at the University of Texas at Austin, where he is also a Professor of Sociology. He has taught and conducted research in criminology and criminal justice for over 25 years, with a particular focus on behavioral health and diversion programs. Dr. Kelly is the author of four books on the justice system and is currently working on his fifth; one of the main focuses of his writing has been juvenile justice and the causes and correlates of criminal behavior.

Dr. Terrie Moffitt is the Nannerl O. Keohane University Professor of Psychology at Duke University and Professor of Social Development at King's College London. Dr. Moffitt is the Associate Director of Dunedin Longitudinal Study, a seminal study of human development that began in 1972, and she founded the Environmental Risk Longitudinal Twin Study, which follows a 1994 birth cohort in the United Kingdom. Her expertise is in developmental theory, clinical mental health research, neuropsychology, and genomics in behavioral science, and she is also a licensed clinical psychologist with a specialization in neuropsychological assessment. Dr. Moffitt is a member of the National Academy of Medicine.

Dr. Russell Poldrack is the Albert Ray Lang Professor in the Department of Psychology and Professor (by courtesy) of Computer Science at Stanford University and Director of the Stanford Center for Reproducible Neuroscience. His research uses neuroimaging to understand the brain systems underlying decision making and executive function. In 2009, he was elected as Chair of the Organization for Human Brain Mapping. Dr. Poldrack serves as a member of the External Advisory Board for the Adolescent Brain Cognitive Development study.

Dr. Stephen M. Strakowski is the Vice Dean of Research and Associate Vice President for Regional Mental Health at Dell Medical School at the University of Texas at Austin. He is also a Professor in the Department of Psychiatry and Professor (by courtesy) in the Department of Psychology. In his role at Dell Medical School, Dr. Strakowski is guiding the redesign of mental health care delivery for 38 counties in Central Texas and leads a Center for Youth Mental Health focused on improving the care of individuals who are 15-25 years old and struggle with psychiatric conditions. He previously served as Dell's inaugural Chair of the Department of Psychiatry. He has a long history of using brain imaging to study psychiatric diagnoses, thereby developing dual expertise in neuroscience and psychiatry, in addition to extensive clinical and academic experience with adolescents and younger children.

INTRODUCTION AND SUMMARY OF ARGUMENT

This case presents the question whether the Eighth Amendment permits a State to predicate the death penalty on a jury determination that an 18-year-old convicted of murder "will more likely than not commit criminal acts of violence in the future so as to

constitute a continuing threat to society." The great weight of scientific evidence—much of it developed over the past 15 years—shows clearly that reliable determinations about future dangerousness cannot be made with respect to violent offenders under 21 years of age. Because the Eighth Amendment prohibits the State from executing individuals based on unreliable or arbitrary determinations, *see Johnson* v. *Mississippi*, 486 U.S. 578, 584 (1988), no sentence of death consistent with the Constitution may be predicated on a prediction of an 18-year-old's propensity for future dangerousness.

Over the last 15 years, this Court has issued three landmark decisions that significantly altered the treatment of young people in the criminal justice system. *Miller* v. *Alabama*, 567 U.S. 460 (2012); *Graham* v. *Florida*, 560 U.S. 48 (2010); *Roper* v. *Simmons*, 543 U.S. 551 (2005). In all three decisions, the Court looked to an established scientific consensus regarding adolescent development and considered the unique attributes of youth when applying constitutional protections to juvenile offenders. As a result, the Court's "decisions rested not only on common sense—on what 'any parent knows'—but on science and social science as well." *Miller*, 567 U.S. at 471.

Over that same 15-year period, advancements in neuroscience and brain imaging research have revealed that the unique characteristics of youth this Court identified in *Roper*, *Graham*, and *Miller*—immaturity, susceptibility, and changeability—persist beyond age 18. It is now well-established that a human brain continues to undergo profound changes throughout adolescence and young adulthood—a period sometimes referred to as "emerging adulthood"—in the areas and systems that are regarded as most involved in impulse

control, planning, and self-regulation.[3] Brain imaging and other novel developments in neuroscience have made visible the differences between the developing brain and the adult brain as never before, effecting a paradigm shift in the way the behavior of emerging adults is understood in the scientific community. Well-established, peer-reviewed research, as well as our collective professional experience, demonstrate that it is scientifically impossible reliably to predict the future dangerousness of an offender who commits a crime while under the age of 21.

Billy Joe Wardlow was 18 years old when he killed Carl Cole in northeast Texas in 1993. He was convicted of capital murder and sentenced to death in 1995 based on the sole aggravating factor then available in the Texas death penalty statute—whether the defendant was likely to be dangerous in the future. But Texas's death penalty statute under which Mr. Wardlow was sentenced to death turned on a determination that cannot be made in any objectively reliable manner for offenders who commit crimes under the age of 21. In *Roper*, this Court observed that "[i]t is difficult even for expert[s] … to differentiate between the juvenile offender whose crime reflects unfortunate yet transient immaturity, and the rare juvenile offender whose crime reflects irreparable corruption." 543 U.S. at 573. That was an understatement. It simply cannot be done with any technology or methodology available today to the

[3] Emerging adulthood has been loosely defined as the period between adolescence and the mid-to-late-20s. Henin & Berman, *The Promise and Peril of Emerging Adulthood: Introduction to the Special Issue*, 23 Cognitive & Behav. Prac. 263, 263 (2016); *see also* Steinberg, *Adolescence* 4 (11th ed. 2017) (defining adolescence as beginning with puberty and ending when individuals make the transition into adult roles, roughly from ages 10 to the early 20s).

scientific community, and it certainly could not be done in 1995 when Mr. Wardlow was sentenced to death.

ARGUMENT

THERE IS NO RELIABLE WAY TO PREDICT THE FUTURE DANGEROUSNESS OF AN OFFENDER WHO COMMITS A VIOLENT CRIME WHILE UNDER THE AGE OF 21

I. ADVANCEMENTS IN NEUROSCIENCE RESEARCH HAVE TRANSFORMED THE SCIENTIFIC COMMUNITY'S UNDERSTANDING OF THE DEVELOPING BRAIN

In the last 15 years, technological advancements have transformed our understanding of the developing brain. In particular, "remarkable research has been conducted in the field of developmental neuroscience to provide a richer understanding of brain function and development during adolescence and emerging adulthood."[4] Scientists have now demonstrated that the signature qualities of youth this Court previously identified in *Roper* v. *Simmons*, 543 U.S. 551, 569-570 (2005)—immaturity, susceptibility, and changeability—are marked in the very fibers of their brains. Indeed, as the U.S. National Institutes of Mental Health has recognized, these recent advances "have altered long-held assumptions about the timing of brain maturation," revealing that the brain does not become recognizably *adult* until after the age of 20.[5]

---

[4] Victor & Hariri, *A Neuroscience Perspective on Sexual Risk Behavior in Adolescence and Emerging Adulthood*, 28 Dev. & Psychopathology 471, 472 (2016).

[5] National Inst. of Mental Health, *The Teen Brain: Still Under Construction* 2 (2011), https://bit.ly/2N4ZoYU.

Recent scientific advancements include the following: (1) the tools and methods of analysis used in conducting functional magnetic resonance imaging (fMRI) research have become vastly more sophisticated and commonplace in neuroscience research;[6] (2) diffusion tensor imaging (DTI), a form of MRI that allows neuroscientists to study the white matter structure of the brain, has provided new insights into how the wiring of the brain changes over the course of adolescent development;[7] and (3) new approaches to understanding functional networks in the brain, such as resting-state functional connectivity magnetic resonance imaging (RS-fcMRI), have enabled critical advancements in studies of individual and group development.[8]

With these advancements, neuroscientists have demonstrated that the brain is not yet fully developed in critical respects relevant to a determination of future dangerousness until well after the age of 18. Incontro-

---

[6] *See* Smith, *fMRI 2.0: Functional Magnetic Resonance Imaging Is Growing from Showy Adolescence into a Workhorse of Brain Imaging*, 484 Nature 24, 25 (2012) (noting that "fMRI has been applied to almost every aspect of brain science" and that "[i]n 2010, neuroscientists used fMRI in more than 1,500 published articles").

[7] *See* Horton et al., *Neuroimaging Is a Novel Tool to Understand the Impact of Environmental Chemicals on Neurodevelopment*, 26 Current Opinion Pediatrics 230, 231-232 (2014) (describing DTI and other "[r]ecent advances in neuroimaging techniques" that have "opened unprecedented access to study the developing human brain").

[8] *See* Shannon et al., *Premotor Functional Connectivity Predicts Impulsivity in Juvenile Offenders*, 108 Proc. Nat'l Acad. Sci. U.S. 11241, 11241 (2011) (describing RS-fcMRI studies as "rapidly emerging as a major theme of human imaging research" and applying that tool to study how young people's brains develop).

vertible evidence of significant changes in brain structure and function during adolescence and emerging adulthood are consistent with and suggest the physiological basis for the observed psychosocial immaturity of adolescents and emerging adults, confirming that their impulsivity, vulnerability, and changeability render them, as a group, meaningfully different from adults. *Roper*, 543 U.S. at 569-570. But this new understanding of the developing brain also reveals how little we know about the persistence of youthful antisocial behavior into adulthood. No known technology or methodology would allow an expert to differentiate between an emerging adult whose antisocial behavior is due to neurological immaturity and an emerging adult who is likely to be dangerous in the future.

A. Risk-Taking And Impulsivity Correlate With Brain Development

Recent findings in neuroscience show that adolescents and emerging adults are physiologically predisposed to risky, impulsive decision-making as a result of two developmental processes.

First, in early adolescence, specific brain regions, notably the ventral striatum within the basal ganglia, mature in ways that promote reward- and sensation-seeking, leading to riskier behavior.[9] Recent, seminal neuroimaging studies show that a heightened sensitivity to rewards dominates adolescent decision-making.[10]

---

[9] Casey et al., *The Adolescent Brain*, 28 Development Rev. 62, 64 (2008).

[10] *Id.* at 67; *see also* Crone et al., *Annual Research Review: Neural Contributions to Risk-Taking in Adolescence – Developmental Changes and Individual Differences*, 57 J. Child Psychol. & Psychiatry 353, 359 (2016).

Research also shows that development of the amygdala between early adolescence and adulthood elevates the brain's sensitivity to emotional triggers. In fMRI studies in which subjects were shown images of human faces in expressions of fear, researchers found that adolescents, relative to adults, exhibited a general pattern of "heightened amygdala activity and slower behavioral responses to fearful faces."[11] That finding suggests "increasing emotion regulation capacity from adolescence to adulthood"[12] and "continued functional change from young childhood through early adulthood."[13] In other words, adolescents and emerging adults tend to be more susceptible to emotional interference and more prone to make poor decisions—even when they know better.[14]

Second, during adolescence and emerging adulthood, transformations in the prefrontal cortex and its communication circuitry radically alter the brain's ability to regulate emotions and decision-making.[15] Struc-

---

[11] *See* Heller & Casey, *The Neurodynamics of Emotion: Delineating Typical and Atypical Emotional Processes During Adolescence*, 19 Developmental Sci. Rev. 3, 5-6 (2016).

[12] *Id.*

[13] Gee et al., *A Developmental Shift from Positive to Negative Connectivity in Human Amygdala—Prefontal Circuitry*, 33 J. Neuroscience 4584, 4590 (2013).

[14] Hare, *Biological Substrates of Emotional Reactivity and Regulation in Adolescence During an Emotional Go-NoGo Task*, 63 Biological Psychiatry 927, 933 (2008); *accord* Boyer & Bergstrom, *Threat-Detection in Child Development: An Evolutionary Perspective*, 35 Neuroscience & Biobehavioral Revs. 1034, 1035 (2011).

[15] *See* Spear, *The Behavioral Neuroscience of Adolescence* 81-90 (2010); Gogtay et al., *Dynamic Mapping of Human Cortical*

tural MRIs show decreases in gray matter throughout adolescence, while the structural integrity of white matter continues to increase throughout adolescence and early adulthood.[16] This reduction of gray matter reflects a winnowing of connections within and between the prefrontal cortex (executive function) and the basal ganglia, "allow[ing] for fine tuning and strengthening of connections."[17]

Meanwhile, the volume of white matter in the brain begins to increase dramatically.[18] This increase reflects, in part, the process of myelination, whereby neural pathways are insulated with a white fatty tissue

---

Development During Childhood Through Early Adulthood, 101 Proceedings Nat'l Acad. Sci. 8174, 8175 (2004); Huttenlocher, *Neural Plasticity: The Effects of Environment on the Development of the Cerebral Cortex* 41, 46-47, 52-58, 67 (2002); Casey et al., *Structural and Functional Brain Development and its Relation to Cognitive Development*, 54 Biological Psychol. 241, 242-243 (2000).

[16] Crone, 57 J. Child Psychol. & Psychiatry at 357.

[17] Casey, 28 Development Rev. 62 at 65; *accord* Caballero et al., *Mechanisms Contributing to Prefrontal Cortex Maturation During Adolescence*, 70 Neuroscience & Biobehavioral Revs. 4, 5 (2016) ("During the first two decades of life, the gray matter in the frontal cortex experiences a significant decrease in volume. … The consistent thinning of neocortical structures observed in humans in cross-sectional and longitudinal studies occurs at a time of synaptic pruning[.]").

[18] *See* Westlye et al., *Life-Span Changes of the Human Brain White Matter: Diffusion Tensor Imaging (DTI) and Volumetry*, 20 Cerebral Cortex 2055, 2062 (2010). One well-known longitudinal MRI study at the National Institute of Mental Health documented an increase in white matter continuing through the teenage years to at least age 22. *See* Giedd et al., *Brain Development During Childhood and Adolescence: A Longitudinal MRI Study*, 2 Nature Neuroscience 861, 861-862 (1999) (study of 145 children and adolescents scanned up to five times over approximately 10 years).

called myelin.[19] That insulation "speeds … neural signal transmission," making "communication between different parts of the brain faster and more reliable."[20] Increased white matter volume enables individuals to modulate anxiety, deal with fear, and become socially adept.[21]

In sum, new neuroimaging studies reveal that the prefrontal cortex—an area of the brain associated with reasoning and executive function—remains developmentally immature and underregulated until the mid-20s, while the brain's reward centers are relatively overexpressed, making emerging adults "more vulnerable to impulsivity," less capable of emotional reasoning, and more likely to make "errors in self-regulation."[22] Because of these developmental delays, the judgment and decision-making of adolescents and emerging adults differ from adults' in several respects: they are less able to control their impulses; they weigh the risks and rewards of possible conduct differently; and they are less able to envision the future and apprehend the consequences of their actions. Even older ad-

---

[19] Steinberg, *A Social Neuroscience Perspective on Adolescent Risk-Taking*, 28 Developmental Rev. 78, 94 (2008); *see also* Giedd, 2 Nature Neuroscience at 861.

[20] Goldberg, *The Executive Brain: Frontal Lobes and the Civilized Mind* 144 (2001); *see also* Spear, *Adolescent Neurodevelopment*, 52 J. Adolescent Health 7, 8-9 (2013).

[21] *See* Jacobus et al., *White Matter Integrity, Substance Use, and Risk Taking in Adolescence*, 27 Psychol. Addictive Behav. 431, 431-432 (2013).

[22] Henin & Berman, 23 Cognitive & Behav. Prac. at 265; Taber-Thomas & Perez-Edgar, *Emerging Adult Brain Development*, in *The Oxford Handbook Of Emerging Adulthood* 126, 126-127 (Jeffrey Jensen Arnett ed., 2016).

olescents who have developed general cognitive capacities similar to those of adults show deficits in these aspects of social and emotional maturity.[23] Therefore, it is impossible for experts to distinguish whether an emerging adult who engages in risky or impulsive behavior is merely evincing a neurological immaturity or, rather, exhibiting signs of a dangerous future.

B. Susceptibility To External Influences Correlates With Brain Development

Recent developments in neuroimaging confirm both the conventional wisdom and previous psychological studies that adolescents and emerging adults are much more susceptible to influence from peers.[24]

During adolescence, the brain systems governing thinking about social relationships undergo significant change.[25] Compared to adults, adolescents and emerging adults show heightened activity in the brain's reward centers when faced with a variety of social stimuli, such as facial expressions and social feedback, making young people particularly attuned to and motivated by the views and actions of their peers.[26] In essence, the effect of being in a charged emotional context is to make the adolescent and emerging adult brain "look

---

[23] Steinberg, *Adolescent Development and Juvenile Justice*, 5 Ann. Rev. Clinical Psychol. 47, 55-56 (2008).

[24] Scott & Steinberg, *Rethinking Juvenile Justice* 38 (2008).

[25] *See* Blakemore & Mills, *Is Adolescence a Sensitive Period for Sociocultural Processing?*, 65 Ann. Rev. Psychol. 187, 189 (2014); Blakemore, *Development of the Social Brain in Adolescence*, 105 J. Royal Soc'y Med. 111, 112 (2012).

[26] *See* Blakemore & Mills, 65 Ann. Rev. Psychol. at 189; Blakemore, 105 J. Royal Soc'y Med. at 112.

younger" than it actually is.[27] Similarly, adolescents and emerging adults are also more sensitive to social threats.[28] As the brain matures, increased self-regulation is "facilitated by the increased connectivity between regions important in the processing of emotional and social information and regions important in cognitive control processes."[29] This developmental pattern is consistent with adults' superior ability to make mature judgments about risk and reward, and to exercise cognitive control over their emotional impulses, especially in circumstances that are socially charged.[30] But while the brain of someone under 21 can signal emotions like the adult brain, it fails to regulate or process those emotions as well as an otherwise similar adult.

Peer-influence is especially pronounced when it concerns risky behavior. Several studies have found that risk-taking is increased amongst adolescents and

---

[27] Rudolph et al., *At Risk of Being Risky: The Relationship Between "Brain Age" Under Emotional States and Risk Preference*, 24 Developmental Cognitive Neuroscience 93, 102 (2017).

[28] Hare, 63 Biological Psychiatry at 927-934.

[29] Somerville et al., *A Time of Change: Behavioral and Neural Correlates of Adolescent Sensitivity to Appetitive and Aversive Environmental Cues*, 72 Brain & Cognition 124, 132-133 (2010) (noting importance of white-matter development and the "functional network [in] mediat[ing] the ability to exert control in the face of emotion"); Steinberg, *Should the Science of Adolescent Brain Development Inform Public Policy?*, 64 Am. Psychologist 739, 743 (2009).

[30] Chein et al., *Peers Increase Adolescent Risk Taking By Enhancing Activity in the Brain's Reward Circuitry*, 14 Developmental Sci. F1 (2011); Spear, *The Behavioral Neuroscience of Adolescence* 121-126.

young adults in the presence of peers compared to either being alone or being in the presence of an adult, whereas peer presence has little impact on risk-taking among adults.[31] For example, one recent behavioral study reported that 18- to 22-year-old participants took more risks in the presence of same-age peers than when they were either alone or in the presence of a slightly older young adult.[32]

The ability for peer-presence to undermine the brain's decision-processing mechanisms persists into young adulthood, and is likely attributable to the asynchronous neurological developments that define this period.[33] In short, what social science has told us about the relationship between peer-influence and antisocial behavior in adolescents and emerging adults is reflected in what we now know about the brain. "A necessary condition for an adolescent to stay law-abiding is the ability to deflect or resist peer-pressure," a cognitive process that is not fully developed until adulthood.[34]

---

[31] Gardner & Steinberg, *Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study*, 41 Developmental Psychol. 625, 626-634 (2005).

[32] Silva et al., *Adolescents in Peer Groups Make More Prudent Decisions When a Slightly Older Adult Is Present*, 27 Ass'n Psychological Sci. 322, 327-329 (2015).

[33] Reniers et al., *Is It All in the Reward? Peers Influence Risk-Taking Behaviour in Young Adulthood*, 108 Brit. J. Psychol. 276, 277 (2017); Rudolph, 24 Developmental Cognitive Neuroscience at 102.

[34] Zimring, *Penal Proportionality for the Young Offender: Notes on Immaturity, Capacity and Diminished Responsibility*, in *Youth on Trial* 271, 280-281 (Thomas Grisso & Robert Schwartz eds., 2000).

For these reasons, and based on what we now know, discerning a signal of an 18-year-old's future dangerousness is an impossible undertaking.

II. THE MEANS OF PREDICTING FUTURE VIOLENCE IN ADULTS RELY ON METRICS THAT, IN THE CASE OF ADOLESCENTS AND EMERGING ADULTS, VERY LIKELY REFLECT THE TRANSIENT CHARACTERISTICS OF YOUTH

In light of what science has now shown about the developing brain, there is a broad consensus in the neuropsychological community that it is impossible to determine whether an 18-year-old—even one that has committed an act of deadly violence—is likely to commit acts of violence as a mature adult. The most common means of predicting future violence in adults rely on metrics that, in the case of adolescents and emerging adults, are more likely to reflect the transient characteristics of youth. Neither an 18-year-old capital defendant's offense conduct nor his prior criminal history can reliably predict future dangerousness because even youth who commit violent and repeated crime are overwhelmingly likely to grow out of it. Predictions of future violence in the case of an 18-year-old are inherently unreliable and will lead to many more false positives than accurate predictions.

In the case of an 18-year-old capital defendant, neither the offense conduct nor prior criminal history is a reliable predictor of future violence. Research shows that almost all adolescents and emerging adults who engage in antisocial or violent conduct desist as a by-product of the maturation process.[35] "[T]he vast major-

---

[35] Steinberg et al., *Psychosocial Maturity and Desistance from Crime in a Sample of Serious Juvenile Offenders*, DOJ, Ju-

ity of adolescents who engage in criminal or delinquent behavior desist from crime as they mature."[36] In fact, a substantial portion of young people who engage in criminal conduct—from 25 to upwards of 50%—are "instantaneous desisters," or people for whom the first offense is also the last.[37] Even those adolescents and young adults who do not desist after their first offense overwhelmingly do so soon thereafter. Researchers estimate that the percentage of juvenile offenders who desist from crime by their mid-20s ranges from 85 to 90%,[38] a pattern that holds regardless of offense type,

---

venile Justice Bulletin (Mar. 2015), https://bit.ly/3hxgFrE; *see also* Laub & Sampson, *Understanding Desistance from Crime*, 28 Crime & Justice 1, 5 (2001) ("It is well known that crime declines with age in the aggregate population.").

[36] Steinberg & Scott, *Less Guilty by Reason of Adolescence: Developmental Immaturity, Diminished Responsibility, and the Juvenile Death Penalty*, 58 Am. Psychologist 1009, 1014-1015 (2003).

[37] *See, e.g.*, Kurlycheck, et al., *Long-Term Crime Desistance and Recidivism Patterns—Evidence from the Essex County Felony Study*, 50 Criminology 71, 97-98 (2012); Erickson, *Delinquency in a Birth Cohort: A New Direction in Criminological Research*, 64 J. Crim. L. & Criminology 362, 364 (1973) (study of 9,945 juvenile delinquents in Philadelphia revealed that "46 percent were classified as one-time offenders"); Piquero et al., *The Criminal Career Paradigm*, 30 Crime & Justice 359, 389 (2003) (25-year longitudinal study of juveniles adjudged delinquent showed that "61 percent of [] subjects in [the] delinquent sample reached their maximum level of seriousness in offending during adolescence").

[38] Moffitt, *Adolescent-Limited and Life-Course-Persistent Antisocial Behavior: A Developmental Taxonomy*, 100 Psychol. Rev. 674, 680 (1993); Steinberg, *The Influence of Neuroscience on U.S. Supreme Court Decisions about Adolescents' Criminal Culpability*, 14 Neuroscience 513, 516 (2013).

including cases of violent crime.[39] Ultimately, of the many who engage in criminality in their youth, researchers estimate that only "5% or 6%" are "life-course-persistent offenders."[40] The high rate of criminal conduct during adolescence and emerging adulthood, coupled with the massive rates of desistance for offenses of all types, render it impossible to predict which 5-6% of young offenders will persist with criminality into adulthood. "[C]hildhood antisocial behavior is so common that it predicts chronic offending only weakly, if at all."[41]

In fact, researchers have consistently concluded that the behavior of juveniles who will and will not continue as criminal offenders through adulthood is "often indistinguishable during adolescence."[42] In first distin-

---

[39] *See* Laub & Sampson, 28 Crime & Justice at 52 ("What is also striking … is that there appear to be no major differences in the process of desistance for nonviolent and violent juvenile offenders."); Moffitt, 100 Psychol. Rev. at 678 ("[M]easures of the frequency or seriousness of adolescent offending will not discriminate very well between life-course-persistent and adolescence-limited delinquents.").

[40] Moffitt, 100 Psychol. Rev. at 676, 688.

[41] *See* Lynam, *Early Identification of Chronic Offenders: Who Is the Fledgling Psychopath?*, 120 Psychol. Bulletin 209, 211 (1996); *see also* O'Shaughnessy, *Violent Adolescents: Psychiatry, Philosophy, and Politics*, 32 J. Am. Acad. Psychiatry & L. 12, 14 (2004) ("The fact that many [young people] desist … highlights the complexity of predicting violent behavior [during youth.]"); Steinberg & Scott, 58 Am. Psychologist at 1014 ("[M]aking predictions about the development of relatively more permanent and enduring traits on the basis of patterns of risky behavior observed in adolescence is an uncertain business.").

[42] Monahan et al., *Trajectories of Antisocial Behavior and Psychosocial Maturity from Adolescence to Young Adulthood*, 45 Developmental Psychol. 1654, 1655 (2009); *see also* Edens et al.,

guishing between those who commit crimes only as adolescents and those who continue to commit crimes as adults, researchers recognized that they could not "effectively assign individual delinquent adolescents to meaningful subtypes on the basis of … their antisocial behavior during adolescence."[43] And experts who have dedicated their careers to identifying risk factors associated with persistent criminality continue to acknowledge that "[t]he results show very imperfect predictions of which offense trajectory individuals will follow over time," and to warn against the "danger that policy makers will start to use less than good predictions as a rationale for harsh punishments and severe legal sanctions."[44] Thus, extensive research confirms that antisocial behavior should not be considered as a basis to make long-term predictions of an adolescent's or emerging adult's violent behavior because such predictions will mistake the hallmark features of youth for permanent defects and dramatically overpredict the number of young people will be violent in the future.

In sum, the evidence is clear that Mr. Wardlow was sentenced to death based on a prediction of future dan-

---

Assessment of "Juvenile Psychopathy" and Its Association with Violence: A Critical Review, 19 Behav. Sci. & L. 53, 59 (2001) (collecting evidence that psychopathy assessments may "tap construct-irrelevant variance associated with relatively *normative* and *temporary* characteristics of adolescence rather than deviant and stable personality features"); Mulvey & Cauffman, *The Inherent Limits of Predicting School Violence*, 56 Am. Psychologist 797, 799 (2001) ("Assessing adolescents … presents the formidable challenge of trying to capture a rapidly changing process with few trustworthy markers.").

[43] Moffitt, 100 Psychol. Rev. at 678.

[44] Loeber et al., *Violence and Serious Theft: Development and Prediction from Childhood to Adulthood* 333 (2008).

gerousness that was scientifically unfounded when made and refuted by his character today. Established neuroscience, neuropsychology, and brain imaging confirms this point, and so should this Court.

CONCLUSION

The Court should grant the petition.

Respectfully submitted.

ALAN E. SCHOENFELD
JARED D. HOFFMAN
SIMON B. KRESS
WILMER CUTLER PICKERING
HALE AND DORR LLP
7 World Trade Center
250 Greenwich Street
New York, NY 10007
(212) 230-8800

SETH P. WAXMAN
Counsel of Record
WILMER CUTLER PICKERING
HALE AND DORR LLP
1875 Pennsylvania Ave., NW
Washington, DC 20006
(202) 663-6000
seth.waxman@wilmerhale.com

JUNE 2020