

CHRISTEN A. CARSON, PH.D., ABPP

Clinical and Forensic Psychology
Board Certified in Forensic Psychology
Board Certified in Couple and Family Psychology

6523 California Ave SW Suite# 522
Seattle, WA 98136-1833

(206) 386-2280 drccarson@mac.com

Licensed psychologist: Washington #PY00002700, Florida # PY10389

EXPERT AFFIDAVIT OF CHRISTEN A. CARSON, PHD, ABPP

I, Dr. Christen A. Carson, state that the following is true to the best of my knowledge, information, and belief:

1. I am a clinical and forensic psychologist in private practice in Seattle, Washington. I am the past-president of the Washington State Psychological Association.
2. I am Board Certified in Forensic Psychology by the American Board of Professional Psychology and a Faculty Member of the American Board of Forensic Psychology.
3. I am Board Certified in Couple and Family Psychology by the American Board of Professional Psychology and President-Elect of the American Board of Couple and Family Psychology.
4. Among other areas, I specialize in juvenile and adult sentencing mitigation. I have completed over 100 forensic evaluations and provided oral testimony approximately 40 times.
5. I am serving as a clinical case consultant for the Federal Judicial Center - Center for Law Brain and Behavior workshop: *Science-Informed Decision-Making* (Harvard Law School, June 2024).
6. I have provided regional and national training, including for the American Board of Forensic Psychology (Portland, Oregon), the Association of Family and Conciliation Courts (AFCC), and an upcoming workshop on youthful sentencing considerations at the national American Psychological Association (APA) conference (Seattle, Washington, August 2024).

7. A current copy of my Curriculum Vitae is attached as Exhibit “A.”
8. The statements below are based on my education and training regarding adolescent brain development and its relationship to criminal offending.
9. The science of adolescent brain development has significant implications for the culpability of youth involved in the criminal justice system.
10. Offense behavior and decision-making exhibited by an individual before their mid-20s reflects the neurodevelopmentally limited capabilities of a brain still growing and maturing. Decades of neurodevelopmental research has concluded: “It is well established that the brain undergoes a ‘rewiring’ process that is not complete until approximately 25 years of age.”¹ By rewiring, neuroscientists mean that intricate connections are formed and pruned throughout adolescence and young adulthood, during which time the full capabilities of the brain—from decision-making to emotional regulation—are steadily cultivated. A brain in adolescence or late adolescence (ages 18 through the early 20s) is one still in progress.
11. Youth between the ages of 18 and the early 20s are more similar to younger adolescents than adults in their brain development, primarily in terms of reduced capacity for emotional regulation, judgment, and risk appraisal. These reduced capabilities are particularly evident in contexts of “hot cognition.”² When late adolescents are in situations of hot cognition, their mental processing of information is adversely impacted by strong emotions, immediacy, and stress. Unsurprisingly, much youthful criminal or illegal behavior is perpetrated in such hot cognition contexts.
12. A hallmark sign of immaturity in adolescence is “sensation-seeking.” Sensation-seeking is evidenced when individuals exhibit a strong desire to seek out intense, exciting experiences with decreased regard for risk. Data indicate that sensation-seeking peaks around age 19, while the capacity for self-regulation—a behavior that opposes sensation-seeking – develops gradually throughout adolescence and plateaus around the mid-20s³.
13. The reduced sensation-seeking and increased ability to self-regulate demonstrated by adults flow from the progressive development and wiring of the prefrontal cortex. The prefrontal cortex and related networks are responsible for executive functioning,

¹ Arain, M., Haque, M., Johal, L., Mathur, P., Nel, W., Rais, A., Sandhu R., & Sharma, S. (2013). Maturation of the adolescent brain. *Neuropsychiatric disease and treatment*, 9, 449.

² Casey, B. J., Taylor-Thompson, K., Rubien-Thomas, E., Robbins, M., & Baskin-Sommers, A. (2020). Healthy Development as a Human Right: Insights from Developmental Neuroscience for Youth Justice. <https://doi.org/10.1146/annurev-lawsocsci-101317-031101>

³ Steinberg et al. (2017). Around the world, adolescence is a time of heightened sensation seeking and immature self-regulation. *Developmental Science*. 21(2), e12532.

including impulse control and modulation of emotions. The maturation of the prefrontal cortex and its associated networks over the course of adolescence and young adulthood accounts for improvements in a wide variety of domains, from planning and strategizing to the modulation of intense emotions and focusing of attention. These domains are essential to the regulation of emotion and well-reasoned decision making.

14. Adolescent and late-adolescent *neurological* immaturity is expressed in *functional* immaturity—which may be evidenced in underdeveloped moral reasoning, faulty weighing of risks and benefits, and judgment impulsivity in offense conduct⁴.
15. Initial judicial adoption of neurodevelopmental research focused on the limitations of youth who were younger than 18. This may have prompted a misunderstanding that late teens and early 20s possess fully mature capabilities. However, there is no bright line separating offenders younger than 18 from those that are in the “late adolescent” category. There is diverse evidence for this neurodevelopmental continuum. Four lines of research demonstrate that brain development and its functional expressions continue up to age 25: psychosocial-behavioral assessments, morbidity and mortality data, functional neuroimaging during task performance, and neuroimaging.⁵

- a. *Psycho-social-behavioral assessment:*

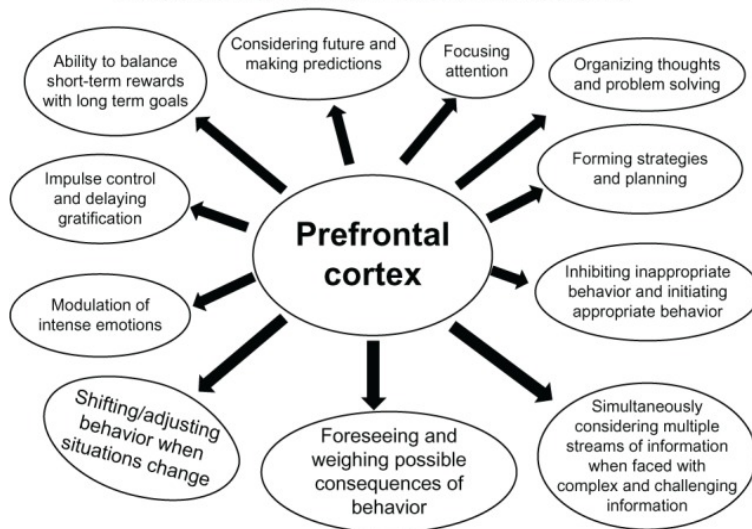
Important pro-social psychological capabilities develop from the teens to the mid-20s. Psycho-social-behavioral assessment during the late teens and early 20s demonstrates continued progression in a number of executive functions, as reflected in the model below:⁶

⁴ Cunningham M. D. (2022). *Miller evaluations*. In R. Roesch (Ed.), *Routledge encyclopedia of psychology in the real world, psychology and law*. New York: Routledge, Taylor & Francis Group.

⁵ Cunningham, M. D. (2022). *Miller evaluations*. In R. Roesch (Ed.), *Routledge encyclopedia of psychology in the real world, psychology and law*. New York: Routledge, Taylor & Francis Group.

⁶ Arain, M., Haque, M., Johal, L., Mathur, P., Nel, W., Rais, A., Sandhu, R., & Sharma, S. (2013) Maturation of the adolescent brain. *Neuropsychiatric Disease and Treatment*, 13(9), 449-461.

Executive human brain functions



As the brain matures from the late teens to the mid-20s, psycho-social capabilities develop for complex thinking, greater appreciation for diverse views, improved understanding of mutuality in relationships, increased emotional regulation, and greater ability to weigh risks and benefits.⁷

With progressive emotional, social, and intellectual maturity, better control over behavior develops. Steinberg, Cauffman, and Monahan⁸ described three aspects of such psychosocial maturity essential to desistance from crime:

- *Temperance*: The ability to control impulses, including aggressive impulses.
- *Perspective*: The ability to consider other points of view, including those that take into account longer-term consequences or that take the vantage point of others.
- *Responsibility*: The ability to take personal responsibility for one's behavior and resist the coercive influences of others.

b. Morbidity and mortality data:

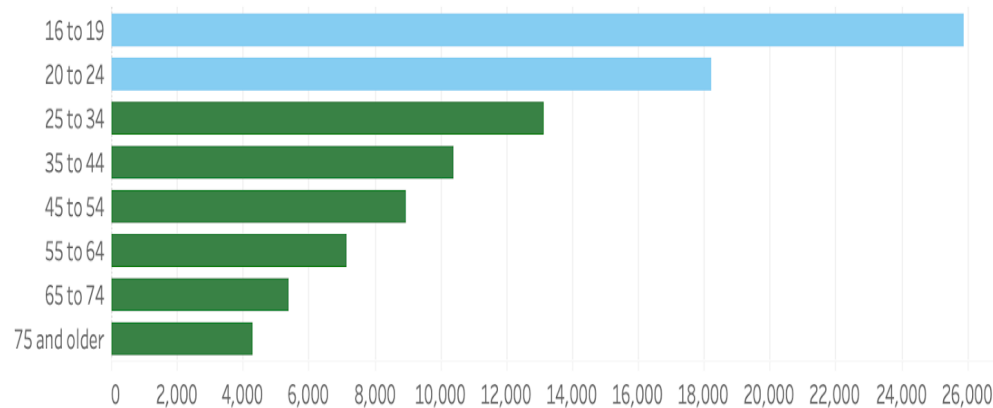
Various sources of morbidity and mortality data demonstrate the behavioral implications of brain immaturity and associated decision-making, as well as the

⁷ Simpson, R. (2008). Young Adult Development Project. MIT

⁸ Steinberg, L., Cauffman, E., & Monahan, K. (2015). Psychosocial maturity and desistance from crime in a sample of serious juvenile offenders. *Juvenile Justice Bulletin*, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.

steadily accruing benefits of psychosocial maturity with age in the late teens and early 20s. Studies of data from car crashes prove instructive in highlighting the consequences of this neurodevelopment. To illustrate, the graph below from the National Safety Council (2021) reflects driver crash rates per 100,000 licensed drivers by age group. Note that crashes in the 16 to 19-year-old age group and 20 to 24 age group are significantly higher than that of older cohorts.

Drivers in crashes per 100,000 licensed drivers



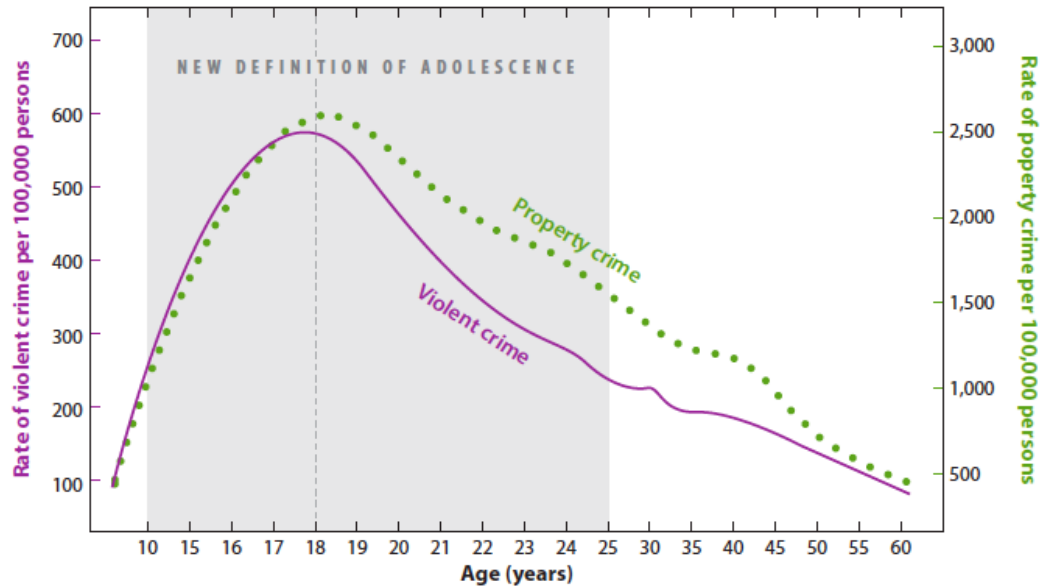
Recognition of the actuarial and statistical implications of a driver being less than 25 years old is demonstrated by the policies of car rental companies toward drivers younger than 25 (e.g., declining to rent to these drivers, applying significant surcharges, and restricting these drivers to specific vehicles.) The data supporting these restrictions are sufficiently broad that there is no attempt to make a case-by-case determination based on driving history or other individualized metrics.

Harvard's White Paper on the Science of Late Adolescence: *A Guide for Judges, Attorneys, and Policy Makers* (2022) similarly notes adolescents' elevated risk-taking decisions and behaviors in multiple behavioral domains:

Compared to adults, middle and late adolescents are more likely to engage in behaviors that risk their lives and well-being. Many health risk behaviors peak in late adolescence and young adulthood. This includes risk-taking behaviors and risk-related outcomes such as reckless driving, unprotected sex, and unintentional injuries—further, overdose deaths and substance misuse peak in late adolescence and early adulthood.⁹

⁹ White Paper on the Science of Late Adolescence: A Guide for Judges, Attorneys, and Policy Makers (2022). Center for Law, Brain, and Behavior.

Age-crime data similarly demonstrate the behavioral implications of brain immaturity through age 25 as reflected in offending patterns mapped over the lifespan. Violent crime and property crime markedly decrease after age 25 compared to age 17-19, as reflected in the figure below:¹⁰



(Casey et al., 2022)

The age-crime curve demonstrates the decreased level of offending subsequent to brain development and increased psychosocial capacities.

c. Functional neuroimaging during task performance

The chronology of brain development can be followed using neuroimaging measurements, in particular functional MRI (fMRI). Neuroimaging through fMRI can evaluate the brain and its various circuits and connectivities in action. In fMRI studies analyzing large-scale brain activity over several years, there is a noticeable lag in the development of the prefrontal cortex and the associated frontoparietal network (as compared to other regions of the brain). These later-developing regions are responsible for evaluative decision-making, impulse control, and emotional regulation, and account for diminished behavioral control in adolescents.

d. Neuro-imaging (MRI/CT)

Brain maturation does not reflect a singular developmental track. Instead, it is a multilayered and parallel process. There is an early priority in the development of

¹⁰ Casey, B. J., Simmons, C., Somerville, L. H., & Baskin-Sommers, A. (2022). Making the sentencing case: Psychological and neuroscientific evidence for expanding the age of youthful offenders. *Annual Review in Criminology*, 5, 1-23.

subcortical limbic circuits - the reward circuits involved in immediate need attainment (such as desire, fear, and rage) - over the prefrontal cortex, which is involved in executive functions of impulse control, planning, and predicting outcomes such as negative consequences. In emotionally charged situations, the limbic circuits are prioritized, as they are better developed than executive systems of the prefrontal cortex. The latter reaches full capability in the mid 20s.

16. The neurodevelopmental immaturity demonstrated by all adolescents can be exacerbated or augmented by developmental adversity. Such adversity may include neurodevelopmental and psychological disorders, trauma and deprivations in the family system, and corruptive and violent communities. As these accrue, *particular* functional immaturity may be observed.
17. In spite of the robustness and broad applicability of the above scientific findings, a variety of faulty metrics have been asserted in individual cases in denying the role of brain immaturity in adolescent offending. Among the more routinely encountered examples are the following:
 - a. *Planning vs. impulsivity*: There may be an assertion that an offense does not reflect the impetuosity of youth because planning was involved, and therefore, the actions do not appear impulsive. This reflects a misunderstanding of impulsivity. To explain, “spontaneous” and “impulsive” overlap but are not synonymous terms/concepts.

There are two types of impulsivity. The first type is *reactive impulsivity*. Reactive impulsivity involves an immediate reaction without pause or reflection: e.g., you are shoved, and you shove the other person back. It is spontaneous in its immediacy. Reactive impulsivity is most often observed in pre-school-age children, persons who are intoxicated, persons in a crisis or emergency situation, and persons with dementia.

The second type of impulsivity is *judgment impulsivity*. Judgment impulsivity is characterized by the press of internal forces, with inadequate consideration for consequences or alternative options. For example, you meet someone today and spend the next two days planning your wedding and life together. On the third day, you marry. This represents a profoundly impulsive action, even though two days were spent in planning. Judgment impulsivity is particularly characteristic of adolescents¹¹.

¹¹ Cunningham, M. D. (2022). *Miller evaluations*. In R. Roesch (Ed.), *Routledge encyclopedia of psychology in the real world, psychology and law*. New York: Routledge, Taylor & Francis Group.

Further, planning is *not* inconsistent with immaturity. The capability to plan is a feature of human cognition that arises during the preschool years with progressive development in the complexity of plans that may be supported. Planning is a continuous and not dichotomous variable. For that reason, the presence of a plan does not contraindicate youthful vulnerabilities.

- b. *Features of the offense*: An assertion may be made that if features of the offense behavior are similar to behaviors enacted by adults, then the vulnerabilities of youth are not applicable, e.g., motive of pecuniary gain, efforts to avoid detection, etc. However, the role of youthfulness is not demonstrated in the offense being completely distinct from that carried out by an adult. Certainly there are features that are more commonly observed among youthful offenders. There are no features of adolescent offending, though, that are completely distinctive to that group alone.

To illustrate, car accidents occur with both adult and in adolescent drivers. These accidents may emanate from the similar behavioral features, including excessive speed, inattention, and stimulation. However, teens exhibit these risky behaviors more frequently than adults. One can't differentiate the role of youthful immaturity by inspecting the accident itself. Rather, the role of immaturity is demonstrated by marked reduction in such crash-risk behaviors among drivers older than 25.

- c. *Wrongful awareness*: It is sometimes asserted that if a youth "knew" an act was wrong, then youthfulness immaturity is not implicated. However, moral awareness and reasoning are more complex than a recognition that behavior is "wrong." To illustrate, a typically situated 5-year-old knows that it is wrong to kill another person. However, that recognition is socially regarded as so primitive and superficial that a 5-year-old would never be held to the level of criminal responsibility or moral culpability applied to a 25-year-old for the same homicidal conduct. From psychological research, it is understood that moral reasoning is not an all-or-nothing phenomenon. Rather, it accretes to age 25, encompassing such varied constituents as a moral code, increased empathy, and sensitivity to the impacts of actions.
- d. *No "homunculus"*: It may be asserted that though a youthful defendant was immature in some respects, his offense behavior did not reflect such immaturity, thus rendering his age irrelevant as a sentencing consideration. This postulates a homunculus, i.e., miniature "person" of maturity, intact discernment, and moral clarity who somehow magically sits outside of youthful limitations and impairments, formulating offense conduct as if an adult. This homunculus is a fiction. The immature brain and associated limitations in decisional capabilities

and moral reasoning are the only resources a youthful defendant possesses for understanding and acting on the world at the time of offense conduct.

18. The faculties of moral discernment and reasoning, facets of decisional and judgment capability, are products of increased brain development. Accordingly, the qualitative development of these capabilities is progressive through childhood and into the mid-20s and significantly accounts for the greater capacity of adults to desist from criminal conduct. Desistance from crime is also demonstrated by recidivism data, including the low recidivism rates in *Miller*¹² releases¹³.
19. Courts have already incorporated these findings in their sentencing decisions. For example, Washington State's *O'Dell* case applied this developmental science in sentencing considerations, stating, "The science proves that youth reduces culpability and is therefore relevant to the sentence imposed upon an individual defendant." The Washington courts have further adopted and relied on this science, with the *Monschke* court noting, "no clear line exists between childhood and adulthood" and "individual youthful characteristics may mitigate the sentences of these two young petitioners."
20. Taken as a whole, the body of neuroscientific evidence regarding adolescent brains is clear. By biological fact, adolescents wield a brain that, in its circuitry and anatomy, is tilted towards emotion, intensity, impulsivity, and poor self-regulation. However, these decisional and behavioral vulnerabilities recede with progressive brain development to age 25. Increased age and desistance from crime is a well-known phenomenon that squares well with our neurodevelopmental evidence that executive function, emotional regulation, and increased quality of moral reasoning progressively establish themselves as the brain matures. Courts would be remiss to ignore this body of evidence in their sentencing procedures—to ignore the impact of brain development until the mid-20s, and to make negative predictions about future behavior in the face of overwhelming evidence in favor of desistance.

Respectfully submitted,

Christen A. Carson, PhD, ABPP

¹² *Miller v. Alabama*, 567 U.S. 460 (2012).

¹³ Beckett and Goldbert. (January 12, 2024). *Sentencing reform in Washington State: Progress and Pitfalls*; Daftary-Kapur, T., & Zottoli, T. (2020) Resentencing of juvenile lifers: The Philadelphia experience. *Department of Justice Studies Faculty Scholarship and Creative Works*, 84. Department of Justice Studies, Monclair State University; Samples, S. (August 2021) Crime by "juvenile lifers" after prison "very rare," State says. *Target 8 News*. Grand Rapid, Michigan.