Juveniles Neuronal Development and Criminal Justice

When Neurosciences meet Criminal Law

NICOLÒ CAPPUCCITTI*

Abstract: This paper delves into the deepest and most relevant intersections between juveniles brain development and Criminal Law. It aims to understand and analyze current neuroscientific revelations pertaining to brain development in young adults, and how these same findings have impacted jurisdictions and legislations' ways of handling the sentencing of younger individuals. Furthermore this article supports its arguments mainly on the basis of the most current and detailed neuroscientific research, focusing on the neuronal changes interesting adolescents' brains, particularly focusing on the process of myelination, and the effects on behavioral patterns, such as an increase in explorative conducts and a generally diminished perception of danger. Key judicial rulings, such as the ones held in Roper v. Simmons (543 U.S. 551, 2005), Atkins v. Virginia (536 U.S. 304, 2002), and Miller v. Alabama (567 U.S. 460, 2012) are then examined to demonstrate how the U.S. judicial system has started to recognize the objectively diminished culpability in minors. Finally, the paper illustrates potential Italian Criminal Law flaws on the grounds of youth culpability via a comparative approach, moreover taking into account recent successful legislative innovations.

Keywords: Criminal Law; Juveniles; Fairness of Judgment; Death Penalty; Neurosciences.

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1. *The relevance of fixed legal ages*

In recent years, advancements in neuroscience research have shed light on the functioning of the adolescent[1] brain and its stages of development and maturation, with special regard to the prefrontal cortex, which is the cortical region of the brain that is known to develop the last[2]. Albeit it has always been the age of eighteen being regarded as the bright-line threshold- by which an individual is deemed fully conscious and willing of his actions- recent researches reasonably argue that comprehensive cognitive maturity might not be achieved, especially in areas such as executive function[3], risk-assessment, and decision-making, up until the mid-twenties[4]. Given the extreme variability in brain maturation processes, this leads to complicated consequences on adolescents' conduct and predictability thereof, making them more likely influenceable to peer validation,

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* Nicolò Cappuccitti is a third-year Law student at the University of Milan.Particularly fond of Commercial and Criminal Law, he contributes to legal scholarship with a close regard to interdisciplinary issues. Currently, he volunteers as a lecturer of E.U. Law and International Commercial Law via the Ministry of Education and Merit of Italy. He also is a member of the Pax Moot Team 2025, representing his University.

[1] Notably, while a precise notion of adolescence has yet to be determined, most scientific literature holds that this period relates to the 10 - 24 years old age range. See generally Kaplan PS. Adolescence. Boston, MA: Houghton Mifflin Company; 2004.

[2] See Arain M, Haque M, Johal L, Mathur P, Nel W, Rais A, Sandhu R, Sharma S. *Maturation of the adolescent brain. Neuropsychiatr Dis Treat. 2013 at 449-461, available at https://pmc.ncbi.nlm.nih.gov/articles/PMC3621648/ (last visited 24/11/2024)*

[3] See, eg., Laurence Steinberg, *Risk Taking in Adolescence: What Changes, and Why?*, 1021 ANNALS. N.Y. ACAD. SCI. 51, 57 (2006).

[4] See *ibid*.

more prone to finding themselves in risky circumstances[5], and comparatively more subjected to stress[6] than adult defendants[7]. Coherently, legislators have always strived to grapple with precise age limits for which an individual is deemed to be responsible for certain acts, and to which extent this individual can exercise specific juridical powers. These legal ages establish rigid thresholds at which individuals gain or lose certain rights[8] or duties[9], or are otherwise invested in special responsibilities, for they are considered comprehensively "fit"[10] by the given field of Law. Internationally, legal thresholds do vary across most jurisdictions, considerably so. At large, minors are exempt from obtaining tattoos or piercings without

[5] Injury and violence are known to be the most frequent causes of death among juveniles. In a U.S.-based study, it was outlined how out of 19 million adolescents aged 15-24 diagnosed with ST illnesses, 39% of them admitted to have had unprotected sex; moreover 30% of them had been involved in motorcycle incidents (41% of which resulted to be fatal); 12% committed suicide; and 15% of them had been involved in homicides (especially as a victim thereof). See Guyer AE, McClure-Tone EB, Shiffrin ND, Pine DS, Nelson EE. *Probing the neural correlates of anticipated peer evaluation in adolescence,*at 1000–1015 (Child Dev. 2009).

[6] See Giedd JN. *Structural magnetic resonance imaging of the adolescent brain,* 77-85 Ann NY Acad Sci. (2004)..

[7] See generally Giedd JN, Blumenthal J, Jeffries NO, et al. *Brain development during childhood and adolescence: a longitudinal* MRI study. Nat Neurosci. 1999;2(10):861–863.

[8] In Italy, the legal voting age is set at 18 years, allowing individuals of this age or older to participate in elections for both local and national offices. See Law No. 39 of 1975, which lowered the minimum voting age from 21 to 18 for most elections.

[9] In South Korea, compulsory military service is governed by the Military Service Act, which mandates that all able-bodied male citizens serve in the military for a period of 18 to 21 months, depending on the branch. This requirement aims to bolster national defense and applies to men between the ages of 18 and 28. The Act allows for exemptions and alternative service options under certain conditions, such as for those with physical or mental health issues or specific cases involving exceptional talents that contribute to the nation. See Act No. 18003, (Apr. 13, 2021).

[10] For example, Italian Law exempts minors to the general principle of civil unfitness as for labor purposes, as provided by special Laws, recognizing a specific capacity of the child to 'contract' its occupational status; See Article 2.2, Italian Civil Code.

their parents' consent[11], they cannot purchase cigarettes or tobacco-based products[12], nor can juveniles willingly discontinue their own education[13]. In the U.S., the age required for the individual to be able to legally purchase alcoholic substances is set at twenty-one years old[14] (even though variations within each State legislation do occur[15]), whereas the legal age to be eligible for purchasing a long gun from a licensed dealer[16], is set as low as eighteen[17] (without accounting to mere ownership laws, for which, in some States, a long gun can be owned starting at sixteen years old of age[18]). The association of different legal ages to different legal effects constitutes a natural consequence of moral, scientific, and legal dogmas, constantly surveilled and subjected to a gradual evolution of values and societal standards. The identification of the utmost precise legal age for assigning criminal culpability is vital in those legal systems honored

[11] For example, State of California Penal Code § 653 rules that everyone who "tattoos or offers to tattoo someone under the age of 18 is guilty of a misdemeanor".

[12] In California, Business and Professions Code § 22958 establishes that individuals must be 21 years of age to purchase tobacco products, except for active-duty military personnel aged 18 or older, who may do so with valid military identification. Civil penalties for retailers who violate this code include fines and potential license suspensions or revocations based on repeat offenses within a five-year period. See California Business and Professions Code § 22958.

[13] Under Montana law, children must remain enrolled in school until they turn 16 or complete the 8th grade, whichever is later. Exemptions to this requirement exist for specific circumstances, such as illness or other valid reasons permitted by school policies See Mont. Code Ann. § 20-5-103.

[14] For example, the State of N.Y. fixes the legal age for drinking at twenty-one years old. See Alcoholic Beverage Control Law, §65-C.

[15] For example, in Texas, minors may consume alcohol on licensed premises if accompanied by a parent, guardian, or spouse of legal drinking age. See Texas Alcoholic Beverage Code §106.04.

[16] Indeed, while the minimum age to purchase a long gun from a licensed dealer is set at age 18, any unlicensed dealer can sell or otherwise transfer a long gun to a person of any age. Long guns include rifles and shotguns. See 18 U.S.C. § 922(b)(1), (c)(1).

[17] See *ibid*.

[18] See Alaska Stat. § 11.61.220(a)(3).

by the principle of juridical equality, on the grounds of judicial fairness and discretion of treatment. Given these general premises, this paper strives to understand whether two different juveniles, who can be both deemed as being adolescents – by definition, a transitory period - with regard to brain maturation, should be deserving of a virtually unjustifiable differentiation of substantial and procedural legal discourse, based on the latest neuroscientific research, as well as via the analysis of legislative landmarks and groundbreaking historical judicial rulings that shaped our concept of criminal Law.

2. *Brain Development in Adolescent and Criminal Intent*

The realm of criminal Law is constructed upon notions of both culpability and blameworthiness. While blameworthiness represents a necessary prerequisite for punishment[19] – as no act act shall be considered wrong if moral fault cannot be assigned to it - it is far from accounting as a sufficient factor[20]. For a fact to be deserving of punishment, not only must it be morally inconvenient, but it as well shall be culpable. Specifically, culpability acts as a tape measure of moral reprehension, placing wrongfulness on a vast spectrum of fault, thus classifying the defendant's conduct. For culpability to serve its purpose, mens rea – the need for a certain mental state to get recognized – constitutes an elemental criteria deserving of consideration in assigning criminal responsibility. Even though a state of "intentional" behavior – for which the defendant directly desired the outcome of his conduct – is not always required by the Law, mens rea's inspection helps at identifying and selecting the severity of the defendant's responsibility, thus graduating the seriousness of the penalty. Indeed, as literature underlines, an "act without a mental state is usually not a crime"[21]. I would moreover argue, that not only an act ought not to be

[19] See Jenny E. Carroll, *Brain Science and The Theory of Juvenile Mens Rea*, volume 94 N.C.L. REV. at 539(2016).

[20] See Stephen F. Smith, *Proportional Mens Rea*, volume 46 AM. CRIM. L. REV. at 127 (2009).

[21] See Liza Little, *Miller v. Alabama: A Proposed Solution for a Court That Feels Strongly*

described as felonious if a mental state is not present at all, but also whenever the mental state does not present the specific graduation of mens rea the Law requires[22]. The concept of criminal intent serves as one of the fundamental pillars which interprets the extent to which an individual shall be criminally prosecuted, acting as a caliper of guilt. On average[23], mens rea stands to verify whether defendants presented, at the time for which the crime was committed, both the understanding of the nature and of the consequences of his actions[24], as well as the ability of the individual himself to form intent while performing a specific criminal act. Given these presuppositions on which substantial criminal Law structures itself upon, legislators have always attempted to classify some circumstances[25] as capable of excluding or diminishing culpability. Popularly, one of the historical classes that most jurisdictions have regarded as unfit for trial or unblameable are children, purporting how only kids would present an objectively disparate ability to discern between fair and unwarranted behaviors. Based on the evidence I will analyze, these assumptions appear to be a weakly purported vision of reality. Criminal Law's main scope is to tackle and dissuade unwanted reprehensible human behaviors, but for legislators to do so effectively it is crucial to retrace the roots of these same behavioral patterns: we need to understand our brain's ways of functioning to evenly craft efficient criminal norms and dispositions. Current understandings of neuroscience have now demonstrated how human brains grow, particularly as it pertains to the cognitive

Both Ways, Southern California Law Review, Volume 88 at 1493(2015).

[22] For example, certain acts require a minimum mental state of recklessness or negligence. Sometimes, certain acts can only be punished when the individual had the intention to produce them.

[23] Ordinarily, mens rea structures do not differ significantly between legal systems, but some elements could be subjected to divergent interpretations.

[24] Article 85 pursuant to the Italian Penal Code, refers indeed to the concept of 'imputability', it comprising both the capacity of forming intent towards a specific criminal act, as well as the ability of the defendant to move himself throughout his surroundings, making understood choices.

[25] See articles 88, 89, 96, 97, 98 of the Italian Penal Code, for they exclude some precisely identified individuals from being subjectable to criminal penalties.

maturation of juveniles. Neuroscientific research unequivocally establishes that our brain is involved in a series of continuous and gradual processes of development[26], spanning well throughout the mid-twenties up to thirty-two years old[27], altering relevant behavioral-related areas pertaining to impulse control, assessment of risks, emotional regulation, stress-bearing capabilities, as well as presumably heightening overall aggressiveness[28]. It is indeed widespread how juveniles are not known for being responsible, rational, or otherwise popular for their prudential way of conducting their lives. According to the U.S.-based study[29], teenagers are the ones who are more likely to be found involved in situations concerning risky contexts, such as drug abuse, reckless driving accidents, and sex-contracted transmissible illnesses, via irresponsible unprotected sexual intercourse (e.g. HIV, AIDS)[30]. The tumultuous changes observable in the stage of life known as adolescence - which can be roughly defined as the period extending from ten to twenty-four years old[31] - can be traced down to several stressors, capable of impacting several regions of the brain. One of the

[26]cited in note 2.

[27] See Talia Stewart, Note, *Capital Punishment of young adults in Light of Evolving Standards of Science and Decency: Why Ohio Should Raise the minimum age for Death Penalty Eligibility to twenty-five*, volume 70 CLEV. ST. L. REV. 91 (2021).

[28] Indeed, adolescents aged 18 to 20 are disproportionately responsible for school shootings, public mass shootings, and overall gun homicides, accounting for 17% of gun offenders in the U.S. See Paul M. Reaping et al., *State Firearm Laws, Gun Ownership, and K-12 School Shootings: Implications for School Safety,* Journal of School Violence volume 21, no. 2 at 132–46 (2022); See also Joshua D. Brown and Amie J. Goodin, *Mass Casualty Shooting Venues, Types of Firearms, and Age of Perpetrators in the United States, 1982–2018,* American Journal of Public Health volume 108, no. 10 at 1385–387 (2018); See also Jaclyn Schildkraut, *Can Mass Shootings be Stopped? To Address the Problem, We Must Better Understand the Phenomenon,* Rockefeller Institute of Government and Regional Gun Violence Research Consortium (July 2021).

[29] See Guyer, McClure-Tone, Shiffrin, Pine, Nelson. *Probing the neural correlates of anticipated peer evaluation in adolescence, 80 (4) , SO* Child Development 1000, 2009; available at https://srcd.onlinelibrary.wiley.com/doi/10.1111/j.1467-8624.2009.01313.x (last visited 24/11/2024).

[30] See *id*, at page number.

[31] See Kaplan PS. Adolescence. Boston, MA: Houghton Mifflin Company; 2004.

most important phenomena taking place in juveniles' divergent minds during this stage of life is myelination, a process tasked with the formation of protein sheaths around axons of neurons[32], contributing to a healthy executive functioning of the nervous system and insulation thereof. Myelination is heavily influenced by both external and internal stressors, spanning from caffeine[33] and cannabis[34] intake to sex hormones[35] (e.g. progesterone, testosterone, estrogen, estradiol), the latter of which are especially found in spiked concentrations during adolescence years[36]. In addition, chemotherapeutic compounds[37] as well as improper nutrition[38] during infancy, have been studied to

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[32] See Georgia Lockwood Estrin, Supriya Bhavani, vol.number *Encyclopedia of Infant and Early Childhood Development*, (insert publisher 2nd ed 2020).

[33] Cited in note 2.

[34] In animals, cannabinoid intake during adolescence caused memory and learning deficiencies. In humans, cannabis intake could lead to refinement issues during brain maturation, potentially increasing psychotic illnesses or facilitating mental abnormalities' development. See Palmer RH, Young SE, Hopfer CJ, et al,. *Developmental epidemiology of drug use and abuse in adolescence and young adulthood: evidence of generalized risk,* 102 Drug Alcohol Depend 78–87 (2009), available at insert link; See also Bossong NG, Niesink RJ,. *Adolescent brain maturation, the endogenous cannabinoid system and the neurobiology of cannabis-induced schizophrenia,* 92(3) Journal's name 370 370–385 (2010).

[35] See generally Peper JS, van den Heuvel MP, Mandl RC, Hulshoff Pol HE, van Honk J. *Sex steroids and connectivity in the human brain: a review of neuroimaging studies*,36(8) Insert Journal's name 1101, ,1101–1113 (2011), available at https://www.sciencedirect.com/science/article/abs/pii/S0306453011001570?via%3Dihub (last visited 24/11/2024).

[36] See *id*.

[37] See Vázquez E, Delgado I, Sánchez-Montañez A, Barber I, Sánchez-Toledo J, Enríquez G., *Side effects of oncologic therapies in the pediatric central nervous system: update on neuroimaging findings, 31(4) Journal's name missing 1123,* 1123–1139 (2011), available at https://pubs.rsna.org/doi/10.1148/rg.314105180?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed (last visited 24/11/2024).

[38] According to a number of studies, nutrition deficiencies could impair certain genes responsible for myelination, eventually resulting in schizophrenia or postpubertal psychoses. See Rayyan , Devlieger , Jochum , Allegaert *Short-Term Use of Parenteral Nutrition With a Lipid Emulsion Containing a Mixture of Soybean Oil, Olive Oil, Medium-*

significantly impact neuronal maturation. Moreover, certain neurotransmitters have been found liable to impairing self-regulation, such as serotonin, melatonin and dopamine[39]. More importantly, serotonin and dopamine levels tend to decrease during adolescence[40], determining a reduction in impulse control and causing mood swings. Oestradiol and progesterone are especially found to play a significant role in enhancing risk-taking tendencies[41]. Other major changes in brain maturation involve alterations in the limbic system[42], which is responsible for emotional balance and regulation, possibly triggering a "biologically driven"[43], thus inevitable, heightened risk-taking[44]. This amount of predominantly neurobehavioral and neurochemical evidence leads to a well-supported conclusion: the brain pertains in a state of maturation determined by the ongoing process of myelination, together with gamma-aminobutyric acid GABAergic

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*Chain Triglycerides, and Fish Oil,*A Randomized Double-Blind Study in Preterm Infants,36(1S), American Society for Parental and Enteral nutrition 81S, 81S–94S (2012), available at https://aspenjournals.onlinelibrary.wiley.com/doi/10.1177/0148607111424411 (last visited 24/11/2024).

[39] See Arain et al.,,., *Maturation of the adolescent brain*.at 449-461 (cited in note 33).

[40] See Wahlstrom D, et al., *Developmental changes in dopamine neurotransmission in adolescence: behavioral implications and issues in assessment,* 72(1) Journal's name 146, 146–159 (2010), available at https://pmc.ncbi.nlm.nih.gov/articles/PMC2815132/ (last visited 24/11/2024).. See aso Dahl RE., *Beyond raging hormones: the tinderbox in the teenage brain,* 5(3) Journal's name 7, 7–22 (2003), available at https://www.researchgate.net/publication/237667972_Beyond_Raging_Hormones_The_Tinderbox_in_the_Teenage_Brain (last visited 24/11/2024)..

[41] See Suzanne O'Rourke et al., *The development of cognitive and emotional maturity in adolescents and its relevance in judicial contexts*, submitted to the Scottish Sentencing Council, Scottish Sentencing Council, pg. 9, 2020.

[42] See Arain M, et al., *Maturation of the adolescent brain*.
, (cited in note 33)

[43] See Laurence Steinberg, Risk Taking in Adolescence: What Changes, and Why?, 1021 ANNALS N.Y. ACAD. SCI. 51,57 (2006).

[44] See Choudhury S, Blakemore SJ, Charman T,. *Social cognitive development during adolescence*, 1(3) Journal's name 165, 165–174 (2006) available at https://pmc.ncbi.nlm.nih.gov/articles/PMC2555426/ (last visited 24/11/2024).

neurotransmission[45], the latter found to prevalently interest the prefrontal cortex[46]. The brain engages in a constant process of "rewiring"[47] throughout adolescence, having experts in the field verified how a surge in neuronal growth[48], similar to the one observed during infancy, is expected to take place immediately after puberty concludes. This reinforces how relevant this age period is for the purposes of brain maturation and behavioral patterns understanding. The latter evidence is also underscored by the Longitudinal MRI study. After this second surge of neurons has successfully taken place, the process of rewiring, assisted by the processes of myelination and dendritic pruning, can finally start. Dendritic pruning is known to eliminate unutilized synapses[49], whereas the process of myelination helps better communication between these neuronal connections, improving the speed of impulse conduction within the brain, allowing for better external stimuli processing. During adolescence, the presence of white matter (W.M.) is seen to increase[50] in the so-called corpus callosum, a major structure connecting the two hemispheres of the brain, enabling the individual to better process external stressors and to more cleverly manage complex situations and events[51]. Nevertheless,

[45] See Li K, Xu E., *The role and the mechanism of gamma-aminobutyric acid during central nervous system development*, 24(3), Journal's name 195, :195–200 (2008), available at https://link.springer.com/article/10.1007/s12264-008-0109-3 (last visited 24/11/2024).

[46] See Guyer AE, et al., *Probing the neural correlates of anticipated peer evaluation in adolescence*, 80(4) Journall's name 1000, 1000–1015 (2009), available at https://pmc.ncbi.nlm.nih.gov/articles/PMC2791675/ (last visited 24/11/2024).

[47] See Arain M, et al., *Maturation of the adolescent brain,* (cited in note 33)

[48] See Baird AA, Gruber SA, Fein DA, et al., *Functional magnetic resonance imaging of facial effect recognition in children and adolescents*, 38(2) Journal's name 195, J:195–199 (1999), available at https://www.jaacap.org/article/S0890-8567(09)62897-5/abstract (last visited 24/11/2024).

[49] See *ibid*.

[50] See Frontline: Inside the Teenage Brain Arlington (TX) Public Broadcasting Service; 2002, available at : http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/ (last visited 24/11/2024)

[51] See Arain M, et al., *Maturation of the adolescent brain,* at page number (cited in note 33).

because of an underlying physiologically underdeveloped prefrontal-cortex, the juvenile could partake in said experimental behaviors, even if the adolescent himself is able to autonomously deem a specific scenario as dangerous[52]. Indeed, neuroscientific evidence furthermore indicates how the prefrontal cortex - one of the most important regions in the brain located just behind our forehead - experiences significant alterations well beyond the mid-twenties[53], since the cortical region develops the slowest[54]. Studies[55] have shown an increase in myelin secretion in adolescents' frontal lobes, allowing for the growth of new neurocircuitry, which finally tries to counteract emotional imbalances determined by the limbic system[56]. The prefrontal cortex is highly relevant to criminal doctrine in the way it regulates abstract thought, discernments of behavior, and character of the individual, leading to emotional volatility and behavioral impulsivity[57] i. Indeed, the prefrontal cortex is said to be tasked with "executing complex behavioral performance". It is safe to conclude how the amount of neuronal morphological and neurochemical evidence that stands in support of the argument of juvenile brain development, is extraordinarily large. The intersection encompassing criminal intent and scientific literature's current knowledge of brain development represents a multiplex challenge for modern legal systems. Therefore, it

[52] See *ibid*.

[53] See generally Casey BJ, Jones RM, Hare TA. The adolescent brain. Ann NY Acad Sci. 2008;1124:111–126. doi: 10.1196/annals.1440.010.

[54] See Arain M, et al., *Maturation of the adolescent brain,* at page number (cited in note 33).

[55] See Giedd JN, Blumenthal J, Jeffries NO, et al., *Brain development during childhood and adolescence: a longitudinal MRI study,* 2(10), Journal's name 861, 861–863(1992).; See also Baird AA, et al., , *Functional magnetic resonance imaging of facial affect recognition in children and adolescents, at page number (cited in note 48).*

[56] See Arain M, et al., *Maturation of the adolescent brain, at page number (cited in note 33).* Neuropsychiatr Dis Treat. 2013;9:449-61. doi: 10.2147/NDT.S39776. Epub 2013 Apr 3. PMID: 23579318; PMCID: PMC3621648.

[57] See *ibid.*

is increasingly clear how current legal frameworks may not comprehensively reflect the factual observations hereby summarized.

3. *Juveniles and the Death Penalty in the U.S. Supreme Court and State Jurisprudence*

March 1993, Christopher Simmons, a seventeen-years-old boy from the State of Missouri, conceived and executed an abhorrent crime consisting in the murder of Shirley Crook. Simmons, together with two accomplices younger than him, first trespassed into Crook's home, abducted her tape and electrical wire, bound her hands behind the victim's back, then moved her to the nearest bridge, and eventually threw her in the Meramec river underneath. Crook drowned, in direct consequence of Simmons' atrocious criminal performance. Simmons was steadfastly arrested as he immediately reenacted[58] and confessed of his crime, which was also supported by the testimony of one of his two accomplices, J. Tessmer. One of his peers the defendant used to 'brag' of his unlawful accomplishment, both before and after Simmons' conduct, sure that he would have gotten "away with it"[59] because of his juvenile status. Defendant Simmons, in State v. Simmons (1997), was eventually found guilty of the crimes of first-degree murder[60] and abduction, for which the jury advised for capital punishment. Such punishment had already been inflicted in cases of similar nature[61]. While the defendant attempted

[58] Defendant Simmons consented to a videotaped reenactment of the facts. See Id.

[59] See *ibid*.

[60] The offense of murder of the first-degree is a class A felony under Missouri's Law, punishable either via capital punishment (after Roper v. Simmons – U.S. 533: provided the individual is eighteen years old or older at the time of murder) or imprisonment for life without parole under Missouri's current §565.020, Title XXXVIII of Missouri's Statute, also having to consider specifically shaped factors of sentencing pursuant to §565.033, Title XXXVIII, when the trial involves minors.

[61] Indeed, similar aggravating circumstances led to the infliction of the penalty of death in State v. Copeland, State v. Kreutzer, State v. Tokar. In the latter of the cases, the death penalty was advised when the defendant exhibited depravity of the mind and as well committed the murder while the victim had been bound. .;

to argue the disproportionality of the conviction, the jury nevertheless found three distinct aggravating factors of Mr. Simmons' conduct: (a) "depravity of the mind"[62], (b) having the defendant conducted the murder for the purpose of cold "pecuniary gain"[63], as well as (c) having the defendant tried to avoid a lawful arrest[64]. In light of these circumstances, the jury denied Simmons main argument. The trial court finally convicted and sentenced Simmons to death, due to "uncontroverted"[65] evidence of plotting, kidnapping, and murder. Simmons attempted[66] to file a Rule 29.15[67] motion of legality under Missouri's Court Rules, steadfastly overruled by the Supreme Court of Missouri, eventually corroborating the conviction to death of the seventeen-year-old. The death penalty has always been a somewhat unique and longstanding fixture to the American Criminal justice system , that has always gone essentially undisputed and mostly uncondemned throughout the twenty-first century. That is until new protagonists entered the premises of Criminal Law: the newest findings of how human neuronal pathways mature. Since its introduction, the structure of capital punishment underwent serious changes: one of the most important ones is the jurisprudential definition of "exemption

[62] See also The Court used this case to underscore the proportionality of the conviction to death.

[63] In accordance with § 565.032.2 (4).

[64] In accordance with § 565.032.2 (10).

[65] Public Defender guilt closing statement. See *id*.

[66] Simmons argued the Court was illegitimate under State v. Harvey (arguing the Court holding jurisdiction for a case of murder), State v. Lingar (concerning the identification of the venue whenever a crime has been partially committed in several Counties), and Wainwright v. Witt (with respect to Jury's selection criteria). See Id.,; ; Wainwright v. Witt ,469 U.S. 412, 414 (1985).

[67] Missouri Court Rule 29.15 governs post-conviction relief for individuals challenging the legitimacy of their sentence, conviction, or trial procedures after conviction in a criminal case. This rule outlines procedures for filing a motion to vacate, set aside, or correct a conviction and includes details about deadlines, counsel appointment, and grounds for relief, aiming to streamline post-conviction review and prevent repeated filings. See Missouri Court Rules, Rule 29.15.

circumstances"[68], whose subsistence juridically impairs the infliction of the death penalty. Some categorical exemptions for which certain classes should be per se excluded from the application of the death penalty in the U.S. (with no regard to the actual crime that was committed or severity thereof) include: (a) juveniles who were younger than sixteen at the time of the crime, as well as (b) individuals bearing "psychiatric delusion" to an extent for which they would be considered incompetent for execution, and (c) juveniles who were younger than eighteen when the t felonious conduct was performed, since Roper v. Simmons (543 U.S.) cornerstone ruling. First and foremost, one of the fundamental rulings in U.S. jurisprudence is Atkins v. Virginia, a decision that ruled the unconstitutionality[69] pertaining to the execution of the intellectually disabled persons[70]. Pursuant to the Court's papers, the ruling's main issue was to discern which individual actually had an intellectual deficiency of such a rigor and severity capable of justifying the discretion in judicial treatment. Several interpretations and nuances followed the Supreme Court's decision, such as in Hall v. Florida (572 U.S. 701, 2021)[71.] held how a rule delineating a person with a sub-average I.Q. of 70 had to be regarded as objectively intellectually underdeveloped. Without the possibility of any spectrum of litigation, it constituted an illegitimate application of Atkins' ruling, making it vividly impossible for the somewhat less-smarter-than-the-median defendant to be tried for death, only on the grounds of a mere I.Q. test. Conversely, Hall v. Florida[72] also stated how "borderline" defendants, referring to individuals who scored a slightly higher I.Q. score (e.g., a score of 75), could be unreasonably

[68] See *id*.

[69] It held that the VIII and XIV Amendments to the U.S. Constitution prohibited the execution of the mentally retarded, overturning Penry v. Lynaugh.

[70] See *id*. The Court started using the term 'intellectually disabled' (I.D.) in place of 'mentally retarted'.

[71] See, 572 U.S. 701, 704 (2021).

[72] See *ibid*.

deemed as mentally fit, under Atkins skewed interpretation, thus able to receive the death penalty, provoking an unjust imbalance of treatment. While the Atkins Court did not handle nor underscore the underlying scientific knowledge, founding its conclusions on superficial I.Q. score tables assessments, it still served as a starter ruling introducing criminal law to neurosciences. With strict regard to the purposes of this article, Roper v. Simmons lucidly reflects the cornerstone of today's intersection between neuroscience and criminal law, due to an evolutionary interpretation of the VIII Amendment[73] to the U.S. Constitution, for which neurological findings played a critical role in a majorly discussed capital case since several years, as its conclusions and data were efficiently implemented and argued by the Court as factual evidence for the purpose of exclusion of the death penalty in Simmons' case. Interestingly, the Court held how juveniles' conducts could not be deemed as morally reprehensible as adults' on the grounds of the latest scientific research findings that supported how youngsters do manifest substantial developmental and psychological divergences when compared to a fully developed adult, showing how society does not trust juveniles with the "responsibilities of an adult"[74], moreover debating how the general consensus of the fifty States had already moved in favor of a tendentiously abolitionist judicial agenda (moreover reinforced by the U.S. being globally perceived as an outcast[75] in relation to the infliction of death penalty sentences), especially towards juveniles. In several rulings, the Supreme Court

[73] The VIII Amendment to the U.S. Constitution prohibits the federal government from imposing excessive bail, excessive fines, or cruel and unusual punishments. This amendment serves as a critical protection in the criminal justice system, ensuring that punishments are proportionate to the offense and that individuals are safeguarded against inhumane treatment. See U.S. Const. Amendm. VIII.

[74] See 543 U.S.

[75] Indeed, the U.S. had not ratified, and hasn't yet ratified, as of October 2024, the Convention on the Rights of the Child of the United Nations (Nov.1989), which negates the imposition of capital punishment towards minors, pursuant to §37 of the CRC.

argued that capital punishment can coexist in harmony within the VIII Amendment legal design, provided that the death penalty deserves not to be the product of "arbitrary and capricious" application[76], and only when its infliction is reasonably narrowed down to that class of individuals who are "the most deserving of execution"[77]. In Simmons' case the Supreme Court argued that a textual interpretation of the VIII Amendment must always constitute the reflection of "evolving standards of decency that mark the progress of a maturing society"[78], once again emphasizing the need for a clearly defined and specific class of individuals considered eligible for execution.. The procedural story of Mr. Simmons is one of an intricate nature. Whereas Simmons, after being sentenced to death, appealed several times and every single appeal got rejected, the Supreme Court of Missouri suspended Simmons' capital sentencing in the same time period in which the U.S. Supreme Court was deciding Atkins v. Virginia, notably ruling the unconstitutionality pertaining the execution of the "mentally retarded". Due to the solid decision defined in Atkins v. Virginia, the Supreme Court of Missouri decided to reconsider Simmons' position, to later find the execution of minors – originally considered acceptable under Stanford v. Kentucky (1998)[79] - to be in plain divergence with the aforementioned Amendments to the U.S. Constitution, requiring the former for penalties to never integrate a "cruel or unusual punishment"[80], with a staggering six-to-three decision, based on a more recent report stating how the majority of Americans found the subjection of juveniles to be in contrast with the constitutional design. Eventually, the Supreme Court of Missouri appealed the U.S. Supreme Court, that ruled in Roper v. Simmons how the still-maturing brain of juveniles, on the basis of an empirically less sophisticated and thus

[76] See 465 U.S., 37, 49-50 (1984).
[77] See 536 U.S. at 319; See also, 462 U.S. 862, 877 (1983).
[78] See 356 U.S. 86, 100-01 (1958)
[79] See In 492 U.S. 361 (1997)
[80] See VIII Amendment to the U.S. Constitution

culpable behavior, exempts them from finding themselves at the receiving end of the death penalty. Juveniles under the age of eighteen at the time of the capital crime were deemed reasonably unfit, for that "the retribution is not proportional if the law's most severe penalty is imposed on one whose culpability or blameworthiness is diminished, to a substantial degree, by reason of youth and immaturity"[81], as outlined by Justice Kennedy writing for the prevailing opinion. Even though the Court formed its decision on the available neuroscientific findings, Roper's ruling set a rigid demarking line for execution unsuitability at the age of eighteen. According to literature, this determines an "illogical exclusion" so that individuals who committed the crime on their eighteenth birthday are to be deemed more culpable with respect to the ones who abstractly performed the same heinous genre of crimes on the day preceding their eighteenth birthday, whose conduct would be considered less reprehensible. Arguably, the Court justified this age cut-off by stating how "(…) for the reasons we have discussed, a line must be drawn, and eighteen is the point where society draws the line for many purposes between childhood and adulthood"[82]. The Court's statement admits that an artificialized legal age term, for is the age eighteen only relevant in our society's tradition and customs, is an arguable threshold of mere convenience. Similar acknowledgments were underscored within Miller v. Alabama's case[83]. Miller v. Alabama delved with a fourteen-year-old boy, Evan Miller, who murdered his mother's drug dealer by repeatedly smashing a baseball bat onto the victim's body[84]. Millers' is a story of tragedy: he grew up in an toxic household[85] – being his mother an alcoholic and his father abusive – leading to a tormented childhood, filled with

[81] See ROPER v. SIMMONS 543 U.S. 551 125 S. Ct. 1183; 161 L. Ed. 2d 1; 2005 U.S. LEXIS 2200; 73 U.S.L.W. 4153; 18 Fla. L. Weekly Fed. S 131.

[82] See ROPER V. SIMMONS 543 at 574.

[83] See 567 U.S. 460

[84] See *ibid.*

[85] See *id* at 2455, 2462-2463.

immense grief. At a blush, this case is as pivotal as Roper v. Simmons, as the Court held the unconstitutionality of existing sentencing schemes ordering mandatory life sentences without the possibility of parole whenever the defendant is a minor, moreover cautioning how "sentencing juveniles to this harshest possible penalty (…) [should be] uncommon"[86]. In Miller v. Alabama, the Court additionally outlined how the juvenile's "chronological age and [youth's] hallmark features"[87] – such as "impetuosity, immaturity, and failure to appreciate risks and [future] consequences"[88] - had to be weighted when convicting younger individuals. According to the Court, States shall be responsible for ensuring that circumstances of mitigating nature would make this kind of sentencing outcome, indeed, unusual. In doing so, Justices designed a sort of clever "youth discount"[89], built on purely arithmetical calculations[90], in so assigning youthfulness the right notion of "[a process of] developmental reality"[91]. Illustratively, Barry Feld, one of the most involved scholars[92] on juvenile sentencing, suggested how adult sentences could get diminished by "categorical" fractions, in the mathematical terms of 25–60% reductions, logically adapted to the defendant's age. Just as in other landmark cases previously discussed, Alabama's Court likewise took into account the neuroscientific findings lying at the base of adolescent's erratic behaviors, especially considering the correct age at which a defendant shall be considered "fit" for individualized consideration, on the grounds of criminal sentencing

[86] See *id* at page 2469.

[87] See *id* at page 2468.

[88] See *id* at pages 2455-2468.

[89] See Barry C. Feld, Abolish the Juvenile Court, Youthfulness, Criminal Responsibility, and Sentencing Policy, 88 J. CRIM. L. & CRIMINOLOGY 68 (1997).

[90] Ibid

[91] See Barry C. Feld, A Slower Form of Death: Implications of Roper V. Simmons for Juveniles Sentenced to Life Without Parole, 22 NOTRE DAME J.L. ETHICS & PUB. POL'Y 9, pg. 57-59, 2008.

[92] See Liza Little, Miller v. Alabama: A Proposed Solution for a Court That Feels Strongly Both Ways, Southern California Law Review, Volume 88:1493, 2015.

to mandatory life without the possibility of parole. Indeed, as for Miller's holding, it was already clear, based on the available research, that juveniles are constitutionally different from adults, thus requiring States to consider the "offenders' age for it is relevant to the VIII Amendment"[93], finally affirming how "criminal procedure laws that fail to take defendants youthfulness into account at all would be flawed"[94]. Even though it is not yet simple, nor otherwise practical to define the 'perfect age' at which an individual can be regarded as an adult, setting this age as low as eighteen undoubtedly counteracts current neuroscientific understandings of how the brain works and develops, for there is not a lot of divergence between a sixteen and twenty years olds on the grounds of cognitive maturity. Without prejudice to the U.S. Supreme Court's rulings, it is inequitable to subject individuals presenting similar developmental patterns to different judicial rights and guarantees, being that the Court's conclusion in Roper v. Simmons is significantly not congruent with the neuroscientific evidence upon which the same ruling rested itself on. Because of Roper's low age of demarcation, legal scholarship movements, spanning from the American Bar Association to the American Psychological Association, rightfully advocated for this strict threshold to be elevated, ranging from twenty-one years old[95] proposals, to even twenty-five years old age limits. Conclusively, there's no doubt to be casted on criminal Law's inherent nature and ultimate goals of deterrence: it necessarily requires for the functioning of the brain to be peculiarly investigated, pertinently appraising the age and maturity presented by the defendant at the time for which the actus reus was performed, for "there can be no

[93] See MILLER V. ALABAMA at 2466.

[94] See *ibid.*

[95] See John H., Blume et al., Death by Numbers: Why Evolving Standards Comple Extending Roper's Categorical Ban Against Executing Juveniles from Eighteen to Twenty-one, 98 TEX. L. REV. 921 (2020); Andrew Michaels, a Decent Proposal, Exempting Eighteen to twenty-one-years-olds from Death Penalty, 40 N.Y.U. REV. L AND SOC. CHANGE 139.

keener revelation of a society's soul than the way it treats its children"[96].

4. *Constitutional Concerns of legitimacy of the Italian Penal Code: a Comparative Analysis*

The Italian legislator is not extraneous to legal age refined demarcations. Upon reviewing the Italian Penal Code, with consistent regard to dispositions pursuant to articles 97 and 98, an attentive eye can observe the potentially significant constitutional implications of these dispositions. Article 97 correctly provides an "ex lege" exclusion of culpability operating in favor of minors whose age was under fourteen at the time of the illicit conduct, whereas article 98 stipulates a nuanced approach to juveniles aged fourteen to eighteen, wherein a diminished degree of culpability may be judicially recognized - by the means of an assessment of the defendant's intellectual maturity - thus determining a mandatory reduction of the penalty. However, as previously discussed, neuroscientific research highlights the development of the adolescent brain to be a continuous process of maturation, extending well beyond the mid-twenties, thus underscoring the ambiguity of article 98 of Italy's Penal Code on the grounds of equality of treatment under the Law. While this rigid distinction may have been historically supported and validated by the morals and values of the time in which the norms were drafted,today this same disposition could be found to be considerably inconsistent with advanced neuroscientific standards, taking into account juveniles' gradual stages of brain development. An almost literal interpretation of articles 3.1 and 3.2[97]

[96] Nelson Mandela's citation during a speech at the Launch of the Nelson Mandela Children's Fund, Mahlamba Ndlopfu Pretoria South Africa, May 8th, 1995.

[97] "All citizens have equal social dignity and are equal before the law, without distinction of sex, race, language, religion, political opinion, personal and social conditions. It is the duty of the Republic to remove those obstacles of an economic or social nature which constrain the freedom and equality of citizens, thereby impeding the full development of the human person and the effective participation of all

to the Italian Constitution strictly requires analogue situations to be deserving of similar juridical effects[98]. In this respect, the Italian Constitutional Court affirmed how "(…) legislators stand in due violation of the principle of juridical equality whenever they subject citizens ongoing similar situations to diverse juridical outcomes, without no solid reason justifying this decision"[99]. Indeed, how can a seventeen-year-old be considered so distant in comparison to an eighteen-year-old peer who just recently celebrated his birthday, given today's neurological and doctrinal understanding of culpability? As Justice Kennedy smartly held in Roper's ruling, "the qualities that distinguish juveniles from adults do not disappear when an individual turns eighteen"[100]. Likewise, in 1993 the Constitutional Court of Italy (C.C.) preached for the need "of a system of punishment sculpted, both procedurally and substantially, on the child"[101]. One year later, the same Court ruled the partial constitutional noncompliance with article 22 – concerning life in prison - to the Italian Penal Code where it "does not state that the penalty of life imprisonment must not be imposed on the child"[102]. Interestingly, the C.C. of Italy further held how the presence of a rightly articulated normative system would stand in clear irony within a framework which deliberately permits imposing life in prison to an "individual withstanding evolutionary processes"[103]. The aforecited legal disposition to the Italian Penal Code may have

workers in the political, economic and social organization of the country". See art. 3, Constitution of the Italian Republic.

[98] See Constitutional Court of Italy, July 9, 1958 no. 53. (The Court interprets article 3 affirming how the principle of equality is violated whenever legislators treat equal situations presenting different hallmarks).

[99] See Constitutional Court of Italy, March 29, 1960, no. 15.

[100] See Roper v. Simmons, U.S. 543, 574 (Supreme Court 2005) (here Justice Kennedy underlined how the identification of age 18 serves as a filter to protect and shield all those under the age of 18 from certain responsibilities or acts).

[101] See Constitutional Court of Italy, April 1, 1993 no. 140.

[102] See Constitutional Court of Italy, December 2, 1994 , no. 168.

[103] See *ibid*.

become obsolete, potentially generating detrimental consequences to the dignity of young adults unreasonably excluded from the procedural[104] and a substantial framework, fitted on the ideologically and culturally made-up concept of "being adult". Moving from the aforementioned neurological considerations and evidence, the initiative of this article would entail extending the normative content set out in article 98 – as well as procedural and judicial guarantees - up until the defendant's twenty-fifth birthday. Unfairly, the ones who would support for the applicability of categorical exemptions provisions to adolescents older than eighteen, in light of the existence of a partial or total mental defect - pursuant to articles 88 and 89[105] - would fail to align with the literal wording provided by Italian Law, as the application of these exemptions lies on the ascertainment of a pathological mental alteration, qualifiable as a physical or mental illness: an abnormity or otherwise consisting in an unexpected deviation of the mind. In fact, adolescents' cerebral fallacies do not constitute an alteration of any sort, rather they represent physiological manifestations of the subject's expected neuronal development, and, as such, not possibly subjectable to the same procedural burdens as the mentally disabled. Therefore, only through a judicial assessment, tasked with determining the presence of a sufficient cognitive maturity (or lack thereof), by any means available[106], will it be possible to consider the Italian Penal Code as

[104] In Italy, juvenile criminal proceedings are governed by Presidential Decree 22 September 1988, no. 448 ("Provisions on Criminal Proceedings Against Juvenile Defendants"), applicable to individuals under 18 years of age at the time of the alleged offense. This decree emphasizes the rehabilitative purpose of the juvenile justice system, taking into account the minor's age and maturity level to apply measures that favor reintegration and education. Notably, children under 14 are considered not criminally responsible and are therefore exempt from prosecution unless security measures are warranted for public safety .

[105] Articles 88 and 89 of the Italian Penal Code establish a categorical exclusion from punishment dependent on the ascertainment of a mental defect capable of totally eradicating the defendant's culpability or at least able to diminish it.

[106] See Italian Supreme Court of Cassazione, 2009 no. 23006.

neurologically consistent. It is the Law that stands[107] in duty to adapt to recently validated understandings of human behavioral patterns offered by 'hard' sciences. Unfortunately, the maturity of the adolescent individual is not linear, nor constant[108]. The lack of homogeneity in the neuronal development of juveniles has led scientists to conclude that, although it cannot be established with absolute certainty the exact instance of achieving full cognitive capacity, this very moment can be usually affirmed to occur no earlier than twenty-one years. Indeed, in Roper v. Simmons, the U.S. Supreme Court's ruling was harshly criticized as being "flawed"[109], for it held the suitable age for death penalty had to be set as short as eighteen years old, being this demarcation an arbitrary choice imposed by the Court in apparent contradiction with neuroscience. Critics argued that this age had to be elevated to at least twenty-five years old, on the basis of the most recent international policy, as to comport with "evolutionary standards of decency"[110]. Italian scientific and legal scholarship is not exactly unprepared when it comes to grappling with neuroscientific findings and legal applications thereof, especially when dealing with mental deficiencies or aberrant behaviors[111]. For example, Di Giovine, an

[107] See Lebel C., Beaulieu C., *Longitudinal development of human brain wiring continues from childhood into adulthood*, 31(30) The Journal of neuroscience: the official journal of the Society for Neuroscience 10937, (2011).

[108] Studies caution for the need for future longitudinal research to understand individual onset of pubertal maturation. See Herting M Megan, Sowell R Elizabeth, *Puberty and structural brain development in humans*, 44 Frontiers in Neuroendocrinology, 122-137.

[109] See Alexa Johnson-Gomez, *The Brain on Death Row: Reconciling Neuroscience and Categorical Exemptions from Execution*, 24.2 Minnesota Journal of Law, Science & Technology 447, (2023).

[110] See Roper v. Simmons 543 U.S. at 587.

[111] See Ombretta Di Giovine, *Ripensare il Diritto Penale Attraverso le (Neuro-)Scienze?*, (G. Giappichelli Editore, Sezione Saggi, 2022, [1st edition 2019]). (Here Di Giovine explains the underlying intersections between pedophilia and criminal law, as well as investigating the relationship between the latter and psychopathy).

Italian author, describes the potential intertwinings connecting current research findings on juveniles' prefrontal-cortex stages of development to the inherent consequences pertaining to the capacity "to intend"[112], advising not to lower any further current anagraphical thresholds. The apparent disinterest demonstrated by a fraction of European scholarship could be traced down to the conservatism of certain mental paradigms, potentially disabling adaptive judgment. At a glance, it may be argued that extending the concept of adolescence to as late as twenty-five years old could be seen - by doctrinal standards and societal needs - as an act of excessive condescension, which sacrifices criminal Law's inherent retributive scopes. In relation to this issue of multidisciplinary significance, a report commissioned by the Scottish Sentencing Council has addressed the matter in Scotland, specifically demanding how "in light of the continuous maturation of the adolescent brain up to the age of twenty-five, the resulting cognitive maturity deserves to be considered for procedural purposes (…)"[113]. According to the report, the "young person" merits to be identified in the defendant younger than twenty-five[114] at the time of the crime, thus requiring a peculiarly shaped evaluative regard towards younger defendants within Courts of Law, particularly when assessing individual maturity[115]. These guidelines so far outlined by the Scottish Sentencing Council highlighted how it is extremely relevant for the Court to have "access to sufficient information for assessing the subjective maturity of the young person"[116], thus shall the Court impose rationally "shorter"[117] custodial sentences to those eligible. According to the scottish report,

[112] See *id* at pages 37-38.
[113] See Scottish Sentencing Council, Sentencing guideline, Sentencing Young People, Parliament House, Parliament Square, Edinburgh, EH1 1RQ, effective as of 26 January 2022.
[114] See *id* at page 2.
[115] See *id*, at pages 4-5.
[116] See *ibid*.
[117] See *id* at page 8.

it is vital for judicial systems to "verify the ability of the adolescent to engage with the Court process"[118], as well as to understand the defendant's "fitness to plead"[119], for the exercise of sentencing of a young person is different from that of the sentencing of an "older individual"[120].Despite the ambiguous doctoral silence on the matter, the legislative provision pursuant to article 98[121] to the Italian Penal Code, where it extends its nuanced effectiveness solely to offenders who "(…) have reached the age of fourteen, but not yet eighteen (…)"[122], produces an apparently unjustified disparity in consideration of the accused's procedural guarantees under articles 3, 111[123], 27[124]

[118] See Suzanne O'Rourke et al., The development of cognitive and emotional maturity in adolescents and its relevance in justice, submitted to the Scottish Sentencing Council, page 4-5, 2020.

[119] See *ibid*.

[120] "Older individuals" must be regarded, for sentencing purposes, and according to the guidelines, as anyone over the age of 25. See Scottish Sentencing Council, Sentencing Young People, Parliament House, Parliament Square, Edinburgh, EH1 1RQ, page 3, effective as of 26 January 2022.

[121] Article 98.1 to the Italian Penal Code recites as follows: "È imputabile chi, nel momento in cui ha commesso il fatto aveva compiuto i quattordici anni, ma non ancora i diciotto, se aveva capacità di intendere e di volere(1); ma la pena è diminuita [169, 224 4, 223-227](2)".

[122] See *ibid*.

[123] Article 111 of the Italian Constitution, often cited as Costituzione della Repubblica Italiana art. 111, establishes key due process rights within the Italian judicial system. It mandates that trials be fair and conducted within a reasonable time, ensuring transparency, impartiality, and the right to appeal. It also guarantees that all parties have equal opportunity to present their cases, establishing foundational principles for judicial proceedings. See Cost. It. Art. 111.

[124] Article 27 of the Italian Constitution, often cited as Costituzione della Repubblica Italiana art. 27, addresses fundamental principles related to criminal justice and human dignity. It provides that criminal responsibility is personal, meaning individuals can only be punished for crimes they personally commit. It also upholds the presumption of innocence until proven guilty, stating that no one shall be considered guilty until a final conviction. Additionally, Article 27 mandates that punishments must aim at the re-education of the convicted, rejecting any inhuman or degrading treatment. See Cost. It. Art. 27.

and 31[125] to the Italian Constitutional Chart, insofar as it does not expand the normative provision on subjective evaluation of maturity in favor of the defendant aged up to twenty-five. Nevertheless, it is correct to argue that raising this age limit poses some reasonable arguments[126], such as the absence of a clear, scientifically-proven, tipping point for which a juvenile must be considered to have transcended into the adult stage, being it unclear when this exact moment falls within the stages of one's life[127]. Given this strenuous limit, an alternative solution could consist in tagging youthfulness as a mitigating factor in juvenile's hearings, rather than for it to be classified as a straightforward categorical exemption on the grounds of culpability. In this fashion, defendants within the eighteen-to-twenty-five years old bracket may reasonably argue the necessity for Courts to positively balance their youth in opposition to virtually aggravating circumstances picturing the case. Either way, the Sentencing guidelines provided by the Scottish Sentencing Council moreover smartly require for Justices to weigh in the "maturity and personal circumstances"[128] of the person aged under twenty-five,

[125] Article 31 of the Italian Constitution, cited as Costituzione della Repubblica Italiana art. 31, focuses on the protection and support of the family, particularly concerning motherhood, childhood, and youth. It mandates that the Republic must assist and safeguard the family institution by providing economic measures and other support necessary to fulfill its functions. Additionally, Article 31 requires the state to protect mothers, children, and young people, promoting their welfare and development. See Cost. It. Art. 31.

[126] See Alexa Johnson-Gomez, The Brain on Death Row: Reconciling Neuroscience and Categorical Exemptions from Execution, 24 MINN., J.L. SCI. AND TECH. 447 (2023).

[127] See Herting MM, Sowell ER. Puberty and structural brain development in humans. Front Neuroendocrinol. 2017 Jan 1;44:122-37.

[128] See Scottish Sentencing Council, Sentencing Young People, Parliament House, Parliament Square, Edinburgh, EH1 1RQ, page 6, effective as of 26 January 2022.

cautioning for the diverse "nature" and "duration"[129] of sentencing, inferring the need for shorter sentences of a lesser invasive essence.

5. *Conclusion*

This continuum of neuroscientific evidence hereby illustrated points to the need for renovations in most jurisdictions of the world, pertaining to the identification of unreasonably rigid age-bracket thresholds charged of legal significance. Even though the inherent neuroscientific findings have proved how juveniles, up to the mid-twenties, do in fact exhibit diminished self-regulation abilities and emotional regulation physiological deficiencies, legislations around the world have continued to deadly implement adult-level juridical responsibilities and consequences towards young-adults, apparently disinterested in neuroscience's investigations. This inflexible loyalty to mens rea standards calibrated on adults evidently tarnish mens rea purpose as a measure of guilt and liability. These observations do not imply – nor do they stress - that adolescents are lacking free will, rather they do underline the existence of a proved qualitative divergence in decision-making processes, thus signaling a consequential reduction in the level of culpability. While some jurists would argue that an age cut-off fixed at the age of eighteen should be considered 'reasonable', for it is the product of societal[130] and juridical convenience, a decision of such illogical strictness is undoubtedly sacrificing judicial fairness, unreasonably subjecting individuals - indeed presenting similar, if not equal, neurological profiles - to potential disastrously different juridical consequences.

[129] See *ibid*.

[130] For example, Constitutional Law No.2 of 1975 lowered the overall age of legal maturity of the child from 21 to 18, modifying article 58 to the Italian Constitution, potentially showing how social standards do in fact help shaping legal discourse.