INCARCERATION ECHO: NAVIGATING THE GENETIC AND ENVIRONMENTAL IMPACT OF PARENTAL INCARCERATION ON CHILDREN'S PROBLEM BEHAVIORS

by

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ABSTRACT

SOPHIE MARIA DEAN. Incarceration Echo: Navigating the Genetic and Environmental Impact of Parental Incarceration on Children's Problem Behaviors. (Under the direction of DR. SUNGIL HAN)

With approximately three million young children facing the adversity of parental imprisonment consistently, the prioritization for analyzing the consequential impacts of parental incarceration on the development and wellbeing of the child has elevated. Constricting on the collective broad topic of parental incarceration and the implications the imprisonment has on the child, the focus of the research has become inquisitive to examine the linkage between the incarceration of the parent to the development of behavioral problems, specifically aggression, in the child. Although there is a vast accumulation of research studying the expansive topic of parental incarceration, additional research should be compiled to narrowly examine the differential impacts of parental incarceration on the genetics and environmental trajectories that mold the development of the child. In accentuating the vitalness of refining the focus of the ramifications of parental incarceration on the wellbeing of the child, the current study aims to investigate the development of child behavioral problems, specifically aggression as it distinctly influences the genetics and environmental trajectories, while controlling for potential other confounders that could impact the development of child behavioral problems. The study underlies certain protective and risk factors that allude to the development of behavioral problems as an underlying result of the imprisonment of the parent.

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DEDICATION

I dedicate my dissertation work to my family and loved ones. A special feeling of gratitude to my supporting parents, Josie and Brooks Dean whose words of encouragement and support pushed me to overcome any challenge faced when completing my dissertation work. The continuous support and sacrifices made for me to accomplish my academic achievements by my parents will never be forgotten. Mom and Dad, thank you for not letting a label define who I am and pushing me to overcome any academic and emotional challenges I had prior to you adopting me. My siblings Natalie, Nicole, Kevin, and Justin have also supported me throughout my entire journey of completing my dissertation work and are very special individuals to me. I would also like to dedicate my work to my brother in-law Lorenzo Clark who also reminded me how strong I am and to continue to push through every obstacle that comes my way. Lastly, I would also like to extend my gratitude and dedication to my loved one Darius who has never left my side and has continuously pushed me to never give up. Without the support of my family and loved ones, this dissertation work would not be possible.

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CHAPTER 1 : INTRODUCTION

Over the preceding four decades, the United States has faced unprecedented magnitude levels of incarceration, exceeding global metrics in both the frequency and cumulative count of incarcerated individuals (Walmsley, 2019). As the frequency and aggregate count of imprisoned individuals is sizable, the number of children dealing with either or both parents confined in either state or federal prison has become substantial as well (Glaze & Maruschak, 2009). Fifty-two percent of inmates at the state level and sixty-three percent of inmates at the federal level reported having children who were minors (Glaze & Maruschak, 2009). In aggregation with both state and federal inmates, nearly 2.7 million young children are faced with the consequential challenges constructed as a result of the separation from their parents stemming by the imprisonment of either one or both of their parents (Sykes & Pettit, 2014), and for many individuals the separation of a parent due to imprisonment can be a persistent issue over their lifetime (Murphey & Cooper, 2015; Western & Wildeman, 2009).

Given that parental incarceration exerts a substantial impact on numerous children and can become a persistent lifelong issue for millions, interest concerning the security consequences on the elevated risks for behavioral, physical, psychological, and social issues as a result of parental incarceration has additionally amplified. Parental incarceration has been consequently linked to a multitude of adolescent difficulties comprising mental health problems (Murray & Farrington, 2008; Wilbur et al., 2007; Turney et al., 2014; Sharp et al., 2012), academic difficulties (Braman, 2004; Cho, 2011; Dallaire et al., 2010; Foster & Hagan, 2007; Haskins, 2017; Wildeman et al., 2017), and antisocial behaviors (Farrington & Welsh, 2007; Joseph, J. 2001; Kjellstrand & Eddy, 2011a; Kjellstrand & Eddy, 2011b; Monahan et., al, 2009). Among these consequential correlations of challenges impacting the development of the child in certain

areas, criminologists and sociologists have shifted scrutiny to the high risks of problem behavior, specifically aggression, among the children in emphasizing the cycle of intergenerational crime (Besemer et al., 2017; Murray et al., 2012; Wildeman, 2009). The adversity of having a parent currently or formerly incarcerated can create a possible cycle of intergenerational deviant behavior traits that lead to the development of externalizing behaviors, such as aggression, as a result of the negative, challenging, and emotional pathway endured by the children, which can independently alter with the makeup of the nature and nurture trajectories of the child in their development (Fox, 2017). Murray and colleagues (2012) conducted a meta-analysis to produce findings that exhibited the correlation between the display of externalizing behaviors among children with incarcerated parents in comparison to their control group which included children without incarcerated parents. The findings showed that children who dealt with the detachment of their parents as a result from incarceration had an elevated risk of exhibiting external behavior than children in the control group after controlling for potential confounders (Murray et al., 2012). Despite this correlation finding between externalizing behaviors for the treatment group in comparison to the control group, there is limited research on the possible distinct roles of genetic or environmental trajectories of the child that alter the susceptibility of the child partaking in externalizing behaviors when the adversity of parental incarceration is considered for the groups of children with and without incarcerated parents. Majority of the research conveys the linkage to the development of externalizing behaviors as a causation from the environmental factors surrounding the child with the parent confined to prison (Geller et al., 2009; Kjellstrand & Eddy, 2011a; Kjellstrand & Eddy, 2011b; Muftic & Smith, 2018; Murray & Farrington, 2005), but relatively minimal research has analyzed the progression of externalizing behavior problems from the causation of genetic trajectories (Kjellstrand et al., 2020). In

attempting to understand why distinct children are more susceptible for exhibiting certain behavioral problems, understanding the separate roles of genetic and environmental components are crucial focal points to discern how genetics and environmental factors contribute to human variation for the development of problematic behaviors across the development of the child. It is vital to analyze the separate degree of implication on the developmental aspects of the child from the genetic and environmental trajectories because certain environmental factors alter the genetic traits that lead to risk mechanisms. Scrutinizing the separate relationship of genetics and environmental components rather than from a genetic x environmental stance can assist researchers in understanding the elucidation for why an individual may be more susceptible to developing problematic behavioral traits compared to other individuals (Shonkoff & Phillips, 2000). In addition, discerning the corresponding contributions from both the nature and nurture approach is vital because it can assist in formulating more efficient interventions that tackle the causation of behavioral problems. Separately studying behavioral genetics research can assist in shaping an enhanced understanding of risk and protective factors in developmental outcomes for the child (Rutter, 1997; Rutter et al., 1999a; Wahlsten, 1990; Wahlsten & Gottlieb, 1997). To illustrate, if research findings reveal that genetics play a crucial role in developing certain behaviors that can become risk factors for further delinquency, like aggression, policies and interventions can prioritize focusing on strategies and techniques that assist with coping and emotional regulation (Beaver et al., 2015). Understanding how certain genetics can lead to risk factors for deviance, early interventions and attentively designed routines enacted by caregivers can integrate protective barriers to provide assistance against developing problematic behavioral traits among children who acquire inherited vulnerabilities and behavioral demands like antisocial behavior traits, depression, and attention deficit hyperactivity disorder (Shonkoff &

Phillips, 2000). Likewise, if findings concluded that environmental factors are more dominant in influencing the development of problematic behaviors, early interventions and programs can be executed to focus on prioritizing family support, resources for community involvement, and opportunities to enhance the education of the individual, which are all components that can deter the risks for problematic behavior outcomes and engagement in deviance (Beaver et al., 2015; Shonkoff & Phillips, 2000). Separately studying the role of environmental factors on the impact of developing problematic behavior traits can also show the significance of human relationships and engagement in the early stages of development for the child (Shonkoff & Phillips, 2000). Separately studying the impacts of genetic and environmental elements on the developmental outcomes for the child is vital to assist in having a nuanced understanding of certain genetics and environmental factors that influence risk factors that alter the likelihood of problematic behaviors unfolding, along with creating tailored interventions and policies to subside the development of problematic behaviors. Acknowledging the prominence of studying the separate genetics and environmental correlation roles to the developmental outcomes of the child, this research aims to address the lacuna in the existing literature focusing on the risk factors associated with parental incarceration in developing specifically aggressive behaviors as a result of either certain genetic (nature) or environmental (nurture) trajectories.

The current study elongates the preceding research from the Fragile Families and Child Wellbeing study by employing a multivariate approach to scrutinize the defined role of each identified trajectory from the distinct roles of nature and nurture in predicting the development of aggressive behavior. The focus of the multivariate approach analysis is to analyze the degree that parental incarceration alters certain trajectories on either the nature or nurture characteristics that further predict the development of aggressive behaviors for the child. Derived from previous

literature and aims to mitigate the gap in distinct findings from the genetic and environmental influences, the research conducted is targeted by the two encompassing inquiries: Does parental incarceration have an impact on the development of aggressive behaviors in children? Do the effects stem from the genetic (nature) propensities of the child or the environmental (nurture) elements surrounding the child? In aligning with previous research and the research question proposed, it is hypothesized that there is a significantly stronger correlation between the genetic propensities or the environmental elements in the development of aggressive behaviors rather than an interplay of both components after controlling for other confounders aside from parental incarceration.

CHAPTER 2: LITERATURE REVIEW

Parental Incarceration

Parental incarceration is a significant concern that has been framed as a risk marker and a risk mechanism (Murray & Farrington, 2005) that can indirectly or directly affect the development of the child as parental incarceration involves the absence of either or both parents from the family household (Geller et al., 2009; Phillips et al., 2006). Preceding the imprisonment of the parent, the children have long endured the risk factors associated with parental incarceration that can become a risk mechanism for emerging problematic behavior traits for the child (Kjellstrand et., al 2020; Mumola, 2000; Poehlman, 2005; Eddy, 2011a). A multitude of the pre-incarceration milieus have depicted parental substance abuse, mental health adversities, and destitution (Dannerbeck, 2005; Johnson & Waldfogel, 2004; Phillips et al., 2006). Each of the risk markers and mechanisms created by the adversities surrounding the prior-and-post parental incarceration settings produce a ripple-down effect that becomes detrimental to the early developmental stages as the early experiences of the child significantly shape behavioral traits (Tierney, 2009) that can modify the likelihood of an individual developing aggressive behavior traits, further enhancing the potential engagement in deviant acts (Barnard & McKeganey, 2004; Brooks-Gunn & Duncan, 1997; Downey & Coyne, 1990). Preceding research delved into the environmental components surrounding the child in the pre-and-post incarceration setting (Corcoran et al., 2009) and concluded a correlation between the advancement of environmental adversities such as poverty and financial hardships as a result of substance abuse and family victimization created from the incarceration of the parent. Results from a study designed by Turney and Wildeman (2015) aimed at focusing on the association between maternal incarceration and the likelihood of residing below the poverty line. The discoveries unveiled that

there was a correlation between poverty line incomes and maternal incarceration. The mothers who held the highest percentage of being incarcerated also held the highest percentage of having household incomes that were below the poverty line in contrast to mothers who had lower percentages of being incarcerated (Turney & Wildeman, 2015). Beyond the challenges of financial stability in the pre-incarceration environment, the pre-and-post environment molded by the incarceration of the parent can introduce supplemental stressors that develop certain stigmatization and discrimination for the child, hindering the meaningful social interactions and learning occurring specifically at school for the child (Fox, 2017). The learning and socialization process at school can be hindered for the child due to the separation of the parent as a result from the incarceration (Fox, 2017).

Parents are a crucial component for the advocacy of education at the individual and school level for the child alongside establishing the influence of learning and procurement of social skills by constructing secure connections with their children (Liu et al., 2022; Breiner et al., 2016). Consequently, when parents are detached from the daily lives of their children due to confinement, then the educational learning support and social skills are hindered which can result in social stigmatization and discrimination (Liu et al., 2022). Elaborating on the linkage between the result of social stigmatization and discrimination for the child as an effect of parental incarceration, research findings revealed that children with incarcerated fathers have encountered social stigmatizations and discriminations, resulting in ample academic and social difficulties at school (Braman, 2004; Dallaire et al., 2010; Foster & Hagan, 2007; Wildeman et al., 2017). Collectively, previous literature and research concludes that the pre-environment settings followed by the post-incarceration conveys additional adversities that produce stressors in the living and learning environments to their children.

The Debate Between Nature vs. Nurture

Criminologists and sociologists have continuously debated whether it is the genetic predispositions or environmental factors that are at fault for the deviant behavioral outcomes for children (see Beaver et al., 2014). Underscoring the nature perspective in the debate, the nascent body of research in the advancing field of different domains in biosocial criminology has illuminated hereditary associations to deviant behaviors (Raine, 1993; Rowe, 2001; Barnes et., al, 2016). Delving into the intricacies of the biosocial theory, as it supports the argument that genetics are responsible for emerging certain traits that enhance the likelihood of engaging in deviant acts, the biosocial theory integrates four varied key domains to elucidate the antecedent of individual differences. In explaining the origins of individual differences, the domains incorporated in the biosocial theory facilitate in answering the fundamental question underlying the debate between nature versus nurture, which is why are some individuals more violent, aggressive, antisocial, and engage in delinquent acts than other individuals? (Beaver et al., 2015).

The behavior genetics domain further advances the nature argument by arguing the importance of genetics linking to the influence of developing traits that influence deviance through numerous research studies (Baker et al., 2006; Barnes & Beaver, 2012; Wertz et al., 2018). The twin and adoption studies are pivotal examples of reinforcing the argument that genetics are crucial to the development of personality traits that contribute to the influence of problematic behaviors progressing (Rhee & Waldman, 2002). To illustrate the significance of genetics contributing to the development of problematic behavior traits that make an individual more susceptible to engage in deviance, the Australian Twin Register study develops a study that incorporates twins who were raised in different environmental settings to compare the problematic traits of the individuals. The findings concluded that seventy-one percent of the

variance in disorderly behavior was ascribable to the genetic propensities (Slutske et al., 1997). Resembling the conclusions from the Australian Twin Register study, adoption studies were conducted to conclude whether it was the environmental factors surrounding the individual that elucidated why distinct individuals were more vulnerable to developing problematic behavior traits or if it is the result of the genetic propensities of the individual. The adoption studies concluded that adoptees whose biological parents had a criminal record were prone to have a criminal record in contrast to the control groups whose biological parents did not have a criminal record (Hjalmarsson & Lindquist, 2013; Joseph, 2001; Mednick et., al, 1984; Walters, 1992). Shifting from the conceptualization that genetics is crucial in grasping the development of problematic behaviors that increase the probability of engaging in deviance, the molecular genetics domain in the biosocial theory collaborates in understanding the particular genes that are essential for comprehending human variation in influencing certain predictors of deviant outcomes (Beaver, 2009; Carey, 2003; Barnes et al., 2016). In assessing the particular genes that explain human variation, DRD2 and DRD4 are the two distinguished genetic polymorphisms that assist in developing personality traits and certain cognitive facilities that can make distinct individuals more susceptible to developing problematic behaviors. The DRD2 genetic polymorphism is responsible for the development of personality traits, and the DRD4 genetic polymorphism is accountable for the cognitive facilities (DeLisi et al., 2008) which are both linked to the structural and functional variation in the brain (Raine, 2008). Studies have found a significant relationship between the DRD2 genetic trait for developing antisocial behaviors along with other personality traits that are a predictor factor for partaking in delinquency (Faraone et al., 2001; DeLisi et al., 2008; DeLisi et., al, 2009). Aggression, impulsivity, and antisocial personality traits depict distinctive examples of DRD2 genetic polymorphisms influences that

can become risk factors for engaging in deviance (Chistiakov et., al, 2012). Concluding that the first two domains of the biosocial theory explain the importance of genetics and which particular genes influence the personality traits that make an individual more receptive to engaging in delinquency, the neuroscience domain highlights on the hypothesis argument that all human mental life encircling the morals, decision making, and feelings of love and anger originate from the brain which is preloaded in the DNA of the individual (Pinker, 2002). From the vantage point of concluding the domains incorporated in the biosocial theory, biosocial theorists argue that understanding the complexities of human variation must scope beyond the sociological explanation for the development of problematic behavior traits (Fox, 2017; Burt & Simons, 2014). It is imperative to consider the nurture counterargument that sociological factors contribute to the development of certain behavioral outcomes in order to provide a nuanced understanding of the different justifications on the elements that influence the shaping of certain behavioral outcomes, specifically problematic behavioral outcomes.

While some criminologists allude to a hereditary theoretical explanation as to why certain individuals are more susceptible to engaging in deviant acts, opposing criminologists posits that the social and environmental surroundings and elements play a crucial role in influencing individuals to participating in anomalous behaviors (Akers et al., 1995; Brauer & Chekroun, 2005; Erickson et al., 2000; Link et al., 1989). Theorists accede to the nurture argument that social and environmental influences, such as family attachment and dynamics (Hirschi, 1969; Dornbusch et., al, 2001), socio-economics state (Oni, 2007), and peer bonds (Rothwell et., al, 2009; Wright et al., 1999), conduce substantially to molding certain developmental elements that can heighten the risks of deviant outcomes (Meier et., al, 1984; Mann et., al, 2016). In arguing that social and environmental propensities play a vital role in the shaping of the individual,

criminologists highlight the importance of understanding how environmental, family, attachment, and economic factors influence learned behaviors that negatively impact the psychological and behavioral outcomes of the child (Johnson et al., 2012; Wareham et al., 2009). These findings affirm that the combined elements of the social and environmental settings surrounding the individual are a fundamental determinant in sculpting the disposition for engaging in deviance. The social influences amidst the environment surrounding the individual highlights the impact of peer influences in replicating learned behaviors through the social interactions that also influence values and morals that either steer or deter the individual from partaking in deviant activities (Akers, 1998; Lee et al., 2004). Aside from peer interactions, other societal factors revolving around economic hardships such as residing in disadvantaged locations or living under the poverty line produces strains and stressors on an individual that can become a causative factor of deviant behaviors as a coping mechanism to the strains (Johnson, 2012). Concluding the nurture argument, it underscores the intricate reciprocal relationship of societal and environmental dynamics to the proclivity towards delinquent behaviors for the individual.

Concluding both stances on the intricate debate between the genetic and environmental distinct roles in influencing certain developmental aspects of the individual that steers to a higher susceptibility to engaging in deviance, both stances provide a multifaceted fabric of elements to support the justification of either environmental or genetics explication for certain behavioral outcomes. Nature theorists align their theoretical framework with highlighting the causation of deviance due to the responsibility of inherent traits, whereas the nurture theorists conform their theoretical framework with their argument that societal and environmental factors are influential for deviant behaviors to develop.

Parental Incarceration, Nature, and Nurture Influence

It is crucial in understanding the distinctive repercussions of parental incarceration because it portrays a critical juncture where the biological predispositions and environmental settings are altered to a heightened risk of developing certain trajectories of maladaptive behaviors. Thus, it is vital to delineate the risk factors and mechanisms by which parental incarceration can impact the social, emotional, and cognitive development of the child. More specifically, it is imperative to understand the underlying risk factors associated with parental incarceration, as it elucidates the dichotomy relationship in the emergence of delinquent behaviors due to the effects of parental incarceration on the nature and nurture makeup of a child. Recent meta-analyses showed that heredity was fifty percent responsible for antisocial behaviors, and the remaining variance was accreditable to the nonshared environmental factors (Burt, 2009; Ferguson & Rueda 2010; Rhee & Waldman, 2002). Recognizing that adversities in an environment caused by the pre-and-post incarceration settings and genetics, both evenly contributed to the variance of antisocial behaviors (Monahan et., al, 2009).

In this regard, it is vital to isolate the exploration of both genetics and environmental factors separately in order to obtain an understanding of how parental incarceration can illuminate the impact on the behaviors due to the genetic predispositions of the individual and the environmental factors surrounding the individual.

Parental incarceration and nature characteristics

In discussing the impact of parental incarceration within the framework of the nature stance, a comprehensive analysis of the extant literature divulges convoluted understandings of the biological predispositions influencing the behavioral outcomes for children facing the adversity of parental imprisonment. First, in viewing parental incarceration through the lens of the biosocial theory, it can be explained that the inherited biological predispositions from the

parents contribute to the increased likelihood of the child engaging in deviant behaviors (Savopoulos & Lindell, 2018). For instance, findings from a study examining the genetic components for children with incarcerated fathers exhibited that children who are born to fathers who are criminals are likely to obtain a genetic propensity for antisocial behaviors (Farrington & Welsh, 2007). Similarly, findings of studies examining genetic elements support the relationship between one of genetic polymorphisms DRD2, dopamine receptor, and criminal fathers in predictions of violent delinquency from the child (Delsi et al., 2009).

Second, a line of studies argued that hereditary traits can influence the development of antisocial behavioral traits, which increase the likelihood of engaging in delinquent acts (DeLisi et al., 2009; Button et al., 2005; Hicks et al., 2004; Viding et al., 2005). These studies align with the interplay of non-social factors and biological predispositions in dealing with adversity from parental incarceration that influence specific behavioral outcomes in children. For instance, Murray and Farrington (2005) found that parental incarceration is a risk factor that heightens the antisocial behavioral traits for the offspring while accounting for other potential adversities aside from parental incarceration. Similarly, different attributes influenced by genetics can potentially mold the coping mechanisms for the child dealing with parental incarceration in producing higher levels of extraversion that would influence the problematic behavioral outcomes (Abdullah & Marican, 2016). The development of antisocial behaviors can become a risk factor for developing aggressive behavior traits due to the response of feeling isolated and frustrated which are emotions associated with antisocial behaviors (Donnellan et al., 2005; Jones et al., 2011). The development of aggressive behaviors is detrimental to the child as it can become a risk factor for engaging in deviance as the child becomes older (Barnow et al., 2005; Shahzad & Yasmin 2015). The linkage between incarcerated parents and the development of internalizing

and externalizing problem behavior outcomes, specifically aggressive behavior outcomes was concluded by Turney in 2021. Extending on the findings concluded by Turney in 2021, Wilbur and colleagues (2007) also developed a study that focused on the effects of paternal incarceration on the internalizing and externalizing behaviors of the child. The findings showed significant rises in aggressive behaviors in children whose fathers were incarcerated after controlling for other potential forms of paternal absence. The findings from both of the studies showed that the repercussions of parental incarceration for the behaviors of adolescents concluded that children with incarcerated parents tend to exhibit internalizing or externalizing problem behaviors including impulsive actions and lack of self-control.

Impulsivity is one of the nature variables that can become a risk factor for developing problematic behaviors, specifically aggressive behavior traits that can heighten the risks for delinquency during early childhood and adulthood. The Cambridge Study in Delinquent Development found positive correlations between impulsivity indicators with violence and delinquency that extended past the early childhood and into the adulthood stage (Pulkkinen 1982; Farrington, 1989; Magnusson & Duner, 1981; Sun et al., 2022). Similar findings were shown in a study conducted on the infant socialization and impulsivity to the development of aggressive behaviors through the usage of self-report, mother report, and observational data (Vazsonyi & Javakhishvili, 2019). The impulsivity traits of the infant developed in the early stages of the child predicted the reactive-overt and aggression at the age of 8.5 (Vazsonyi & Javakhishvili, 2019). In addition, a line of studies has shifted focus from the impulsivity variable and have paid attention to the mental health challenges from both the parents that extend to the child.

In analyzing the mental health challenges developed for children with incarcerated parents, Turney and colleagues (2014) focused on the mental health impacts upon the levels of depression, anxiety, and ADD/ADHD. The analysis concluded that children with incarcerated parents were twice as likely to deal with ADD/ADHD, which both lead to higher levels of impulsivity (Turney et al., 2014). Challenges surrounding the ability to attain focused attention and regulate emotions can alter the likelihood of developing aggressive behavior traits, ultimately leading the child to engage in delinquent behaviors as the child gets older (Reif et al., 2007). Findings from the research procured by Reif and colleagues underscores the association between the anxiety and depression challenges for the child developed from the MAOA genotype as it accentuates aggressive behaviors for the child (Reif et al., 2007). Aside from emotional challenges developing as a result of ADD/ADHD, challenges surrounding the verbal IQ of the child along with the development of speech impairment can also arise and produce aggressive behavior tendencies (Reif et al., 2007).

The verbal intelligence levels and regulations of self-control that are diminished as a result of either the ADD or ADHD in the child result in a hindered score obtained from the Peabody Picture Vocabulary Test which is another variable considered in this study. In the study conducted by Ayduk and collaborators (2007), two studies were implemented to test the levels of aggression based on the levels of verbal intelligence and self-control. The first study incorporated middle school boy participants who were primarily minorities and low-income, and the second study included boy participants who were chosen from a treatment camp with behavioral problems. Findings from both groups of participants showed the significance of verbal intelligence and self-regulation in impacting the development of aggressive behavior tendencies. Higher levels of verbal intelligence and self-regulation were correlated with lower

aggression in comparison to the boy participants who held higher levels of aggression and lower levels of verbal intelligence and self-regulation (Ayduk et al., 2007). Shifting from the focus on the correlation of behavioral problems developing, specifically aggression traits because of ADHD/ADD, anxiety, and depression it is also crucial to delve into other nature variables that revolve around emotional aspects that heighten the development of aggressive behavior outcomes such as the impact of withdrawal feelings for the individual. Feelings of withdrawal can be impactful to the influence of developing aggressive behavior traits (Renken et al., 1989). Renken and colleagues conducted a study to test the predictor levels of aggression for elementary school children who dealt with different levels of withdrawal challenges. The ranking outcomes reported by the teachers assisted in predictors of aggression behavior problems for the children. The findings concluded that the predictor values of aggression were statistically significant for boys rather than for girls and were strongly influenced by the attachment classification of the child at eighteen months of age (Renken et al., 1989). Concluding that the behavior issues were strongly correlated with the eighteen months of age stage for elementary school children reinforced the argument made by Bowlby on the significance of the early stage affecting the interpersonal functioning of the later stages in the lives of the children (Renken et al., 1989). Extending beyond the impact of withdrawn feelings developed in the early development stage of the child as it correlates to developing aggressive behavior problems, another significant element that makes certain children more susceptible to acquiring aggressive behavior traits lies in the motor control regulation of the child.

The study by (Hsieh & Chen, 2017) analyzed the relationship between inhibitory control in becoming a predictor factor for aggressive behavior problems. Similarly, to the measurements of motor control in the Fragile Families and Child Wellbeing Study, tasks were given to measure

the motor control abilities in this study. A stop signal task and modified exercise of the Taylor Aggression Paradigm were implemented to measure the inhibitory control through the delay of the reaction to the stop signal task. Findings concluded that the participants with low motor control registered higher levels of aggression than participants with higher motor control and emotional regulation (Hsieh & Chen, 2017). Generally, the findings from the different studies exhibit a correlation between the nature variables chosen for this study to the development of aggression behavior problems that ultimately heighten the likelihood of delinquency in the adulthood stage for the child.

Parental incarceration and nurture characteristics

Amidst the discourse encompassing parental imprisonment, the factors characterized by the nurture stance arise as a fundamental aspect to the linkage of influences on the trajectories of the developmental domains and problematic behavioral outcomes (Johnson et., al 2012). The nurture lens argues that the environmental and social factors execute pivotal contributions in provoking problematic behavioral ramifications, specifically aggressive behavior problems (Rutter et., al 1997; Kendler et., al 2007; Vazsonyi et., al 2015).

A distinguished theory that elucidates the significant ramifications of environmental factors as a result from parental incarceration on the developmental domains would be the general strain theory. The general strain theory proposed that individuals undergo strains or stressors that emerge in adverse circumstances, such as parental incarceration (Agnew,1992). Parental incarceration acts as a social context that heightens the triggers or environment risks such as the socio-economic status and neighborhood location, which can heighten current strains present in the child's life and unveil new strains, like financial hardships, residential instability, and family breakdown (Beaver et., al, 2009; Johnson & Easterling, 2012). The environmental

strains both created and magnified stemming from parental incarceration render nurture theorists to coincide with the general strain theory to assist in underscoring the effects of parental incarceration on the child (Johnson & Easterling, 2012; Sharp et., al, 2012). The abundance of strains imposed on the social and familial environment in the lives of the child can markedly modify the behaviors and development of the child, due to the emotional, economical, and societal challenges imposed on children facing the imprisonment of either or both of their parents (Johnson & Easterling, 2012; Foster, 2012). When a parent is removed from the household due to incarceration, it produces an economical strain on the household as a result of instability in financial income which leads to material hardship and potentially residing in disadvantaged areas. A study using the same FFWB data analyzed in this study examined the relationship between persistent material hardship and patterns of childhood aggression. The findings aligned with the hypothesis of the study that higher scores of aggressive behaviors aligned with children in the high and medium material hardships groups in comparison to the children placed in the low material hardship group. Similarly, to the material hardship groups, children who were residing in disadvantaged neighborhoods were at a higher risk for developing aggressive behavior traits (Bellair et al., 2019). The material hardships arising from the economic strains, social, and emotional challenges enforced upon children with parents who are incarcerated can enhance problematic behaviors because of the adverse social and familial environment surrounding them can lead to coping mechanisms that resort to engaging in problematic behaviors as a mechanism to mitigate the feelings of stress and trauma and enhancing the feeling of belongingness (Bradshaw et., al, 2020). The stress and trauma of witnessing a parent being incarcerated can become traumatic for the child which can produce an emotional reaction that heightens the risks for the child partaking in maladaptive behaviors as well (Dallaire & Wilson,

2010; Hagan & Dinovitzer, 1999; Turney, 2014). Findings from Liu et al., (2022) suggest that paternal incarceration influenced problematic behavioral outcomes of the child due to the circumstances surrounding the incarceration, namely observing criminal activity and contacts with the police that can become traumatic for the child (Liu et., al, 2022). The trauma experienced from the circumstances surrounding the paternal incarceration along with the physical and emotional paternal absence can hinder the behavioral outcomes of the child (Dallaire et., al, 2010; Turney, 2014; Liu et., al., 2022).

In addition, the disruption of attachment and absence of a parent can produce a chaotic home environment that incorporates weak parental supervision (DeLisi et., al, 2009). A chaotic home environment and lack of proficient parental supervision are multitude of factors that arise from parental incarceration and can contribute to the development of maladaptive behaviors (DeLisi et., al, 2009). The attachment theory originally developed by John Bowlby (1969) provides a vital theoretical framework that links the development of socioemotional functions of the child to the secure attachments that a child has with their parents over time (Johnson & Easterling, 2012). When there is a disruption in the attachment relationship between the parents and the child due to the imprisonment of the parent, this can lead to feelings of insecurities and instability when formulating relationships and developing a sense of attachment with parents, caregivers, and peers for the child. The Poehlmann's (2005b) study concluded that sixty three percent of the children had insecure attachment depictions of their relationships with their mothers who were incarcerated, and an analogous proportion had insecure attachment representations of their caregivers. In an accumulation of longitudinal studies, it was found that insecure attachments were linked with the later development of externalizing (Fearon et al., 2010) and internalizing problem behaviors (Warren et al., 1997). The findings from the

Cambridge Study also concluded a linkage between the risk of antisocial and internalizing problems for boys separated from their fathers due to incarceration in comparison to their control groups who were separated from their fathers for other reasons aside from paternal incarceration (Murray & Farrington, 2005, 2008b). Consequently, the separation of parents due to parental incarceration creates a disruption in the development of formulating strong attachments for the child that can be impactful to developing antisocial, internal, and external problematic behaviors. Findings from the study (Sun et al., 2022) support the argument that attachment to parents in the toddler stage is significant in the development of self-control for the child which further assists in preventing aggression and other maladaptive behaviors. The results presented that at the younger toddler age parental attachment was significant in reducing the likelihood of becoming aggressive as the child gets older. For the younger age children who did not have strong forms of attachment to their parents held lower levels of self-regulation and higher levels of aggression and rule-breaking behavior tendencies (Sun et al., 2022). The separation of the parent due to parental incarceration also impacts the nurturing environment of the child due to the type of parenting style that is implemented which can also contribute to the development of aggressive behaviors and further develop maladaptive behaviors as the child gets older.

The parenting styles play a vital role in the development of the child and can be consequential to the development of problematic behaviors when the type of parenting supervision is weak. Authoritative parenting, one of the four parenting styles, provides children with a nurturing, responsive, and supportive form of parenting (Simons et al., 2005). This form of parenting is found to effectively deter problematic behaviors because there is a strong form of nurturing, parental supervision, and support all in which assist in establishing collective efficacy in assisting the child to facilitate their levels of self-control (Johnson & Easterling, 2012; Simons

et al., 2005; Hinnant et al., 2016). When a parent is omitted from the daily lives of their children due to being incarcerated, it can lead to the other parent becoming neglectful to the child and at times even physically aggressive. Findings using the FFCWB data found when dealing with paternal incarceration, it led to the mother implementing neglectful parenting styles and becoming physically aggressive with the child at times (Turney, 2014). Neglectful parenting can lead to an increase in problematic behaviors due to the neglectfulness of the parent supervising and meeting the needs of the child (Johnson, 2009; Sajid, 2016). Similar findings were found in the study (Yoshito et al., 2011) that measured the different forms of parenting styles and concluded that the forms of parenting styles play a significant role in either steering or deterring the child from developing aggressive behaviors. Positive and involved parenting styles were associated with lower levels of aggression for the child, and harsh, psychological controlling, and neglectful parenting styles were correlated with higher levels of aggression for the child (Yoshito et al., 2011).

Concluding the nurture variables as it is influential in the development and behaviors of children with parents incarcerated, the strains characterized in the general strain theory, the disruptions to the parent-child relationships in the attachment theory, and the lack of parental supervision in the form of different parenting styles due to the absence of either or both parents because of incarceration are found to be collective factors that can be detrimental to the development of the child and can enhance problematic aggressive behavior tendencies to arise.

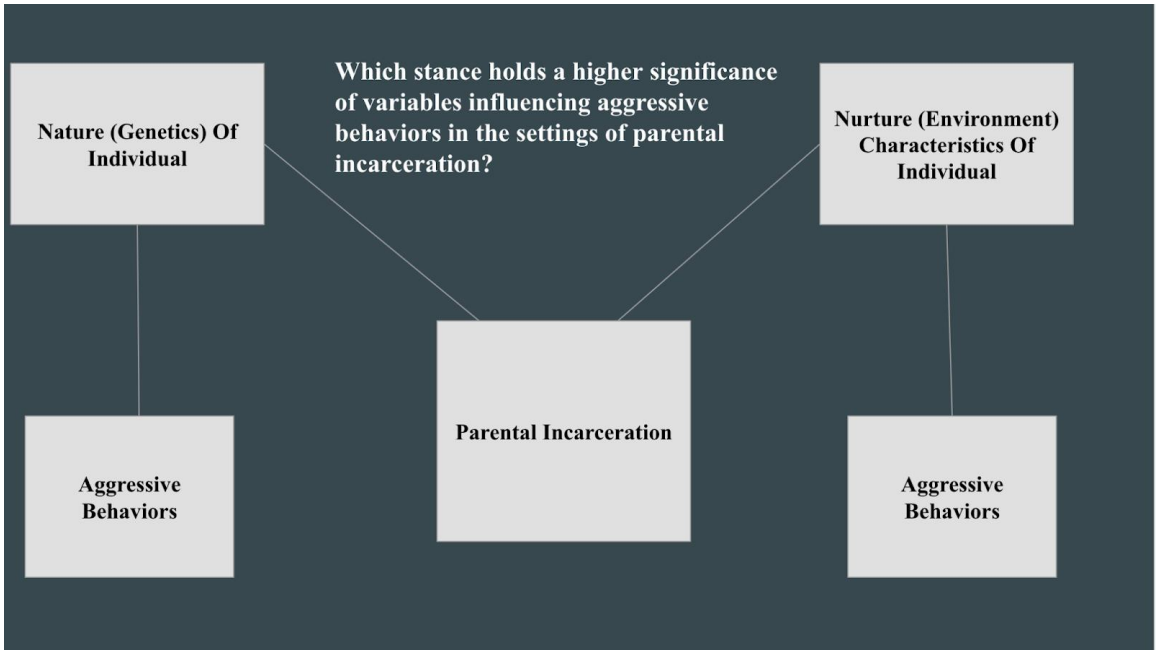

Figure 1. Theoretical framework of the study

CHAPTER 3: THE CURRENT STUDY

There has been a continuous debate on the causation for certain developmental outcomes for an individual as to whether it is the genetic propensities or the environmental factors surrounding the individuals that are responsible for the development of problematic behaviors. In considering whether it is the nature or nurture factors for developing maladaptive behavior traits, the ramifications of parental incarceration on the development of behavioral issues for the child has acquired notable focus through an accumulation of literature reviews. A majority of the previous literature focuses on the interplay between the genetics and environmental (G x E) risk factors associated with parental incarceration. While a vast amount of the research identifies a correlation between the G x E relationship to the development of problematic behaviors in children with incarcerated parents (Burt & Simons, 2014; Beaver et al., 2007), it is crucial to understand the significance of the separate contributions from either the genetics or environmental components that contribute to certain developmental aspects of the child that further heighten the risks for maladaptive behavior traits developing. For instance, previous research has used a dataset from the Fragile Families Child Wellbeing Study with narrow focus on either nature or nurture factor rather than an analysis of multiple variables that correspond separately to the nature or nurture stance as it heightens the risks for developing behavioral problems. In addition, findings using the same dataset revealed that parental incarceration negatively affected the academic performance of the child that led to increased aggression, inattentiveness, and hyperactivity which led to the placement of special education for children ages three to five (Haskins, 2014; Fox et al., 2013). Similarly, another study showed that exposure to adverse childhood experiences such as parental incarceration is significantly correlated with externalizing and internalizing behaviors along with the likelihood of developing

ADHD which has also been correlated with the development of aggressive behavior traits (Hunt et al., 2017). As previous research has focused on components of either nature or nurture factors, the current study aims to analyze the separate contributions of the genetics and environmental surrounding factors as it influences the development of problematic behaviors for children with and without incarcerated parents. The primary objective of this study is to examine the level of degree to which the aggressive behavior tendencies are a causation of the genetics or environmental trajectories for children who are facing the adversities associated with the incarceration of their parents. The execution of the objectives aimed in this study are factored around the research questions:

1. Does parental incarceration have an impact on the development of aggressive behaviors in children?
2. Do the effects stem from the genetic (nature) propensities of the child or the environmental (nurture) elements surrounding the child?

CHAPTER 4: METHODOLOGY

Data

In testing the relationship between parental incarceration and the effects of nature versus nurture, the data accumulated will be secondary and accessed through the dataset from the Fragile Families and Child Wellbeing Study (FFWB). The FFWB is a longitudinal birth cohort study that occurred from 1998 through 2017 and selected 4,898 children who were born in seventy-five of the hospitals selected in the twenty cities across from the United States. The mother participants were chosen from the maternity ward rosters to collaborate in this study. The data was collected through six different waves starting with an initial interview from both the mother and father at the birth of the focal child amidst the study. For the study, phone interviews were used to accumulate data on a variety of components including parental relationships, parenting, health behaviors, family and social support, demographics, housing, usage of social programs, education, and employment.

As the waves of interviews progress, the information and age of the focal child collected during the interviews varied. In the first wave, both parents are interviewed, and this occurs around the focal child's first birthday. Followed by the year one wave, year three and five interviews occur around the third and fifth birthday of the child and focus on the home life and routines, health and health care, and parenting styles. During this wave, a home visit occurs to assess the results from the Peabody Picture Vocabulary Test, the home environment such as the neighborhood setting and exterior and interior of the home, and any other relevant knowledge on the effects of the parent and child during the visit.

Measures

Dependent variable

Behavior Problems (Aggressive Behavior)

The Fragile Families Study utilizes items from the Child Behavioral Checklist (Achenbach, 1992) to assist in developing indicators of externalizing and internalizing behavior problems. The caregivers of the child were asked to answer questions surrounding the topic of how often their child engages in a range of behaviors and this study specifically focuses on aggressive behavior of children. Examples of questions posed to the caregivers were "He/she destroys others 'things" (Fombly et., al, 2010). Caregivers were asked to respond whether the statement questions were never true, sometimes true, or often very true. The responses were coded numerically from zero to two. There was a total of 15 questions asked for aggressive behavior. The numeric responses to the questionnaires were totaled and averaged out to produce the measurements of aggressive behavior with higher values indicating more aggressive behavior.

Independent variables

Incarceration

Parental incarceration is measured through the self-reports of the history of incarceration through a number of questions in wave 3, beginning at the focal child's first birthday of direct and indirect reports from both parents. At wave 3, both mothers and fathers provide direct reports if their partner has been incarcerated (in jail or prison), and if one of the parents had been incarcerated, it is coded as yes=1.

Nature variables

Impulsivity

The questions asked at Year 3 Mother's Survey are a condensed version of Dickman's Impulsivity test. The FFCWS Survey only includes the dysfunctional impulsivity of Dickman's

Impulsivity test. The dysfunctional impulsivity coincides with the measure of the capacity of self-control. Employing cognitive ability, impulsivity is a major individual predictor of violent offending (Farrington, 1998). At Year 3, six of the impulsivity items are measured and coded numerically on a 4-point Likert scale (1=strongly agree and 4-strongly disagree). Examples of questions were: “I will often say whatever comes into my head without thinking first” and I frequently buy things without thinking about whether I can really afford them.” In conducting the numeric response scores, the items are summed to present the degree of impulsivity. Higher values indicate lower levels of impulsivity.

Intelligence Scale

The parental cognitive ability is measured as the sum of the correct items in the Similarities subtest of the Wechsler Adult Intelligence Scale – Revised (WAIS-R). The subset test is one out of the six verbal tests and five performance tests designed to measure adult intelligence. The responses to the word association questions are scored numerically from two, one, to zero. The estimate of the cognitive ability was determined by providing the sum of the raw sores that ranged from zero to sixteen.

ADHD

To measure ADHD of children, this study utilizes an accumulation of one item variable asked from diagnostics. The primary caregivers were asked to answer whether the following statement: If their child is demanding were not true, sometimes or somewhat true, or very true or often true of their child. The provided responses were numerically coded starting with zero for not true up to two for very true or often true of her child. The scores for the one variable can be calculated by adding the numeric scores of the response from the PCG.

Withdrawn

The withdrawn subscale includes eight different variables listed as: acts too young for age, avoids eye contact, does not answer when spoken to, refuses to participate in games/activities, unresponsive to affection, shows little affection, shows little interest in things, withdrawn/does not get too involved. The questions were asked either during the phone interview or home interviews and were read to each parent caregiver, who was asked to indicate whether the statement was not true (0), sometimes or somewhat true (1), or very true or often true of her child (2). The scores for the subscales are calculated by adding scores for each item.

Anxious/Depression

The anxious/depression indicators are measured to examine its association with problem behavior of children. The statements asked revolved around mental health questions to get a nuanced understanding of the extent to which the respondent was anxious and depressed. The statements listed eight variables: Clings to adults, Feelings hurt easily, Too upset by separation, Look unhappy, Nervous/high strung, Self-conscious/easily embarrassed, Too fearful, and Looks sad. Similarly, to the previous indicators that were included in the Health and Health Behavior, these following statements were asked to the PCG of the child. The PCG had to respond whether the statements were either true or not true with numeric coded responses. The not true response was coded zero, the sometimes or somewhat true was coded one, and very true or often true of the child was coded two.

Nurture Variables

Parenting

The parenting variable measured four items of parenting responded by the mother of the child. The accumulation of 4 questions were conducted to capture the nonviolent discipline type of parenting, the psychological aggression parenting, the physical assault parenting, and the

neglectful parenting. For each question, the scoring measurements were asked to pick one of the following eight responses to the statements: “Being a parent is harder than I thought” “I feel trapped by my responsibilities as a parent” “I find that taking care of my child(ren) is much more work than pleasure, and “I often feel tired, worn out, or exhausted from raising a family. The possible responses were coded alphabetically starting with a) once, b) twice, c) 3-5 times, d) 6-10 times, e) 11-20 times, f) more than 20 times, g) not in the past year, but it happened before, or h) this has never happened. If the sum of the scores to the four questions were higher, this indicated better parenting skills in comparison to a lower sum of scores.

Material Hardship

At Year 3, a total of 8 questions were asked and collected from the “*Basic Needs – Ability to Meet Expenses”* to both parents to determine material hardship. The target focus on the questions revolved around paying bills on time, loss of utilities, food insecurity/stability, residential instability/stability, and financial hardships. Examples of questions asked to both the mother and father participants were: Was there any time in the past 12 months when (You/Your Household) did not pay the full amount of the rent or mortgage? In the past 12 months (You/Anyone in Your Household) evicted from your home or apartment for not paying the rent or mortgage? Additional questions were asked from the Survey of Income and Program Participation that focused on the child going hungry, if the respondent had access to free food, had a place to live all within the past twelve months post hardships. Lastly, two additional questions were asked from the IOWA study and asked to the PCG whether they have had to work overtime or take an additional job and if expenses on buying clothes have had to be reduced. For all the questions, the responses were either Yes=1 or No=0. The summed scores are calculated with higher values indicating more material hardship.

Analytic Plan

In aiming to test the distinction between certain genetic and environmental variables that heighten the risks for progressing aggressive behaviors for children with incarcerated parents, this study employed data collected from the interviews with the children, parents, and caregivers chosen in the Fragile Families Child Wellbeing Study. In particular, a series of analytic approaches were utilized. First, the data was manipulated and cleaned for statistical analysis. Missing values on any of the variables included in this study were cleaned, and each of the variables from different data sets were merged into one another to create a new data frame set. After cleaning the data, the second step was conducting the descriptive statistics for all the variables included in the analysis. Descriptive statistics are expected to provide pictures of characteristics of the sample and how variables in the analysis are measured. Followed by the descriptive statistics, a group mean comparison t-test was executed using the aggression variable and the incarceration variable. By comparing mean scores of aggressive behaviors of children between children with incarcerated parents and children with parents who have never been incarcerated, the effects of parental incarceration can be assessed. Lastly, four different regression models were implemented: basic model, incarceration model, non-incarceration model, and total model. With a basic model, the incarceration variable and sex variable which is a control variable are entered into the regression model to examine the sole effects of parental incarceration. For the incarceration and non-incarceration models, the study sample was divided according to parental incarceration and separate regression models were executed to examine differences in effects and significance of nature and nurture variables for aggression of children. Having separate regression models according to parental incarceration is expected to bring hints on how parental incarceration will affect various nature and nurture factors, ultimately leading to

aggressive behavior of children. The final model including all variables and samples was conducted to provide comprehensive results for parental incarceration, nature and nurture variables for the dependent variable.

CHAPTER 5: RESULTS

The following analysis presents descriptive statistics (see Table 1), incorporating various statistical information such as sample means, standard deviation, minimum and maximum values for each of the variables chosen for this analytic study. Looking at the dependent variable of the study 'Aggression', primary caregivers (PCG) answered that their children tend to show relatively low levels of aggression (mean: 9.360, range from 0 to 28). When it comes to the incarceration of the parents, about 4% of respondents, 174 individuals, answered that at least one of the parents had been in prison or jail since the project started. In analyzing the descriptive statistics of the genetic (nature) variables, the levels of withdrawal based on the eight questionnaires asked to the PCG about the child showed lower levels of withdrawal (mean: 1.997, range from 0 to 14). The mom intelligence variable produces statistical results that measure the level of intelligence from the mother and concludes lower levels of intelligence based on the verbal and performance tests (mean 6.752, range from 0 to 15). The dad intelligence measures the same verbal and performance tests for the fathers of the child and presents lower levels of intelligence (mean 6.538, range from 0 to 15). The anxious/depression variable measures mental health using eight different questions and the descriptive statistics present lower levels of anxiousness and depression for the child (mean 3.427, range from 0 to 14). The ADHD variable focuses on one item on the diagnosis of ADHD from the PCG about the child and outputs lower levels of ADHD (mean 0.880, range from 0 to 2). The last nature variable is impulsivity and measures of the condensed version of Dickman's Impulsivity test asked to the PCG and reveals higher levels that indicate a lower level of impulsivity (mean 17.81, range from 6 to 24). Transitioning from the descriptive statistics of the genetic (nature) variables, the nurture variables output a mixture of lower and higher levels of the variables chosen for this study.

The father hardship variable measures the economic hardships associated with the father, and the results show lower levels of hardships that produce a mean lower than the midpoint of the range (mean: 0.624, range 0 to 8). Followed by the father hardship variable, the hardships of the mother variable measured the same economic hardships associated with the father and produced lower levels of hardships (mean 0.888, range 0 to 7). The mother parenting variable produces higher levels (mean 11.010, range 0 to 16).

Table 1: Sample Descriptive Statistics

Variables	Mean	SD	Min	Max
Aggression	9.360	5.399	0	28
Incarceration+	174	4%	-	-
Nature				
Withdrawn	1.997	2.123	0	14
Mom Intelligence	6.752	2.660	0	15
Dad Intelligence	6.538	2.757	0	15
Anxious/Depression	3.427	2.476	0	14
ADHD	0.880	0.739	0	2
Impulsivity	17.814	3.712	6	24
Nurture				
Father Hardship	0.624	1.061	0	8
Mother Hardship	0.888	1.274	0	7
Mother Parenting	11.010	2.673	4	16
Control				
Boy (=1)+	2,557	52.2%	-	-

Note.= Frequency and percent (%) are presented for dichotomous variables rather than mean and standard deviation

Next, a mean comparison test for aggression of children is implemented to assess the effects of incarceration on the dependent variable. Children with incarcerated parents present more aggressive behaviors compared with children with non-incarcerated parents. The results of the mean comparison test statistically support the significant difference in aggression between the two groups.

Table 2: Mean Comparison T-Test

	Incarceration Group	Non-Incarceration Group	Difference	T-value
Aggression	8.805	7.33	1.475	-3.154***

Note. ***p<.001

Followed by the mean comparison test, the multivariate regression analysis of the parental incarceration variable for the dependent variable was implemented. The aim is to examine whether the differences in the development of aggressive behaviors for both incarceration and non-incarceration groups remain when controlling for the gender control variable. In doing so, the model examines the variation in aggression of the child by the incarceration variable and the sex of the focal child. In Table 3, the results of the regression model show a significant association of the incarceration variable and the gender of the focal child with aggressive behavior of children. The coefficient of the incarceration variable is statistically significant, indicating that when one or both parents were incarcerated, there is a 1.430 increase in aggressive behavior. Also, the model shows that boys have more aggressive behaviors. The r-squared value is .0061, which describes the proportion of variance in the aggressive behavior, dependent variable, that is predicted from the incarceration and gender variables. It indicates that 0.61% of the variance in aggressive behavior can be predicted from the independent variables. Also, the F-value of 8.57 indicates that the regression model of the incarceration and gender variable is statistically significant compared to the model without variables.

Table 3: Results of Basic Regression of the Incarceration for Aggression (N=2,487)

Variables	b	SE	beta	z
Incarceration	1.430	0.464	0.062	3.08**
Control				
Child's Gender	-0.575	0.212	-0.054	-2.71*

R2(adjust): 0.0061

F-value: 8.57***

Note. *p<.05, **p<.01, ***p<.001

Followed by the basic model, to assess how parental incarceration influences various nature and nurture factors, leading to aggressive behavior of children, the sample is split into an incarceration group and non-incarceration groups. Then, independent regression models for each group were implemented to examine the different effects of nature and nurture variables for aggressive behavior of children. Table 4 depicts the results for the development of aggressive behaviors for children with incarcerated parents. First, the results indicate that as predicted, children with incarcerated parents who were anxious and depressed, had ADHD, withdrawal, and parents with levels of impulsivity challenges held a significant correlation to the development of aggressive behaviors. The coefficient for the withdrawn variable conveys that when one unit increases in the withdrawn variable, there is a .550 increase in the predicted aggressive behaviors. The anxious/depression variable reveals that there is a .625 increase in the predicted aggressive behaviors when the anxious/depression independent variable produces a one-unit increase. The impulsivity variable revealed that there is a .304 increase in the predicted aggressive behaviors when the impulsivity independent variable produces a one-unit increase. The last statistically significant nature variable, ADHD, indicates that when the ADHD unit produces a one-unit increase, it can be approximately expected that there is a 2.853 increase in aggressive behavior. However, none of the environmental factors produced statistically significant correlations. Followed by the coefficients of the statistically significant variables, the adjusted r-squared value implies that 51.1% of the variance in aggressive behavior (dependent variable) can be anticipated from the independent variables included in this model for children with incarcerated parents. The F value also supports the significance of the model in explaining development of the aggressive behaviors (dependent variable).

Table 4: Results of Regression for the Incarceration Group for Aggression (N=87)

Variables	b	SE	beta	z
Nature				
Withdrawn	0.550	0.233	0.235	2.36*
Mom intelligence	0.063	0.163	0.031	0.39
Dad intelligence	0.051	0.158	0.026	0.32
Anxious/Depression	0.625	0.236	0.276	2.65***
ADHD	2.853	0.604	0.412	4.73***
Impulsivity	0.304	0.138	0.192	2.20*
Nurture				
FatherHardship	-0.285	0.339	-0.066	-0.84
MomHardship	0.614	0.311	0.156	1.98
Mother parenting	-0.084	0.181	-0.041	-0.46
Control				
Boys (= 1)	-.388	0.919	-.0338	-0.34*
R2(adjust): 0.511				
F-value: 9.99***				

Note. *p<.05, **p<.01, ***p<.001

Followed by the incarceration model, the following analysis (See Table 5), incorporates the results for children without incarcerated parents. Compared to the findings from the regression model for children with incarcerated parents, there are statistically significant correlations for multiple nature and nurture variables. Similar to the incarceration model, the withdrawn, anxious and depression, and ADHD nature variables hold a significant association for the development of aggressive behaviors. In the previous incarceration model, none of the nurture variables held a significant correlation to the aggressive behaviors but the mother parenting and mother hardship had a significant correlation in this model. All the genetic (nature) variables have positive

associations implying the increased values for aggressive behaviors when there is a unit increase in the specific independent variables. The withdrawn variable reports that for when there is a one-unit increase, there is a .458 predicted increase in aggressive behavior, holding all other variables constant. The effects of the mother intelligence variable communicates that there is a .083 increase in the dependent variable when the mother intelligence variable produces a one-unit increase. The anxious/depression variable highlights that there is a predicted .556 increase value for the dependent variable when the anxious/depression incarceration variable unit is increased by one. The last significant variable, ADHD, also indicates an increased value of 3.690 for the aggressive behaviors when the ADHD independent variable unit is increased by one. Two of the nurture variables, mom hardship and mother parenting variables produced both a negative and positive coefficient to the levels of aggressive behaviors. For every unit increase in the mother hardship, there is a .185 increase in the aggressive behaviors. However, when there is a one unit increase in the mother parenting variable and the parents receive higher scores of parentings, this leads to a -.126 decrease in the prediction of aggressive behaviors. Lastly, the adjusted r-squared value expresses that 57.5% of the variance in aggressive behaviors (dependent variable) can be predicted from the independent variables of the non-incarceration group. The F-value indicates that there is an overall statistically significant correlation to the model with certain predictor variables and supports the overall significance of the model.

Table 5: Results of Regression for Non-Incarceration Group for Aggression (N=1,928)

Variables	b	SE	beta	z
Nature				
Withdrawn	0.458	0.045	0.177	10.16***
Mom intelligence	0.083	0.032	0.041	2.62***
Dad intelligence	0.075	0.030	0.038	2.48

Anxious/Depression	0.556	0.038	0.260	14.57***
ADHD	3.690	0.117	0.504	31.64***
Impulsivity	-0.081	0.023	-0.057	-3.50
Nurture				
FatherHardship	0.094	0.079	0.183	1.19
MomHardship	0.185	0.068	0.043	2.72*
Mother parenting	-0.126	0.033	-0.061	-3.85*
Control				
Child's Gender	-0.280	0.157	-0.027	-1.78**
R2(adjust): 0.575				
F-value: 261.44***				

Note. *p<.05, **p<.01, ***p<.001

Lastly, the total model that includes all variables for the total sample was conducted. The results of the analysis indicate that the parental incarceration variable does not hold a significant association with aggression of the child when other nature and nurture factors are considered. Among nature variables, Withdrawn, Anxious/Depression, Mom Intelligence, and ADHD show significant and positive associations with the dependent variable. The withdrawn variable has a significant statistical correlation to the development of aggressive behaviors. It is concluded that for every one unit increase in the withdrawn variable, there is a 0.466 predicted value to the development of the dependent variable. The anxious/depression variable also has a p-value that is less than 0.001 and infers that for every one unit increase in the anxious/depression variable, there is a 0.555 increased value of the aggressive behavior variable. The mom intelligence variable concludes for lower levels of mother intelligence there is a .082 increased value of the aggression in the dependent variable. The last statistically significant variable is the ADHD variable which determines a predicted increased value of 3.661 for higher scores of levels of ADHD based on the response of the PCG variables.

Among the nurture variables, the only variable that produced a statistically significant correlation to the development of aggressive behaviors is the financial hardships surrounding the mother of the child. The mother hardships variable implies that there is a statistical significance at the ninety-five percent level and concludes for each unit decrease in the mother hardships variable this leads to an increased value of .218 in the development of aggressive behaviors. The last statistically significant variable in this model is the gender variable, indicating that boys have less aggressive behaviors than females when accounting for the other independent variables. The gender variable implies that each unit increase in the gender variable leads to a predicted decreased value of -0.286 variable for the development of aggressive behaviors. The adjusted r-squared value in this model conveys that there is a 57.10% of the variance in aggressive behaviors (dependent variable) can be predicted from the nature and nurture independent variables included in this model. Lastly, the F-value of 244.70 indicates that there is an elevated statistical significance correlation in this model.

Table 6: Results of Regression for the Total Model for Aggression (N=2,015)

Variables	b	SE	beta	z
Incarceration	0.102	0.383	0.004	0.27
Nature				
Withdrawn	0.466	0.044	0.181	10.51***
Mom intelligence	0.082	0.031	0.041	2.62***
Dad intelligence	0.074	0.030	0.038	2.49
Anxious/Depression	0.555	0.038	0.259	14.69***
ADHD	3.661	0.114	0.502	32.00***
Impulsivity	-0.066	0.023	-0.046	-2.86
Nurture				
FatherHardship	0.059	0.077	0.012	0.76

MomHardship	0.219	0.066	0.051	3.29*
Mother parenting	-0.120	0.032	-0.058	-3.72
Control				
Child's Gender	-0.286	0.156	-0.027	-1.84**
R2(adjust): 0.571				
F-value: 244.70***				

Note. *p<.05, **p<.01, ***p<.001

CHAPTER 6: DISCUSSION

This study aims to synthesize research on the increasing levels of aggression of children with research on the increasing degree of parental incarceration. The analysis explored whether having a parent currently or formerly incarcerated was associated with the development of aggressive behavioral outcomes among young toddlers. Although preceding studies have illustrated maladaptive behavioral outcomes among children with incarcerated parents, the results from this study suggest vigilance in projecting the causation of these behavioral outcomes as a solely G x E relationship.

The analysis revealed that parental incarceration was associated with the development of aggressive behaviors. The results of the mean comparison test and the basic model support a significant relationship of parental incarceration and aggression of the child. When children have one or both parents who are incarcerated or have been incarcerated, they are more likely to express aggressive behaviors compared with children whose parents were not incarcerated. As previous literature concluded, parental incarceration impacts the development of their children. The results of this study also suggest that the adversity of parental incarceration leads to more consequential behavioral outcomes which is aggressive behavior of children that is considered a critical cue to later delinquent behaviors (Barnow et al., 2005; Timmermans et al., 2009). However, in the final model, the parental incarceration variable lost its significant effects, implying the effects can be mediated by nature and nurture variables.

Second, this study found that nature and nurture variables show variant associations on aggression of the child according to parental incarceration status. For instance, the environmental independent variables included in the models had no significant effect on the development of aggressive behaviors for children with incarcerated parents. The findings of the genetics

variables having significant correlations to the development of aggressive behaviors align with previous research suggesting that parental incarceration can produce different negative outcomes for the child depending on the variation of genetics that alter the likelihood of making an individual more susceptible to the development of aggressive behaviors. The findings from the incarceration model (Table 4) also propose the argument that the causation of aggressive behaviors is a result of the genetic propensities of the individual rather than solely the environmental (nurture) propensities. Only genetic (nature) variables posit statistically significant correlations to the development of aggressive behaviors for children with one or both parents incarcerated. These findings reiterate the biosocial theoretical framework and molecular genetics domain for understanding the human variance in the causation of aggressive behavioral outcomes for children with incarcerated parents. The conceptual molecular domain integrated into the biosocial theory reiterates how particular genetics are crucial for understanding the difference in human variation in modifying specific genetic predictors of aggressive behavior outcomes. Utilizing the molecular genetics domain and biosocial framework components, this assists in determining that the anxious/depression, ADHD and withdrawn variables are predictors to explain the human variation for why certain individuals are more susceptible to developing aggressive behaviors in comparison to others. The findings from the incarceration group model also revealed that boys showed more aggressiveness in comparison to the females when one or both of their parents were incarcerated. However, when the model with the non-incarcerated parents group was performed, the results produced an extended effect on the development of aggressive behaviors through both the nature and nurture independent variables.

Similar to the incarceration model, the molecular genetics domain explained how certain genetics are more influential in developing aggressive behaviors, which is why five of the

genetic variables are statistically significant. The biosocial theory framework also acknowledges that there can be a G x E relationship, which can facilitate the explanation for why both nature and nurture variables were statistically significant to the development of aggressive behaviors for children without incarcerated parents. Aside from the genetic variables, the environmental variables that produced significant correlations were the parenting perception questionnaires from the mother and the financial hardships of the mother as well. The environmental variables findings of significant correlations to aggressive behaviors can be supported through the general strain theory. The general strain theory posits that strains and stressors can contribute to aggressive behaviors as a result of the negative emotions caused by the strains and stresses placed on the individual. Financial hardships can produce a strain on the child that can develop negative coping mechanisms that develop into further aggressive behavior. This correlation becomes evident as it produces the hardships of the mother as statistically significant. Similar to the financial hardships, the poor parenting strain can also produce negative emotions that develop into aggressive behaviors for the child. The questions asked to the mother about her perceptions of a parent and parenting style produced statistically significant correlations to the development of aggressive behaviors as the general strain theory framework reiterates.

CHAPTER 7 : LIMITATIONS

Nevertheless, the valuable discoveries derived from this study, it is vital to acknowledge the limitations that can potentially impact the interpretation and validity of the results. The first major limitation of the data gathered from the Fragile Families Child Wellbeing study would be the dependency upon self-reported data. The usage of self-reported data can become a limitation for the level of honest responses surrounding the questions revolving around incarceration. As time spent incarcerated can be a touchy subject for the individual incarcerated and the family members of the incarcerated individual, the use of self-report data can potentially lead participants to choose not to disclose their time and occurrence of being incarcerated. Surrounding the self-reported data of potential reporting bias, this dataset could not dependably control for the length of the incarceration along with the number of times the parent was incarcerated. The limitations of knowledge on the length of the incarceration and the number of times the parent was incarcerated creates the inability to determine if more frequent and longer terms of incarceration had a stronger effect on the development of aggressive behaviors in comparison to shorter periods of incarceration and number of times being incarcerated.

Revolving around the incarceration limitations, another limitation in this study revolves around the disparate aggressive behavior effects by race but rather gender. Since this study circulates around the impacts on the genetic and environmental trajectories of the child participant, race could be a social structure variable that can potentially alter the significance of certain variables in the development of aggressive behaviors. Many previous literature findings showed a higher significant exposure to parental incarceration and a higher risk to certain negative impacts on nurture and nature variables such as hardships and anxious/depression

(Kopak & Smith-Ruiz, 2016; Del et al., 2022). If race was considered for the development of aggressive behaviors in the indirect and direct impact effects of parental incarceration, then the results may fluctuate give both gender and race control variables. The incarceration variable also limits on determining whether maternal or paternal incarceration has a stronger effect on the development of aggressive behaviors when controlling for the other genetic and environmental independent variables. Lastly, one of the overall significant limitations for this study would be the construction measurement of dependent variable and certain nature variables. Most of these variables are measured by social constructions which then becomes an opinion constructed by the opinion of indicators from checklists of different surveys and panels developed by others. There is no true construct of what solely genetically fits into the characteristics of aggression, impulsive, and depressed. The findings can vary depending on future researchers' social construction on the variables included in this study.

CHAPTER 8: CONCLUSION

Concluding, this study directed to analyze the research inquiries: Does parental incarceration have an impact on the development of aggressive behaviors in children? Followed by the question, do the effects stem from the genetic (nature) propensities of the child or the environmental (nurture) elements surrounding the child? Through aiming to address these research objectives, data was collected from the previous Fragile Families Child Wellbeing study to execute a mean comparison test of the independent and dependent variable, along with the implementation of four separate regression analyses. The findings from the mean comparison test revealed that children with incarcerated parents displayed more aggressive behaviors than children without incarcerated parents. In delving deeper into the causation for aggressive behaviors, regression analysis was conducted to analyze the significance of the genetic and environmental variables to the development of aggressive behaviors for children with and without incarcerated parents along with the inclusion of both groups. The findings from the regression analysis of the children with incarcerated parents illustrated that four of the genetic independent variables revealed statistically significant correlations to the aggressive behavior's dependent variable.

Shifting from the incarceration regression analysis, the non-incarceration group regression analysis demonstrated that there was a statistically significant correlation between a combination of the nature and nurture variables to the development of aggressive behaviors for children without incarcerated parents. Differing from the incarceration group regression model, the Peabody variable was found to be statistically significant, but the impulsivity variable was no longer statistically significant. Each of the nature variables were found to be highly statistically significant. Additionally varying from the incarceration regression analysis, two of the nurture

variables were found to be statistically significant. The hardships and the parenting responses answered by the mothers of the focal child were found to be statistically significant. The gender variable of the non-incarceration group model was also found to be statistically significant as concluded in the incarceration group model.

After separately conducting two group models, the total model regression analysis included all the independent variables analyzed in this study. Staying consistent throughout the different models, the withdrawn, anxious/depression, and impulsivity model produced statistically significant correlations to the development of aggressive behaviors. As seen in the non-incarceration model but not the incarceration model, the hardship of the mother is the only nurture variable to produce a statistically significant correlation to the development of aggressive behaviors. Ultimately, the findings conclude that the specified nature variables are consistently statistically significant to the development of aggressive behaviors. Although the findings showed correlations between the genetic variables to the dependent variables, it is still vital to acknowledge the potential response bias and self-report limitations which could impact the validity of the results concluded in this study. The significance of analyzing the distinct genetic and environmental variables underscores the critical role in understanding the causation of aggressive behaviors for children with and without incarcerated parents.

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