

**Interpersonal Relationships, Access to CPS Resources, and Physical and Mental health
outcomes: Implications for Child Maltreatment Intervention**

by

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Can Interpersonal Relationships and/or Connections to Resources Modulate our Stress Response: Implications for Child Maltreatment Intervention

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Background

Child Maltreatment is a severely underreported public health concern that impacts at least 4 million child a year, disproportionally impacts marginalized communities and those with specific risk factors and can cause lifetime repercussions for the involved families. Due to the highly sensitive and consequential nature of child maltreatment, research is continually being performed to ensure that interventions in place are sustainable, highly effective, and based on what may be more impactful for those who need it most. In addition, research continues to be performed to gain a better understanding of the pathway between early life experiences and later health outcomes.

Methods

Using the National Survey of Child and Adolescent Well-Being (NSCAW II) General Release Data, this project analyzed associations between maltreatment experience and later health outcomes relating to physical health and depression. This project targeted children aged 8 – 17 that had recent contact with the child welfare system and only Wave 1 data was reviewed. This project looked at how close interpersonal relationships with caregivers and peers and support from caseworkers could moderate the appearance and severity of negative health outcomes which has been shown in the literature to be closely related to maltreatment.

Results

Peer and Caregiver relationships had a positive association with the child's depression scores meaning that as they reported improved relationships or decreased loneliness, these were associated with lower depression scores for the children. Even when accounting for the age between adolescents and teens, peer relationships continued to show a positive association with a child's depression scores. Exposure to violence as both a witness or victim more than one time was positively associated with depression scores of the children as well.

Conclusion

The importance of social support for children and their families cannot be overstated, and needs to include individual's outside of familial relationships, such as a child's peers. The cumulative effects of multiple traumatic events for children must also be acknowledged to gain a better understanding of how interpersonal and community support can serve as a potential protective factor for these children during important developmental periods in their life.

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Preface

Thank you to the faculty and staff both in and outside of the University of Pittsburgh for your guidance during this process as you have provided insight that has been beyond invaluable. I would also like to specifically thank my committee members for helping me get to this point. Lastly, I would like to thank my friends and family for their tireless support because without them I wouldn't be here.

The data used in this publication, [Dataset 173, Dataset Title: National Survey of Child and Adolescent Well-Being (NSCAW II) General Release, Waves 1-3], were obtained from the National Data Archive on Child Abuse and Neglect and have been used in accordance with its Terms of Use Agreement license. The Administration on Children, Youth and Families, the Children's Bureau, the original dataset collection personnel or funding source, NDACAN, Cornell University and their agents or employees bear no responsibility for the analyses or interpretations presented here.

1.0 Introduction

Child Maltreatment has been recognized as a public health issue since the 1960's (U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau [U.S. Department of Health & Human Services ACYF - CB], 2021) and affects more than just the child experiencing the maltreatment. The most common definition of Child Maltreatment is "any abuse or neglect that occurs before the age of 18 that results in actual or potential harm to a child's health, survival, development, or dignity in the context of a relationship of responsibility, trust or power" (World Health Organization [WHO], 2020). Even with this definition, there remains a consensus that maltreatment remains underreported due to there being only a few sources of quality annual data on this subject and only cases that get reported being included (Hussey et al, 2006). Even with this underreporting, there were still 4.4 million reports made to CPS in 2019 which resulted in a rounded number of 3.4 million investigative responses in Federal Fiscal Year (FFY) 2019 (U.S. Department of Health & Human Services ACYF - CB, 2021). These investigative responses, whose purpose is to serve as a stop to the maltreatment, is unlikely to reverse the effects that the maltreatment has had on the child.

As severe as death is, with an average of five children dying from child maltreatment daily (Child Welfare Information Gateway, 2021a) the lifelong impact of surviving maltreatment can manifest itself in more obvious ways such as fear or aversion or can be more subtle by altering the way they respond to future stress. The long-term effects of maltreatment can vary depending on the age of the child when maltreatment occurs, the relationship to the perpetrator, type of maltreatment, number of occurrences, or even severity of maltreatment (Australian Institute of

Family Studies, 2014). The interplay of these factors can directly impact the way the body reacts to the maltreatment as a stressor and shows up in their life. Research has been occurring for decades to explain the mechanisms that exist that contribute to the effects on children's bodies from child maltreatment. Research into the ways in which certain health outcomes are associated with and potentially a result of child maltreatment is a higher area of interest. These effects can manifest as physical alterations at the genetic or organ system level, mental health disorder development, or decisions and feelings regarding later parenthood. This thesis examines the association between external factors present during and after maltreatment, such as support systems and available resources to see if any of those factors are associated with later health outcomes. This thesis seeks to build upon current research by presenting child maltreatment's effects in a holistic manner to further conversation regarding how different types of support can be included in conversations surrounding the creation and implementation of child maltreatment interventions.

1.1 Specific Aims

This thesis has three main aims/objectives. First, this study aims to examine the interpersonal relationships among children and individuals who are typically close to them, which for this study will be the caregiver and their peers. The quality of these relationships will be examined in association with the severity and incidence of negative health outcomes. As noted above negative health outcomes have been shown in prior research to be a common outcome for children who have experienced maltreatment. A child's relationship with those around them such as family, which can include guardians/caregivers, and community members such as peers, will be analyzed. A series of regression analyses will be conducted to examine whether certain kinds

of personal relationships, in both quantity and quality, have a higher association with specific health outcomes even when controlling for other close relationships and exposure to varying degrees of lifetime maltreatment.

The second aim of this study is to examine the quality of resources, through the perspective of the caregiver, and thus support provided to families by the Child Protective Services (CPS) caseworker, who serves as an extension of CPS. By using the perceived support that the caregiver feels were given to their family, an analysis will be conducted to determine if there is any association with this perceived support and the health outcomes of their child. The way the caregiver perceives support and resource availability from the casework will be assessed for associations with their child's health outcomes. Looking at how the caregiver feels they have been supported through the lens of resources to assess any connection between their needs and expectations being met and their ability to better support their child's overall well-being.

The third aim of the study is to examine if the selected health outcomes are associated differently with pre-adolescents versus adolescents based on the quality of their peer relationships from Aim one and their resources in Aim two. This analysis will occur by looking at the quality of their support systems, resources provided, and overall health outcomes of children aged 8 – 12 compared to those aged 13 – 17. By comparing two age groups, this project intends to analyze the importance and potential strength of these relationships during pre-adolescence and adolescence for individuals who have experienced maltreatment at any point prior to this. Understanding how these relationships may have different degrees of association during specific developmental time periods can be used to improve interventions that are targeted toward those experiencing child maltreatment at varying ages.

To complete these aims, this thesis will examine the National Survey of Child and Adolescent Well-Being (NSCAW II) and perform a literature review on the areas that are reflected in the data obtained. The data analyzed will have been collected from children who have had contact with the child welfare system due to a report, whether substantiated or unsubstantiated, of maltreatment during child development. Using this demographic of children, the current study will look at the physical and mental health outcomes among children who have experienced maltreatment, which at the minimum will be defined as a closed case with CPS within the last 15 months. By performing this analysis, this study aims to present some data regarding maltreatment impact in a comprehensive manner regarding ways in which the individuals and systems in a child's immediate environment, can impact the health outcomes that are highly associated with the maltreatment they experience. By doing so, this study seeks to highlight the importance of these relationships so that additional research may be performed regarding how those relationships can be included in interventions for these children and later adults.

Based on the background literature, I hypothesize that having positive interactions and thus relationships with caregivers and peers, will moderate the development of and severity of later health outcomes they may experience after controlling for any incidences of lifetime maltreatment. This moderation will be seen in higher association of positive relationships in children with lower numbers of reported physical health outcomes and depression scores. As children increase in age, the relationship type and resources they have access to will have a greater association with more positive health outcomes. In addition, the relationships with more positive associations and considered high in influence may move from having a stronger association with more familial members to those who are not family but are still considered influential in a teen's life such as their peers. In addition, the degree to which those around them can and do intervene and provide

positive resources to the child will also moderate their stress response outcomes which may be able to be seen through a reduction in negative health outcomes. In addition, the critical period model, meaning the timing of the maltreatment and relationship, can also provide insight into how complex the lens must be to analyze and support interventions for those experiencing maltreatment.

2.0 Literature Review

2.1 Maltreatment Background

Maltreatment is normally separated into four main categories, but these can differ depending on the system or organization obtaining this information. The four categories used by the National Child Abuse and Neglect Data System (NCANDS) are physical abuse, sexual abuse, emotional abuse, and neglect¹ (Children Bureau of the U.S. Department of Health and Human Services, 2019). Within those categories, the most common form of abuse that is reported is neglect, followed by physical abuse (Gonzalez, 2021). Among reported occurrences of child maltreatment, 84.5% involve one form of maltreatment with the remaining 15.5% involving two or more forms (U.S. Department of Health & Human Services ACYF - CB, 2021). For those that do experience and have their abuse reported, 70.3% of them are first-time victims with the gender breakdown being 51.4% girls, 48.3% boys, and unknown for .3% of individuals in FFY 2019. (Child Welfare Information Gateway, 2021b).

In addition to under-reporting of child maltreatment, disparities among those experiencing maltreatment exist amongst racial and ethnic groups, which may further exacerbate health disparities these groups already face. In addition to experiencing higher rates of victimization when compared to their white counterparts, children from marginalized racial and ethnic groups also have higher rates of death resulting from child maltreatment. According to the Children's

¹ Please note, these code book definitions of maltreatment are only for publicly available data and may differ from the codebook used for restrictive data sets from NDACAN.

Bureau, American Indian or Alaska Native (AIAN) children and African American (AA) children have the two highest rates of victimization with 14.8 and 13.7 per 1,000, respectively which is significantly higher than nationwide rate of 8.9 victims per 1,000 which was also reported during Fiscal Year 2019 (U.S. Department of Health & Human Services ACYF - CB, 2021). The overrepresentation of marginalized groups in maltreatment reports highlights issues within the system that handles reports, those who are in charge of reporting, and potentially a result of racial bias in this system. The high maltreatment death rate amongst AA children of 5.06 per 100,000 in comparison to 2.18 per 100,000 for White children (U.S. Department of Health & Human Services ACYF - CB, 2021), is a disparity also seen in infant mortality rates in America as well. For infants born to AA/Black mothers in 2018, their mortality rate was 10.8 per 1,000 which is more than double the rate for infants born to white mothers (Center for Disease Control and Prevention [CDC], 2021). This high death rate for AA children in either context highlights a larger issue regarding the systems that are in place to assist families needing to have evaluate how their processes are assisting all equitably.

2.2 Child Protective Services

2.2.1 History

The Child Welfare system, which is a broad term used to describe all the systems or institutions that prioritize the overall safety and well-being of children, is the primary space for all discussions regarding child maltreatment. Since it is made up of organizations, programs, and people in different states and not one central organization, its regulation primarily occurs at the

state level. However, due to the nature and importance of a child's well-being, the federal government supports states and The Children's Bureau within the Department of Health and Human Services (DHHS), the primary federal body that oversees much of child welfare related activities (Child Welfare Information Gateway, 2020). The process, which is detailed in Figure 1, describes how an initial report to any child welfare related institution is processed and how the use of follow-up services or decisions to begin an investigation occurs. Even with this extensive system in place to process reports and follow up on children, cases and ultimately children fall through the cracks. Furthermore, some report that more harm than good results from the involvement of these services due to lack of follow up and interventions for those suffering as a result of some of their investigations (Campbell et al., 2010) and when reports come out regarding child safety issues in foster placements (Oxner, 2021). As this system continues to be overburdened with cases, research has shown that this has led to high workloads for social workers (National Research Council 2014, p.200) which can negatively affect the quality of care that these cases receive due to caseworkers having a decreased ability to find and provide resources (Carney et al., 1993). As more research continues to be conducted on the relationship between caseworkers and other social work-related workers, understanding how burnout contributes to overall care and health outcomes for those they oversee remains an important connection to study.

CPS as it exists today, both structurally and institutionally, began to come to fruition during the 20th century. Prior to this time, child services or the responsibility of general protection for children were either left in the hands of the states or city with slightly more oversight occurring for those who were orphans. Towards the end of the 19th century and into the 20th, the two main developments that started the shift to more centralized protection was the increase in number of children needing orphanages (Gordon, 2011) and in charities where people began receiving formal

social work-related training (Myers, J.E.B, 2018). As the children in these institutions grew, so did the scrutiny regarding the conditions they were living in and if there were other alternatives to orphanages.

Organizations and charities such as the New York Children's Aid Society in the 1850's and Societies for the Protection of Children (SPC) served as primary players in the journey to the formation of an institution dedicated specifically to child welfare and their protection (Myers, J. E. B., 2008). The idea for the SPC actually came through advice given by members of the American Society for the Prevention of Cruelty to Animals (ASPCA) due to their background and ability to understand the laws regarding protection. As stated by Myers 2008, their counsel was sought after the abuse suffered by a nine-year-old was discovered and this incident bolstered support for the creation of an organization dedicated to children protection. Within 50 years, organizations all across America were taking up the cause of child protection but even with this widespread acknowledgement of the need for children to be protected, marginalized communities continued to be treated unfairly in the process which is seen today.

In 1912 when the Children's Bureau was created with the help of activists, the main goals of it was to promote the welfare of women and children (Gordon, 2011). Once this bureau was in place, research about what was and wasn't being offered in all the states could be conducted and this information was used as supporting data for those who were fighting for a more centralized system that had more federal backing and power. As the 20th century progressed and the need for such an institution was becoming more apparent, research and the classification of maltreatment began to become standardized and cases of maltreatment could begin being collected in a systematic manner due to case reporting laws (Gordon, 2011). Even as America was building and

solidifying this system to be used for child protection, in terms of overall child welfare the history and current opinions about its effectiveness remains a topic of debate.

2.2.2 Reporting

Even though CPS in the states is more central now than it was 100 years ago, none of the 50 states have the exact same laws regarding their specific definition of maltreatment. Even without the same definition, the process of reporting any suspected cases can be started by anyone who suspects maltreatment and not just mandatory reporters within institutions. The caveat of it being mandatory is not added to statutes in all 50 states and territories; in fact, only 18 states, including Puerto Rico, mandate that anyone who suspects must report whereas the other states don't include this compulsory language (Child Welfare Information Gateway, 2019). This difference in the compulsory nature of reporting by those not in professions with mandatory reporting can contribute to the underreporting that occurs of maltreatment across the country. Another contributor to underreporting can be the variation in the terms that are included in states definition. One example of this is amongst states who had the highest rate per 1,000 children of child victims in 2019 – Kentucky, West Virginia, and Massachusetts – whose rates were 20.1, 18.7, and 18.5 (U.S. Department of Health & Human Services ACYF - CB, 2021). According to a comparison of their definitions and factors related to maltreatment, the states differ on multiple factors, such as the age that different types of maltreatment apply to, whether the perpetrator can include a family member regardless of maltreatment type, or the types of maltreatment that is included such as head trauma and failure to protect (Weigensberg et al., 2021). With variation among the states with the highest rates of child maltreatment victims, this highlights an issue with how cases may be

reported and the efficacy of the abuse reporting system because even with different age, type, and specifics, these states still have the highest rates.

The typical reporting process, which is detailed in full in Figure 1 from Children Welfare Information Gateway 2020 report, begins when any person, regardless of if they are a mandatory reporter or not, suspects that child maltreatment has occurred. This would prompt the opening of a case which would involve reading this report and performing an initial risk assessment based on what is known about the family and the child. Depending on what is found the family may be referred to services, be put into contact with community-based organizations, or an official investigation is started. Depending on the age of the child, the investigation may offer different suggestions which can include foster care, permanent transfer of custody, or a mix of referral services.

The Child Welfare System

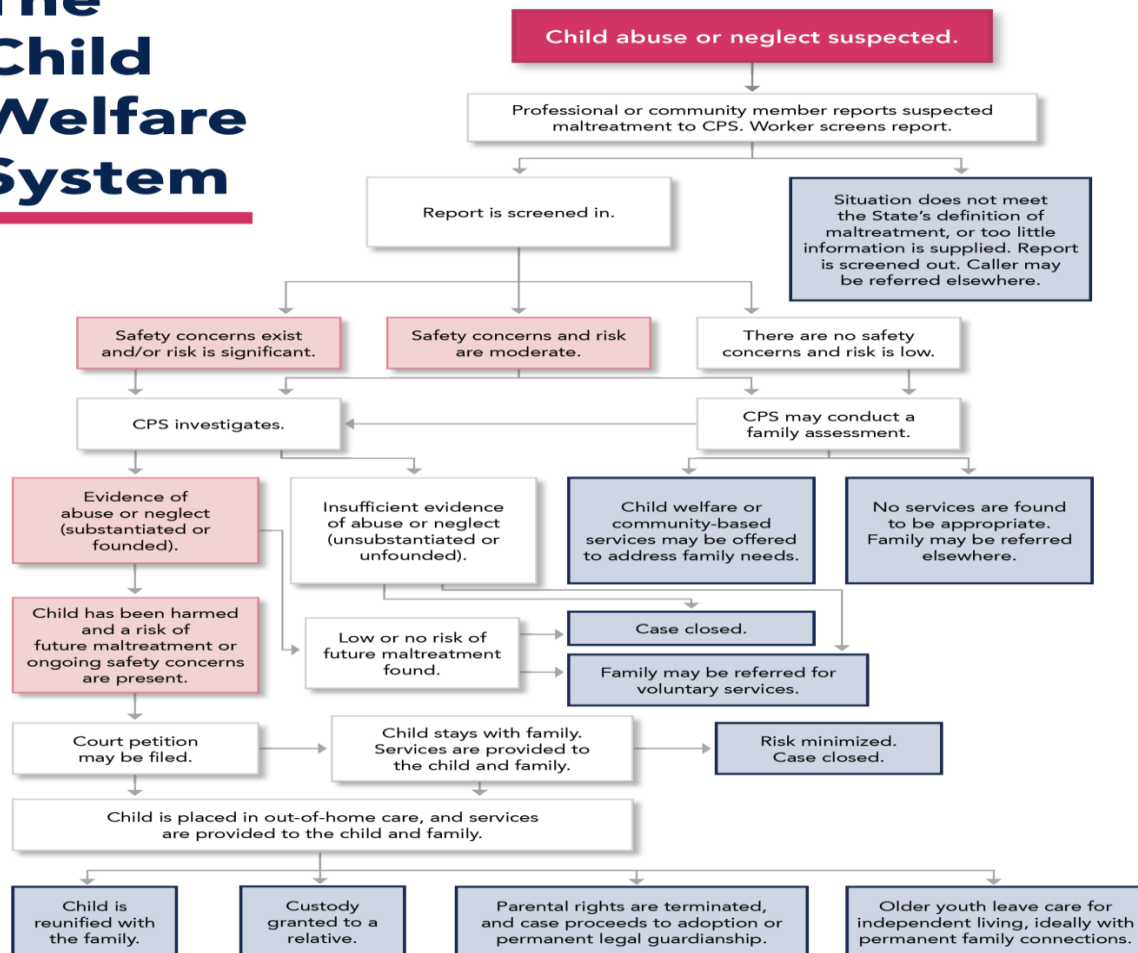


Figure 1 Child Welfare System Reporting Process. From “How the Child Welfare System Works” by Children Welfare Information Gateway, 2020. This material may be freely reproduced and distributed as long as Children Welfare Information Gateway is cited.

2.3 Stress Response

Biological stress, which is defined by the American Psychological Association (APA) as “a condition that imposes severe demands on the physical and psychological defenses of the organism” (APA n.d), and our bodies reaction to it is a fundamental part of the way we interact

with the world around us. As a result, the way the immune system and other body systems are activated upon the perception of stress, whether real or fictional, can lead to a better understanding about how this process leads to physiological reactions. The highly regulatory and selective nature of one's stress response is what allows the body to carry out this process based on the specific nature of the stress but is also the reason why chronic or hyperactivation of this process is a crucial aspect to look into (Seegerstrom and Miller, 2004; Schneiderman et al, 2005).

2.3.1 Mechanism of Action

Upon encountering a stressor, the body immediately begins categorizing the type of stressor present to determine which combination of actions are needed to defend itself. As a result of our stress response, one of two different axes's can be activated. The first, which is Hypothalamus-Pituitary-Adrenal (HPA) axis, is responsible for slower responses whereas the second axis, the Sympathetic-adreno-medullar (SAM), is responsible for faster responses (Chu et al, 2021). The collaboration of the HPA and SAM leads to a variety of systems being activated and to a mixture of chemicals being released which in particular is glucocorticoids (GC), which is released by the HPA, and noradrenaline (NA) and norepinephrine (NE), by SAM (Goday et al, 2018).

To understand how our bodies respond to different stressors physiologically, understanding the physiology behind this process is needed, which starts with the way we distinguish different kinds of stressors. Stressors can be broken down into two categories: psychogenic, which means it is psychological in nature, or neurogenic, meaning it is physical in nature (Anisman & Merali, 1999). In addition to these two categories, depending on the purpose of the research, stress can also be categorized based on its duration or course (so whether it is discrete or continuous), which

is the taxonomy that Elliot and Eisdorfer discussed in 1982 which was cited in 2004 by Segerstrom and Miller as they sought to characterize stressors. As Segerstrom and Miller (2004) go on to describe, this grouping which includes “acute time-limited stressors”, “Brief Naturalistic stressors”, “stressful event sequences”, “Chronic stressors”, and “Distant stressors”, allows an investigator to categorize a stressor not only based on when it occurs but also on the later impact size and how long this stressor can present as a challenge after the initial interaction.

For many physical stressors, the sympathetic system is activated which allows the SAM to release its corresponding chemicals to start the fight or flight response that is a hallmark of our SR (Chu et al., 2021; Godoy et al., 2018). Upon release of noradrenaline (NA) and norepinephrine (NE) into the blood, they begin binding to their respective G-protein receptors, which activates cellular response and leads to an increase in norepinephrine in the brain (Chu et al., 2021). Chu continues on to say that this cellular activation results in changes in many organ systems such as muscular, respiratory, and cardiac. Changes in these organ systems that support the fight or flight response include an increase in blood pressure which translates to an increase in heart rate, glucose levels, and in muscle strength to allow the body to fight, if necessary, a perceived physical stressor (APA, 2018).

Stress responses normally function as a two-prong system where the immediate needs are addressed first while your body continues to release other hormones that ensure you can continue to defend yourself against the stressor. While the SAM releases NA and NE into the blood to begin that process, the HPA begins releasing GCs with one of the main ones being cortisol, which is a steroid that is commonly known as the “stress hormone”. The way cortisol gets released is when a GC named Corticotropin-releasing hormone (CRH) is released from the hypothalamus and goes onto act onto its receptors, which are primarily in the brain, muscles, GI tract, and heart (Chu et

al., 2021). Upon CRH's release, it begins a cascade that initiates the release of adrenocorticotropin (ACTH) hormone which in turn begins the cascade to begin cortisol secretion (Chu et al., 2021, Schneiderman et al., 2005). Both cortisol and CRH increase are important to one's stress response as CRH has been linked to improving a body's ability to be make time sensitive decisions based on different stressors and in different environments (Synder et al., 2012) while cortisol helps with energy production and immune regulation during this time (APA, 2018).

This process which is detailed by Godoy et al., 2018 in Figure 2 depicts a simplified version of the stress response from the beginning when a stressor is identified to the end when the body has responded to that specific stress. As the body acknowledges that the stressor has been removed and it attempts to rebalance itself, this is when any lasting changes that may have occurred as a result of specific or cumulative stress begins to show itself.

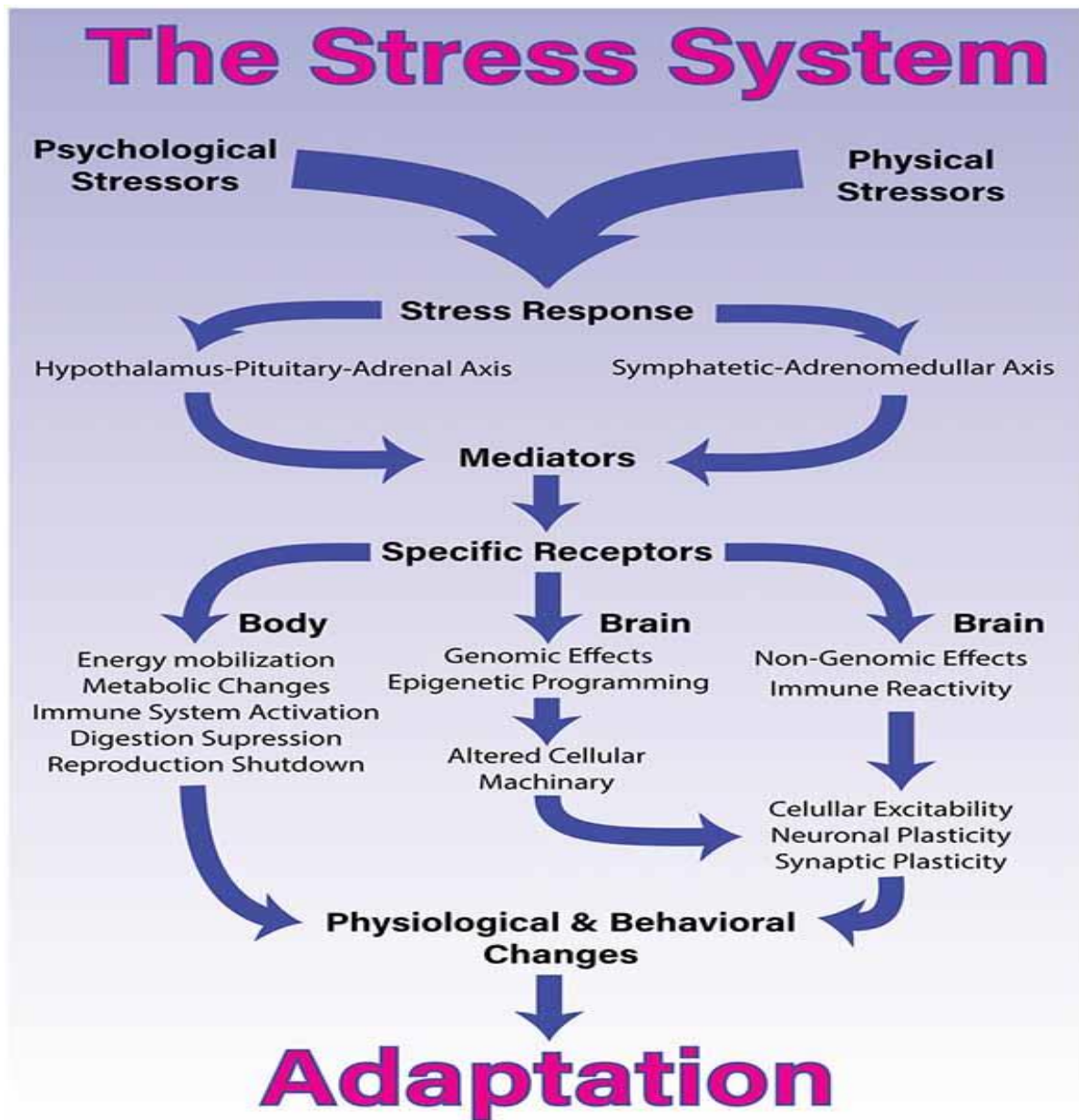


Figure 2 From “A Comprehensive Overview on Stress Neurobiology: Basic Concepts and Clinical Implications”, by Godoy, Rossignoli, Delfino-Pereira, Garcia-Cairasco and Umeoka 2018 *Frontiers in Behavioral Neuroscience*, 12. CC BY-NC-ND.

2.3.2 Adverse Health Outcomes

As a result of how well-coordinated the body is designed to respond to stress and then revert back to a state of balance upon the departure of the stress, chronic activation of one's stress response can have negative effects on the body. One way this can occur is through continued inactivation or suppression of specific body system processes which can lead to either a cumulative effect or an error during this chronic process. An example of this is the suspension of digestion after the stress response is activated due to other bodily processes having higher priority due to their direct connection in assisting the body to assess the situation and react (Schneiderman et al., 2005). This disruption to one's digestion tract when acute or temporary may not cause long lasting effects but if chronic, a change to one's digestive tract functionality (Budzyński and Kłopocka, 2014) is the foundation of many digestive issues such as constipation, diarrhea, and even irritable bowel syndrome (IBS). In addition to the suspension of digestion, as the brain-gut axis modulates the digestion system's response when stress occurs, overstimulation of this axis as a result of chronic or intense stress is thought to have an impact on the increase in gut bacteria (Budzyński and Kłopocka, 2014).

Long-term Gastrointestinal complications are not by far the only health issues that have been connected, through research, to adverse childhood experience (ACE). These ACEs don't have to be child maltreatment and can be other forms of negative experiences, but their nature normally acts as a stressor during important development time periods. Some of the most common health outcomes that have been reported as having higher odds of occurrence in those who have ACEs are respiratory complication, mental distress, diabetes, and cardiac related problems (Gilbert et al., 2015). Based on this article, these odds would increase significantly for those who experienced more than one ACE which means that one's risk for these disease or later health outcomes could

actually be accumulating much earlier than adulthood for these children. According to the APA, some other potential health conditions that are related to chronic stress or earlier stressors are depression, immunological disorders, musculoskeletal disorders, chronic pain, and issues with reproduction (2018).

2.3.3 Epigenetics

As research into stress response and child maltreatment continue to grow, understanding how the gene-environment interaction applies to adverse life events is also growing in interest. For health outcomes that have been associated with ACEs such as psychiatric disorders, epigenetic research is looking to understand how those ACEs may be involved with psychiatric risk, severity, or presentation. For genes that have been shown to be associated with outcomes that also overlap with outcomes seen for those who have experienced child maltreatment, such as developmental delays, research has begun looking into those gene expressions in people who are and aren't affected. An example of this is with the 5-HTT gene also known as SLC6A4, which encodes serotonin receptors, (Jiang et al., 2019), whose methylation has been seen to be highly associated with those who have experienced physical or sexual abuse (Kang et al., 2013). Another epigenetic connection that has been researched involved the *NR3C1* gene which encodes the receptors for the GCs which the body needs as a result of GCs involvement in our stress response (Jiang et al., 2019). Jiang et al., 2019 goes onto to summarize that for those who have experienced kinds of maltreatment, specifically traumatic youth experiences, they have a higher association with a methylation of this gene (van de Knaap, 2014) and this was seen in addition to decreased levels of GC expression. A limitation of this information may be that for many of the epigenetic based studies that are interested in these potential connections, their participants are primarily of

European ancestry which does not reflect the demographic range of those who experience higher rates of maltreatment, are overrepresented in the CPS system, or who are more likely to live with these health outcomes. This highlights the importance of diversifying the research that is being done and how this information can be used to explore the mechanism of action between different aspects of maltreatment and the epigenetic changes that are seen to hopefully use this information beyond the lab and within interventions.

2.4 Current Interventions

For those either at risk of experiencing child maltreatment or those who actually do experience maltreatment, interventions on all levels are constantly being analyzed and implemented to ensure that they have the maximum effectiveness for these populations. In addition to the research being done about interventions as a whole, there has also lately been renewed interest in understanding the components of the intervention to better discern which aspects have the highest efficacy.

2.4.1 Prevention

Interventions that are aimed at protecting communities as a means of preventing child maltreatment normally have either a universal or community-based approach. As defined by Child Welfare Information Gateway, in their Framework for Prevention Child Maltreatment (2017), prevention-based interventions normally fall into one of three categories: Primary, Secondary, or

Tertiary. They go on to say that primary is a focus on the population as a whole, the secondary focuses on those with child maltreatment risk factors, whereas the tertiary is to prevent or decrease child maltreatment reoccurrence for those who have already had some experience. Each category focuses on different combinations of resources, individuals, and institutions to promote the techniques in each kind of prevention services.

Primary prevention programs normally focus on general family-based education for parents, medical professionals they interact with, or community education about maltreatment and its impact. An example of this is the public health promotion of interventions that are aimed to address Shaken Baby Syndrome. Programs such as this have been shown to be successful by including parents in the education as both a learner and teacher which allows important information to reach more individuals and allows the parents to be better connected to their infant's health (Board on Children, Families; Institute of, & National Research, 2012). Other kinds of primary interventions include broad-outreach public education efforts about child maltreatment effects, both practice and agency reform, and supporting families financially and socially (Board on Children, Families; Institute of, & National Research, 2012; Fortson 2016; Child Welfare Information Gateway, 2017).

Acknowledging that supporting families financially and socially can also serve as an intervention for child maltreatment is included in the Technical Package from the CDC regarding interventions that they believe could help families and thus help their children as well. Some of these interventions focus on economic support such as assistance programs, improving their work-life balance with flexible scheduling options, and making child-care physically and financially accessible (Fortson, 2016). Even with the wide-scale implication of many of these interventions, upon running a meta-analysis, van der Put et al (2018) found that the actual effectiveness of many

of these interventions, such as education resources for new and expecting parents, to have a small effect with a Cohen's d of less than .2 at .13. For programs such as this, they are able to have positive effects on motor development, both child and parental mental health, and overall incidence of child abuse (Pinquart and Teubert, 2010).

Secondary prevention-based interventions for those who are at a higher risk of maltreatment are the interventions most commonly associated with preventing child maltreatment narrative. Risk factors for child maltreatment can be broken into three levels which is child-based factors, family-based factors, and social factors. Examples of child risk factors are child disability and behavior, and environmental risk factors include low socio-economic status, lack of access, and neighborhood violence (Child Family Community Australia, 2017). Also, according to Child Family Community Australia's Resource Sheet, some examples of family risk factors include mental or physical health issues, history of abuse in their life, and family/child stress. The CDC provides similar risk factors for child abuse but instead notes that risk factors for children are specified as being for victimization whereas individual, family, and community risk factors are described as being for perpetration (2022). For families with these risk factors, it must be noted that even though these may be important risk factors, these factors or experiences don't directly cause child maltreatment.

A well-researched secondary intervention are visits to the homes of at-risk families by a professional who is trained in child services who can provide family-centered resources within the comfort of one's home (US Preventative Services Task Force, 2018). Having the home be the location for these services can also contribute to the success of this method because it decreases barriers that may exist for families, and it may have the potential to address other issues beyond maltreatment in the home such as violence and stress-inducing experiences (Board on Children,

Families; Institute of, & National Research, 2012). The use of this intervention is widely supported by Child Welfare through their recommendation of its usage, and through their financial support of grants to expand them into more communities (Child Welfare Information Gateway, 2017). This program usually works through referral from medical professionals or community-based organizations designed to provide support to new and current families and can be tailored to fit the specific risk factors the family have. The tailoring can occur by focusing on which of the three levels of risk factors is most present and can also incorporate culturally appropriate strategies to ensure that a one size fits all approach isn't being used for everyone who uses these visitation programs.

Tertiary prevention-based interventions are targeted to families and individuals who have already experienced maltreatment, and it focuses on preventing re-victimization and providing different kinds of support for this population. These interventions normally occur on a federal or state level with the child or family because this is the primary function of the child protective services across the country. Some intervention suggestions at this level include, mental and physical health referrals, supporting parents so they can foster safe and stable living environments, and preservation services (Child Welfare Information Gateway, 2017; Fortson et al., 2016). Initiatives such as these have been supported on the policy level as well with acts such as The Family Preservation and Support Services Program Act of 1993 which was used for immediate relief and support for families and this act has been built upon as recently as 2018 when it was passed in 2018 by Congress as the Family Prevention Services Act – Family First (Thomas and Halbert, 2021).

2.4.2 Treatment

Building off of tertiary prevention-based interventions, care for those who have experienced child maltreatment can depend on the type of maltreatment, the age of the individual when they are seeking treatment, or even more factors. Due to the sensitive nature of child maltreatment, as more research continues to be performed regarding the best methods for specific situations methods that utilize trauma-informed care continues to show up in conversations around child maltreatment. According to the Center for Substance Abuse Treatment, Trauma Informed Care (TIC) is defined as care that, “Emphasizes the need for behavioral health practitioners and organizations to recognize the prevalence and pervasive impact of trauma on the lives of the people they serve and develop trauma-sensitive or trauma-responsive services” (2014). The use of TIC means that a one size fits all method isn’t employed but instead is flexible to be structured to an individual's needs in a culturally and socially conscious manner. As early as 2000, state and counties around America have begun selectively implementing TIC approaches for programs targeting children who have experienced a wide array of adverse events (Oral et al., 2016). This increase in usage and implementation of TIC based approaches has been assisted by the creation and distribution of resources from organizations such as Substance Abuse and Mental Health Services Administration (SAMHSA) and Child Welfare Information Gateway in addition to an increase in research of the impact this care can have (Oral et al., 2016). A study conducted in Hawai`i on the impact a new project whose focus was TIC for their approximately 100 at risk youth who participated, showed that overall, even though there was an increase in cost over the six years, the youth health and behavior-based outcomes showed a statistically significant change in the youth’s health and behavior (Suarez et al., 2014). Even though this was a smaller sample size, research continues to be performed that analyze the overall benefit of TIC for youth to gain

further insight into if different aspects of TIC are more beneficial than others and can be used to specifically target youth who would have a greater benefit from this approach (Hanson and Lang, 2016).

Besides programs and interventions that use TIC at their center, another way treatment is broken down is around the kind of maltreatment experienced. For those who have experienced physical abuse, the top concerns are normally internal or external damages which is why physical exams followed by therapeutic interventions are suggestions in these cases. (Urquiza et al., 1994). Damage to one's body are the top concerns for individuals who have experienced either physical or sexual abuse but due to the more sensitive nature of sexual abuse, more detailed interventions and treatment plans are used. The National Institute for Health and Care Excellence (NICE) highlights different therapeutic resources based on the child's age, for those who have experienced sexual assault, based on different symptoms they may present, support for their non-abusing parent, and the ways different therapeutic approaches could be helpful in different situations (2018). The use of therapy is also promoted to provide a space for impacted children to discuss feelings around sexuality, safe sex along with pregnancy, and their body as a result of the abuse (Urquiza et al., 1994). The use of a therapist for all forms of maltreatment at its core allows a medical professional to engage in dialogue with the child to best assess what additional resources they may need and supporting them physically and emotionally as they temporally move away from their experience of abuse. A specific kind of therapy that can be used for those who have experienced various kinds of trauma is Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) which incorporates the trauma-based perspective for children aged 3 – 18 (The National Child Traumatic Stress Network [NCTSN], 2018). The NCTSN reports that this model's flexibility and use of a community therapist should be used for children who are expressing difficulties as a result

of their trauma and can help establish a relationship with the child while also helping to address trauma, coping mechanisms, and address stigma (2012).

Treatments that are aimed at assessing the behavioral and emotional outcomes related to maltreatment tend to focus on issues with attachment and behavior regulation. Attachment issues, which is seen most often in those who have experienced emotional abuse (Riggs 2010) or neglect, is thought to occur as a result of a child not being able to form a healthy and stable relationship with a caregiver or someone close to them (Urquiza et al., 1994; Riggs 2010). As reviewed by Sprague-Jones et al (2020), these attachment issues can be the result of a child's needs not being met which can greatly impact their emotional development and brain development. For the primary kind of attachment centered disorders, Reactive Attachment Disorder (RAD), because it is most commonly seen in those who experienced child maltreatment, treatment for these individuals involve psychotherapy which can often be tailored to their attachment issues (Morales-Brown 2020). An intervention that is aimed at children that targets attachment issues in young children and those who have experienced maltreatment is an intervention called Attachment and Biobehavioral Catch up (ABC) which focuses on strengthening the parent to child relationship (Attachment and Biobehavioral Catch up, 2017). For those who have experienced maltreatment or had had previous contact with a child welfare system, those who received ABC compared to those who received Developmental Education for Families (DEF), which is another intervention aimed at improving child development, showed higher rates of secure attachment (Bernard et al., 2012).

Regardless of the kind of maltreatment experienced, the improvement of the support systems for the families who are either at risk or who have already experienced maltreatment is a reoccurring theme in child maltreatment conversations. As discussed earlier as part of primary and secondary interventions, providing community-based support through educational materials,

financial and social assistance, along with tailoring techniques based on risk factors all function to strength family's relationship to each other and those around them. Social support, which is thought to be a protective factor in the prevention of abuse (Sprague-Jones et al., 2020), is said to be a significant factor in impacting the health outcomes associated with child maltreatment (Sperry and Widom 2013). This social support can also come from the peers of children to the relationship that is seen from children who have poor or inadequate peer relationships and later behavioral issues (Yoon et al., 2021). This relationship which is seen during adolescence (Yoon et al., 2021) supports the fact that as children enter adolescence, they begin to have more freedom to decide who they want around them peer wise and as they are discovering their identity, the people that they do choose can have a critical impact on this (US Department of Health and Human Services, n.d).

Overall, due to the underreported nature of child maltreatment, the actual impact is unknown, but the organizations responsible for overseeing all reports can be helpful in educating communities to better understand the signs, the reporting process, and the importance of protective and risk factors. The stress that children face in response to experiences such as maltreatment and other ACEs has been linked to a wide array of chronic health conditions. Exploring that link can lead to a better understanding of the problem and to improved interventions, which can help address the health disparities seen for those involved.

3.0 Data and Methods

3.1 Data Description

3.1.1 Rationale

The National Survey on Child and Adolescent Well-being (NSCAW) was a longitudinal study that began in 2008 that aimed to gain a better understanding of the conditions and needs of children who come into contact with the child welfare system. This survey was NSCAW II due to it following the same format as another survey study 10 years prior. As per NDACAN, this study sought to examine:

“the well-being of children involved with child welfare agencies; captures information about their families; provides information about child welfare interventions and other services; and describes key characteristics of child development. Of particular interest to the study are children's health, mental health, and developmental risks, especially for those children who experienced the most severe abuse and exposure to violence. (RTI International)”

As a result, data was collected from the child and those around them to gain a better understanding of the conditions in which the child lived. For the data set that is being analyzed, it will predominately include those experiencing some level of trauma or stress beyond one specific category of maltreatment specifically. In addition, the data set that was analyzed for this project was the general release version available for public use by researchers. This data set was

determined by the University of Pittsburgh IRB, to not meet the criteria for human research which is shown in Appenix A.

3.2 Methods

3.2.1 Method of Collection

The target population in the data set used were children from ages 8 – 17 who had contact with the child welfare system through the result of a closed case within a 15-month period starting from February 2008. Since the study used a waved system, data collection for the second and third wave began approximately 18 and 36 months after the initial Wave 1 completed their data collection from April 2008 to December 2009. The children were selected from 83 counties in 30 different states. Data were collected primarily from the children, their caregiver, and their assigned caseworker. Depending on the age and situation of the child, teachers were also interviewed regarding the child and data were collected from them as well. Due to differences in some state and county laws, the definition of a caregiver for the child was not standardized. This project will specifically analyze the data relating to cases for individuals aged 8 -17 years during Wave 1.

Based on the Data File User's Manual (DFUM) (Dowd et al, 2013) for this study, after cases were chosen based on eligibility (which has to be at least 45 days after their case was closed), letters were sent to the caregivers of the children which introduced the study, the stakeholders, and what their goals were regarding the family's participation in the study. After the family had time to review the document, the next step was to reach out to them by telephone to schedule an in-person meeting to answer any questions they had. Even though all caregivers in the home were

invited to the initial sit-down, if the family decided to proceed with the study, the identified caregiver who would be interviewed for the study was chosen based on who they felt knew the child best and would be able to give the most current and comprehensive answers about them. After the caregiver and child were identified, an assent for those older than seven and a consent from the legal guardian, if different from the caregiver, was signed (Dowd et al, 2013).

Once a child and identified caregiver consented to study participation, caseworkers and teachers were identified and recruited. The caseworker outreach was similar to the process used above by sending an introductory letter to them and then they were followed up to answer any questions and complete the consent process. The caseworkers were identified based on their assignment to the closed case that served as the child's contact with the child welfare system. For teachers included in the study, they were identified after the legal guardian gave their approval for them to be contacted only if the child was in grade K-12 and was not home-schooled. As a means of protecting the child's confidentiality regarding contact with the child welfare system, the questionnaire that was used to collect data from teachers didn't include the study name and instead referenced a national survey for teachers. As with the caregiver, the field representative ensured that the most appropriate teacher was chosen for each child based on varying rules and definitions so that this information could be collected during the school year during each Wave (Dowd et al, 2013).

To obtain data from everyone involved, a computer assisted interview (CAI) instrument was used for the child, caregiver, and caseworker. The teacher had a CAI and paper questionnaires. (Dowd et al, 2013) .

To collect all the study data that related to the six primary constructs for the children, three for the caregivers, and one for the caseworker, a wide variety of established questionnaires in those

areas combined with project specific questions were used. For the specific variables, this study looked at both the questionnaire and the specific subscales, if applicable. To quantify family/caregiver relationship, this project used the data from the children who answered the related questions in the shorter version of the Relatedness scale in the Rochester assessment Package for Schools (RAPS) (Connell 1990; Lynch and Cicchetti 1991). The responses from the questions were broken into four subscales by the researchers and the negative answers were reversed scored with a mean being gathered from all the items in each subscale. The four subscales were Parental Emotional Security (how the child emotionally felt with their caregiver), Involvement (activities and time spent by the caregiver with the child), Autonomy Support (if caregiver trusts child and if they can make independent choices), and Structure (treatment of child, understanding what caregiver wants, and belief in child's abilities) (Connell 1990; Lynch and Cicchetti 1991) (Dowd et al, 2013).

To measure and quantify peer relationships, this project used the data from the children who answered the questions in Loneliness and Social Dissatisfaction Questionnaire for Young Children (Asher and Wheeler, 1995). This questionnaire was given to all children aged five and above with a different questionnaire being administered for those who were five through seven and the other questionnaire being for children eight and above. As per the DFUM, for both questionnaires, the items were either recoded or reverse scored so that higher numbers meant greater loneliness. After factor analysis, the scoring range for the children's responses were from 16 to 80 (Dowd et al, 2013).

To measure and quantify the resources from the caseworker, caregivers were asked questions that related to how satisfied they were with the services they received. Of the 14 questions administered on this questionnaire, only 11 were used for this project to directly measure the

services being provided and the caregivers' resulting satisfaction. Only answers from parents who answered yes to having had spoken to a caseworker in general were included in the analysis.

To measure and quantify the two outcomes for this project, which were physical health and depression symptoms, the following assessments were used. The Children's Depression Inventory (CDI) (Kovacs 1992) was used to assess severity of depression symptoms. Responses to the 28 individual symptom items were summed and the raw and T-scores were computed for all the children by the NDACAN researchers (Dowd et al, 2013). To assess physical health, For Physical Health, items assessing the child's health and service history were selected from a pool of 10 questionnaires provided to caregivers about the child's health status. The criteria for the questions selected was that the item assessed physical health domains that have been shown in prior studies to be associated with experiences of maltreatment. The health conditions that are included in this project's analysis are: asthma, diabetes, the use of insulin, a heart problem/disease, blood problems, epilepsy or seizure disorder, migraine or frequent headaches, arthritis or other joint problems, repeated ear infections, back or neck problems, hypertension or high blood pressure, and chronic bronchitis. These health conditions were chosen from all the questions asked due to the fact that they were physical health conditions that don't otherwise have a prominent genetic component, they were not mental health disorders, or being conditions that can be diagnosed prior to any maltreatment such as at birth. Another question assessed whether they had other health problems that weren't already covered and if they answered yes then even though the health condition wasn't specified, an affirmative response to this question or for any of the above health conditions, was scored by this project to be one. This means higher scores translated to having more health conditions.

In addition, a question that addressed how healthy the caregiver felt that the child was, was also included. The health condition answers were summed into a total score, where higher numbers represented more physical health problems.

To gain a better understanding about how different kinds and amounts of maltreatment, in addition to other covariates, can be associated with different health conditions, they were specifically controlled for during certain analyses. To measure and quantify the two controls of maltreatment exposure, two different questionnaires were used. The first questionnaire that was used to obtain maltreatment data was the Violence Exposure Scale (VEX-R) Home Set (Fox and Leavitt 1995) which was used to document the violence that the child experienced as either a witness or victim during different ranges of time prior to them answering these questions. During researcher recoding, the data was recoded based on intensity, instances, and number of exposures as a victim or witness. The second questionnaire that was used to obtain maltreatment data was the Parent-Child Conflict Tactics Scales (CTSPC) (Straus et al., 1998) with Neglect and Substance Abuse questions added. This questionnaire sought to assess how often discipline measures had been used on the child in the last 12 months, never, or ever (prior to the last 12 months). Those instances of discipline by the caregiver were then looked at through the lens of the five subscales of this questionnaire which were Nonviolent discipline, psychological aggression, Physical Assault, Neglect, and Sexual Abuse. The NDACAN researchers recoded the data to reflect severity for some of the subscales and then categorized them based on frequency within the last year, incidence, and then overall lifetime occurrence ever (Dowd et al, 2013).

3.2.2 Statistical Analysis

Upon selecting this data set, the available constructs, variables, and percentage of completed data were reviewed to determine which variables would be used for each of the specific aims of this study. To perform all statistical and descriptive analyses, Stata/SE 16.1 was used and can be found at (www.stata.com). Statistical analyses were performed using linear regression and the creation of correlation matrices to analyze associations and correlations between select variable. Descriptive analyzes were performed using scatterway two way graphs. All regression tables with more than five inputted x variables had Bonferroni corrections performed on them to account for various additional independent variables which could impact the p-value.

3.2.3 Demographics

After the initial recruitment, 5,873 children and their cases were admitted into the study with 1,682 of them being in this project's target population and selected for analysis. The demographics of all children in Wave 1 are included in Table 1 which includes racial identity, age at the time of assessment, gender distribution, and whether they received services.

Table 1 Demographics of Children Included in NSCAW II

Age (Years)	
0-3	3,227 (54.95%)
4-7	993 (16.91%)
8-12	924 (15.74%)
13-17	728 (12.29%)
Race	
American Indian or Alaskan Native	487 (8.29%)
Asian, Hawaiian, or other Pacific Islander	197 (3.35%)
Black or African American	2,032 (34.60%)
White	2,994 (50.98%)
Unknown/Data Not Collected	163 (2.78%)
Gender	
Female	2,855 (48.62%)
Male	3,017 (51.38%)
Received Services	
Yes	4,112 (70.03%)
No	1,760 (29.97%)

This study included a diverse population with there being 50.98% white, 34.60% Black or AA, 8.29% reporting to be AIAN, 3.35% reporting Asian, Hawaiian, or Pacific Islander, and only 2.78% missing data. Due to the low number of individuals who were labeled as emancipated youth in Wave 1, they were included in the general demographics' breakdown but not in the age group breakdown shown in Table 2. The children aged 8 – 12 in this data set were recoded as TweenAge and the children aged 13 – 17 were recoded as TeenAge. All recoded variables can be found in Appendix B.

Table 2 Total Individuals for Both Age Groups

TweenAge		TeenAge	
Age	# in data set (% of this age group / % of both age groups combined)	Age	# in data set (% of this age group / % of both age groups combined)
8	218 (23.59/13.20)	13	165 (22.66/9.99)
9	181 (19.59/10.96)	14	166 (22.80/10.05)
10	199 (21.54/12.05)	15	167 (22.94/10.11)
11	170 (18.40/10.29)	16	164 (22.53/9.93)
12	156 (16.88/9.44)	17	66 (9.07/4.00)

3.3 Results

3.3.1 Preliminary Analyses

To assess any relationship between an exposure to maltreatment (i.e., personal victimization, result of discipline, or witnessing violence) and the identified health outcomes, a correlation matrix to see how related different experiences of violence correlate and a regression were performed. These analyses were done prior to testing the aims to gain a better understanding of how maltreatment, in the forms of discipline, personal victimization, or witnessing violence, in one's lifetime could also be associated with their health outcomes. Since this project sought to establish any associations between support systems and these health outcomes, looking at these

forms of maltreatment provided insight into how different types and incidences of exposure can also be associated with varying degrees of later health for these children. In Table 3, incident kind and number of times a child had exposure to violence as either a victim or witness, which was combined to show exposure to either, was compared to identify any positive or negative relationships. These variables are, in order, any exposure to mild violence, to severe violence, total number of exposures to mild violence, and total to severe violence.

Table 3 Correlation Matrix for Exposure to Violence

	Any Exposure to Mild Violence	Any Exposure to Severe Violence	Total # of Exposure to Mild Violence	Total # of Exposure to Severe Violence
<i>Any Exposure to Mild Violence</i>	1.000			
<i>Any Exposure to Severe Violence</i>	.2547*	1.000		
<i>Total # of Exposure to Mild Violence</i>	.4269*	.4746*	1.000	
<i>Total # of Exposure to Severe Violence</i>	.2068*	.6838*	.5649*	1.000

All violence variables showed a statistically significant positive correlation with one another with the correlation between total # of exposures to severe violence having the highest correlations with any exposure to severe violence and total # of exposures to mild violence.

The next analysis looked for any association between these violence exposures to depression scores by using a regression which is seen in Table 4. This regression analysis measured variation in depression scores as a function of exposure to violence controlling for the child's age, using all children ages 8 – 17, their lifetime exposure to violence, and the severity and frequency

of violence exposure. In Table 4, you see that 11% of the variation, from the R-squared, seen in the child depression scores is accounted for by their age from 8 and 17 and their different exposures to violence as either victim or witness. Any exposure to mild violence and total number of both mild and severe violence exposures had a statistically significant positive relationship with the depression scores meaning that as their exposure to incidences of violence increased, it was associated with increased depression scores.

Table 4 Age Controlled Depression and Violence Association

Depression Score	Coef.	T-value	P-value	Significance
Any Exposure to Mild Violence	-.371	-.49	.626	
Any Exposure to Severe Violence	1.14	2.12	.034	**
Total # of Exposure to Mild Violence	.522	6.78	<.001	***
Total # of Exposure to Severe Violence	.536	2.61	.009	***
Children Aged 8 - 17	-.107	-1.54	.123	
Constant	7.39	7.06	<.001	
No. of Observations = 1,490			*** = p<.01	
R-Squared = .1056			** = p<.05	
Prob > F = .0000				

The regression analysis process was then repeated for the variables that are related to exposure to maltreatment as a result of caregiver discipline. In Table 5, the variables that represent different kinds of maltreatment has the children aged 8 -17's raw depression score regressed against them. Any history of physical abuse as a form of discipline was positively associated with higher depression scores meaning for those who reported this, they were associated with higher depression scores. In addition, based on the R-Squared score of .0239, the discipline the children

experienced only accounted for 2% of the variation in their depression scores. Any history of sexual maltreatment was not statistically significant once Bonferroni correlation was applied.

Table 5 Maltreatment as Discipline Association with Depression

Depression Score	Coef.	T-value	P-value	Significance
Non-Violent Discipline Ever	.693	.45	.654	
Psychological Aggression Ever	.606	.85	.398	
Any Physical Assault Ever	1.47	2.90	.004	***
Child Neglect Ever	.463	.94	.349	
Sexual Maltreatment Ever	1.37	2.02	.044	
Sexual Maltreatment More Than Once	2.46	1.51	.131	
Children Aged 8 - 17	.014	.16	.871	
Constant	6.77	3.68	<.001	
No. of Observations = 1,109			*** = p<.01	
R-Squared = .0239			** = p<.05	
Prob > F = .0004				

3.3.2 Familial Relationships

To address Aim 1, the parental and peer relationships were separated for the analytical tests. A correlation matrix was completed that included the four subscales that were used to describe child's relationship with their first caregiver in Table 6, and then in Table 7, those same subsets had the children's raw depression score regressed against it. The four subscales in order represent Parent Emotional Security, Involvement, Autonomy Support, and Structure.

Table 6 Correlation Matrix for Caregiver Relationship Subscales

	Parental Emotional Security	Involvement	Autonomy Support	Structure
<i>Parental Emotional Security</i>	1.000			
<i>Involvement</i>	.6250*	1.000		
<i>Autonomy Support</i>	.4923*	.5073*	1.000	
<i>Structure</i>	.5709*	.6152*	.5148*	1.000

Table 6 shows that respondents' answers for the four subscales used to quantify one's relationship with their caregiver were correlated with each other with the ranges from moderate to high degrees of correlation.

Table 7 Regression of Subscale Association with Depression Scores

Depression Score	Coef.	T-value	P-value	Significance
Parental Emotional Security	-1.62	-3.92	<.001	***
Involvement	-2.04	-4.40	<.001	***
Autonomy Support	-1.06	-3.06	.002	***
Structure	-1.22	-3.04	.002	***
Constant	28.9	23.3	<.001	
No. of Observations = 1,017				*** = p<.01
R-Squared = .2043				** = p<.05
Prob > F = <.001				

All four subscales in table 7 had a statistically significant negative association with the child depression scores. This means as the child's relationship with their caregiver improved, they were associated with lower depression scores. For each of the subscales for caregiver relationship, this means that for every increase in their security, involvement, support, and structure scores by 1.62, 2.04, 1.05, and 1.22 units respectively, they were associated with lower depression scores

by 1 unit each. In addition, based on the R-squared score of .2043, approximately 20% of the variation in the depression scores are accounted for by the child's relationship with their caregiver.

For table 8, the association between the child's relationship with their caregiver and their physical health (the sum of their health conditions and description of their overall health) was seen using regression analysis. A separate questionnaire question which asked caregivers to rate the child's health between 1 – 5 on a Likert scale (1=excellent, 2=very good, 3 = good, 4=fair, and 5=poor) was not included in the summed PhysicalHealthSumT variable, so a separate regression was performed, and the output for both linear regressions were combined into Table 8. The only subscale for parental relationships that had an association was autonomy support, which has a slight positive association with the number of health conditions a child had.

Table 8 Regression of Physical Health onto Caregiver Relationship

	Sum of Physical Health Conditions			Description of Child's health by CG		
	Coef	T-value	P-value	Coef	T-value	P-value
Parental Emotional Security Involvement	-.039	-.60	.547	-.011	-.12	.902
Autonomy Support	.022	.30	.764	.061	.59	.556
Structure	.107	2.00	.046**	-.016	-.15	.881
Constant	-.098	-1.60	.110	-.118	-1.32	.186
	.676	3.54	.000	2.07	7.53	.000
No. of Observations = 990				No. of Observations = 990		
R-Squared = .0058				R-Squared = .0058		
Prob > F = .2160				Prob > F = .2160		
** = p<.05				** = p<.05		

3.3.3 Peer Relationships

For peer relationships, regression of the children's raw depression scores against their peer relationship was performed (Table 9). Based on the R-squared score of .2315, 23% of the variations in the depression scores are accounted for by the child's relationship with their peers. Also, there was a statistically significant positive relationship meaning that for each one unit increase in the peer relationship score, which is indicative of more loneliness, the mean raw depression scores increased by .326.

Table 9 Regression of Depression Scores and Peer Relationships

Depression Score	Coef.	T-value	P-value	Significance
Loneliness and Social Dissatisfaction Score	.326	20.85	<.001	***
Constant	-.583	-1.15	.252	
No. of Observations = 1,445				*** = p<.01
R-Squared = .2315				** = p<.05
Prob > F = <.001				

The sum of the number of health problems reported by the caregiver was regressed against the peer relationship variable (Table 10). There was a statistically significant positive association between the child's loneliness scores, and thus peer relationships, and the way to caregiver described the child's health. This means that as a child reported higher loneliness it was associated with their caregiver rating them with poor health (which corresponded to the higher numbers).

Table 10 Regression of Physical Health Variables onto Peer Relationships

Sum of Physical Health Conditions				Description of Child's health by CG		
	<u>Coef</u>	T-value	P-value	<u>Coef</u>	T-value	P-value
Loneliness and Social Dissatisfaction Score	.004	1.78	.547	.010	3.18	.002***
Constant	.446	6.31	<.001	1.46	13.8	.000
No. of Observations = 1,423				No. of Observations = 1,449		
R-Squared = .0022				R-Squared = .0068		
Prob > F = .0751				Prob > F = .0015		
*** = p<.01				*** = p<.01		

To visualize how the raw depression scores were distributed amongst the peer relationship scores, a scatterplot graph was created in Figure 3. Figure 3 has a y-line of 13 for the raw depression scores included to indicate a cut-off suggested by the author of the questionnaire for the children which serves as a cutoff based on samples similar to clinic based samples where the rate of depression is thought to be higher.). In figure 3, based on the tabulated scores in the table, 70.19% of individuals had scores lower than the suggested clinical cut off, of 13. On the reverse end, from looking at the scatterplots one can see that lower loneliness scores (better peer relationships) were seen at a greater concentration in the bottom left corner with the lower raw depression scores.

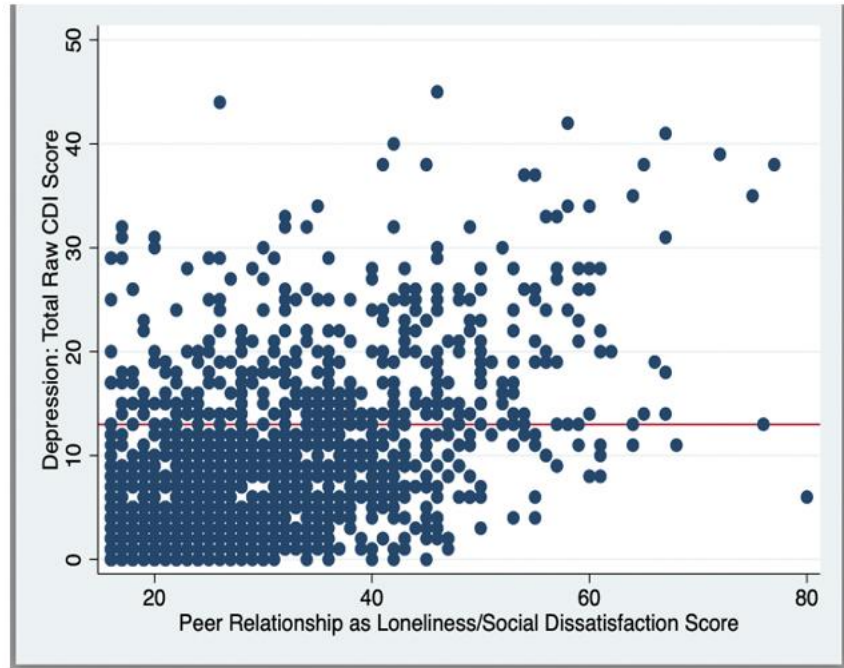


Figure 3 Visual Representation of Depression Score Distribution + Compared to Peer Relationships.

3.3.4 Resources

To address Aim 2 resources that the caregiver received in the form of both social support and resources for their case were regressed against the depression scores (Table 11). The resources variable includes the resources they received personally, how their relationship with the caseworker was, and how that relationship and resources connected to their care. The analysis showed that there was a statistically significant negative association between ability to meet with the caseworker (CW) and the caregiver (CG) being satisfied with the caseworker inviting them to meetings with the mean depression score. There was a statistically significant positive association between the caregiver feeling they had enough resources to make changes and the mean depression score.

Table 11 Regression of Depression Scores on Percieved Support from Caseworker

Depression Score	Coef.	T-value	P-value	Significance
CG able to meet with CW about needs and concerns	-1.07	-2.07	0.038	**
CW listened to concerns of CG	-.414	-1.08	0.279	
CW treated CG with respect	.570	1.47	0.141	
How well CW explained problems and services	.490	1.13	0.261	
Satisfied with how well CW has maintained contact	-.573	-1.57	0.117	
Satisfied with CW inviting CG to meetings	-.237	-0.86	0.391	**
Satisfied with CW involving CG in decision making	.401	1.33	0.185	
CG feelings about having enough to make changes	.463	2.22	0.027	**
CG feelings about how helpful services should have been	-.208	-0.85	0.395	
CG feelings about being offered more services	-.246	-1.06	0.287	
Constant	10.7	7.17	<.001	
No. of Observations = 903			*** = p<.01	
R-Squared = .0171			** = p<.05	
Prob > F = .1164				

The physical health score based on total health problems and the description of the child's health both reported by the caregiver, was analyzed to determine its association with the caregiver's satisfaction with the caseworker level and quality of support using regression (Table 12) . The variable that has a statistically significant association was the question which asks the caregiver if they think they should have been offered more services with a Likert scale of 1= strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4= agree, 5= strongly agree. Even a statistically significant p value is seen, when you take into account the number of variables, it would no longer be significant. Besides that association seen in Table 12, there are no other statistically significant

p-values for the entire regression table, meaning none of the resources-based questions or perceptions were significantly associated with the two physical health measures.

Table 12 Regression of Physical Health Variables onto Percieved Support from Caseworker

Sum of Physical Health Conditions				Description of Child's health by CG		
	Coef	T-value	P-value	Coef	T-value	P-value
CG able to meet with CW about needs and concerns	-.037	-1.14	.254	-.054	-1.61	.107
CW listened to concerns of CG	-.013	-.56	.576	.040	1.70	.089
CW treated CG with respect	-.005	-.20	.841	.003	.12	.902
How well CW explained problems and services	.023	.83	.406	.002	.06	.954
Satisfied with how well CW has maintained contact	-.041	-1.84	.066	-.015	-.65	.515
Satisfied with CW inviting CG to meetings	.012	.72	.473	-.020	-1.14	.253
Satisfied with CW involving CG in decision making	-.022	-1.19	.235	-.037	-1.93	.054
CG feelings about having enough to make changes	-.011	-.88	.382	.000	.02	.980
CG feelings about how helpful services should have been	.017	1.11	.267	-.005	-.33	.739
CG feelings about being offered more services	.014	.97	.332	.043	2.86	.004***
Constant	.623	6.06	.000	1.78	16.75	.000
No. of Observations = 2,935				No. of Observations = 2,979		
R-Squared = .0062				R-Squared = .0104		
Prob > F = .0530				Prob > F = .0006		
*** = p < .01				*** = p < .01		
** = p < .05						

3.3.5 Pre-Adolescence vs Adolescence

To address Aim 3, the impact of peer relationships on depression scores and physical health was analyzed in the two age ranges of pre-adolescence and adolescence. The depression scores were regressed against the peer relationships and the age groups (Table 13). A similar analysis where the number of physical health conditions was regressed against the peer relationships and age groups (Table 14). In three of the four times that the health outcomes were regressed against the peer relationship while controlling for age, peer relationships had a statistically significant positive association on the health outcome. For Physical Health, a statistically significant positive association with peer relationships was only seen in the TweenAge group, and was not seen in the TeenAge group.

Table 13 Regression of Depression onto Peer Relationship w/ Age as Variable

Depression Score	Coef.	T-value	P-value	Significance
Loneliness and Social Dissatisfaction Score	.330	16.17	<.001	***
Children Age 8 -12	.017	.10	.922	
Constant	-1.53	-.78	.437	
No. of Observations = 776				*** = p<.01
R-Squared = .2572				** = p<.05
Prob > F = <.001				

Depression Score	Coef.	T-value	P-value	Significance
Loneliness and Social Dissatisfaction Score	.344	13.64	<.001	***
Children Age 13 - 17	.236	1.13	.257	
Constant	-3.84	-1.21	.226	
No. of Observations = 668				*** = p<.01
R-Squared = .2191				** = p<.05
Prob > F = <.001				

Table 14 Regression of Physical Health onto Peer Relationships w/ Age as Variable

Depression Score	Coef.	T-value	P-value	Significance
Sum of Physical Health Conditions	.007	3.06	.002	***
Children Age 8 - 12	.024	1.15	.250	
Constant	.017	.07	.941	
No. of Observations = 779				*** = p<.01
R-Squared = .0125				** = p<.05
Prob > F = .0076				
Depression Score	Coef.	T-value	P-value	Significance
Sum of Physical Health Conditions	.002	.59	.557	
Children Age 13 - 17	.006	.18	.861	
Constant	.499	.96	.337	
No. of Observations = 643				*** = p<.01
R-Squared = .0006				** = p<.05
Prob > F = .8308				

3.3.6 Maltreatment Impact

To put all this data into the framework of seeing if exposure to different kinds of maltreatment at any point and its severity impacts any associations that may be seen, three groups of regressions were performed which are shown in Table 15, 16, and 17. In Table 15, depression was regressed upon the peer relationships, the exposure to violence variables, and maltreatment in the form of discipline, and it was controlled for by age to see the difference in either age group.

Table 15 Depression Regression w/ Violence Exposure, Maltreatment as Discipline, and Age

Depression Score	Coef.	T-value	P-value	Significance
Loneliness and Social Dissatisfaction Score	.317	14.06	<.001	***
Any Exposure to Mild Violence	-1.08	-1.12	0.262	
Any Exposure to Severe Violence	.369	0.49	0.622	
Total # of Exposure to Mild Violence	.590	5.17	<.001	***
Total # of Exposure to Severe Violence	.382	1.30	0.193	
Non-Violent Discipline Ever	3.36	1.41	0.158	
Any Physical Assault Ever	.392	0.71	0.476	
Child Neglect Ever	.919	1.64	0.101	
Sexual Maltreatment Ever	.849	1.09	0.277	
Sexual Maltreatment More Than Once	-.821	-0.41	0.683	
Children Aged 8 - 12	-.006	-0.03	0.976	
Constant	-6.81	-2.23	0.026	

No. of Observations = 578

*** = p<.01

R-Squared = .3984

** = p<.05

Prob > F = <.001

Depression Score	Coef.	T-value	P-value	Significance
Loneliness and Social Dissatisfaction Score	.317	10.76	<.001	***
Any Exposure to Mild Violence	-2.11	-1.69	0.092	
Any Exposure to Severe Violence	-.487	-0.57	0.567	
Total # of Exposure to Mild Violence	.445	3.75	<.001	***
Total # of Exposure to Severe Violence	1.03	2.84	.005	***
Non-Violent Discipline Ever	-.045	-0.03	.977	
Any Physical Assault Ever	1.29	2.07	.039	
Child Neglect Ever	-.264	-0.42	.671	
Sexual Maltreatment Ever	-.079	-0.09	.927	
Sexual Maltreatment More Than Once	3.79	1.97	.049	**
Children Aged 13 - 17	.243	1.02	.308	
Constant	-4.69	-1.18	.238	

No. of Observations = 458

*** = p<.01

R-Squared = .3403

** = p<.05

Prob > F = <.001

As seen in Figure 15, there was one more variables with a statistically significant positive associations in the regression that included the individuals aged 13 – 17 than it was for the individual's aged 8 – 12 with the same two being peer relationships and total number of exposures to mild violence. The extra variable was total number of exposure to severe violence. For those age of 8 -12, almost 40% of the variation seen in the depression scores is accounted for by the model. For those who are 13 – 17 in age, when Bonferroni correction was accounted for, sexual maltreatment more than once as a more of discipline was not statistically significant. 34% of the variation in the depression scores for those age 13 – 17 is accounted for by the model. This means that the higher depression scores are associated with reporting of higher loneliness scores (so lower peer relationships), greater total number of exposures to both mild and severe violence, and reports of physical assault or sexual maltreatment more than once ever in their life.

In Figure 16 and 17, the same style of regression was performed using the two physical health outcomes. In Figure 16, two variables showed statistically significant positive association with the child's Physical Health Sum score for those aged 8 -12 but once Bonferroni was applied, only their peer relationships remained significant. Also in Figure 16, once Bonferroni correction was applied, only child neglect as a form of discipline had a positive statistically significant association with how their caregiver (CG) rated their health. child's. For both models, the included variables accounted for 4-5% variation in the health-related responses. In Figure 17, total number of exposure to both mild violence and severe violence none of the variables showed a statistically significant associations with the children aged 13 -17 physical health measures with Physical Assault ever not being statistically significant with Bonferroni.

Table 16 Physical Health Sum Regression w/ Violence Exposure, Maltreatment as Discipline, for Adolescents

Sum of Physical Health Conditions				Description of Child's health by CG		
	Coef	T-value	P-value	Coef	T-value	P-value
Loneliness and Social Dissatisfaction Score	.010	3.55	<.001***	.008	2.32	0.021**
Any Exposure to Mild Violence	.096	0.75	0.451	.025	0.17	0.862
Any Exposure to Severe Violence	.122	1.25	0.211	-.059	-0.52	0.604
Total # of Exposure to Mild Violence	-.014	-0.95	0.342	-.032	-1.88	0.061
Total # of Exposure to Severe Violence	-.043	-1.11	0.267	.048	1.07	0.285
Non-Violent Discipline Ever	-.047	-0.15	0.879	-.599	-1.66	0.098
Any Physical Assault Ever	-.005	-0.07	0.948	.008	0.09	0.926
Child Neglect Ever	.069	0.94	0.346	.317	3.75	<.001***
Sexual Maltreatment Ever	.080	0.74	0.457	.138	1.16	0.245
Sexual Maltreatment More Than Once	.529	2.01	0.045**	.162	0.53	0.596
Children Aged 8 - 12	.002	0.07	0.948	.008	0.29	0.774
Constant	.122	0.30	0.761	2.04	4.41	<.001
No. of Observations = 583				No. of Observations = 586		
R-Squared = .0409				R-Squared = .0490		
Prob > F = .0125				Prob > F = .0039		
*** = p < .01				** = p < .05		
** = p < .05						

Table 17 Overall Physical Health Regression w/ Violence Exposure, Maltreatment as Discipline, for Teens

Sum of Physical Health Conditions				Description of Child's health by CG		
	Coef	T-value	P-value	Coef	T-value	P-value
Loneliness and Social Dissatisfaction Score	.004	0.77	0.444	.008	1.79	0.074
Any Exposure to Mild Violence	.392	1.69	0.091	.179	0.93	0.354
Any Exposure to Severe Violence	-.181	-1.13	0.259	.056	0.43	0.667
Total # of Exposure to Mild Violence	-.074	-3.39	0.001***	-.009	-0.48	0.635
Total # of Exposure to Severe Violence	.235	3.40	0.001***	-.003	-0.06	0.956
Non-Violent Discipline Ever	.469	1.64	0.102	.004	0.02	0.987
Any Physical Assault Ever	.256	2.30	0.022**	.002	0.02	0.984
Child Neglect Ever	-.003	-0.03	0.979	.092	0.97	0.335
Sexual Maltreatment Ever	.319	2.01	0.045**	.175	1.33	0.183
Sexual Maltreatment More Than Once	.530	1.44	0.151	.138	0.47	0.641
Children Aged 13 - 17	.009	0.19	0.847	.037	1.00	0.319
Constant	-.282	-0.38	0.703	.960	1.58	0.116
No. of Observations = 451				No. of Observations = 455		
R-Squared = .0781				R-Squared = .0242		
Prob > F = .0002				Prob > F = .4447		
*** = p <.01				** = p<.05		
** = p <.05						

3.4 Discussion

3.4.1 Health Outcomes

Depression had the most variables with a statistically significant association, which is consistent with the research that shows high rates of depression in those who have experienced maltreatment (APA, 2018). The importance of social support systems such as caregivers, as both a potential protective factor and having an impact on health outcomes associated with child maltreatment (Sprague-Jones et al., 2020; Sperry and Watson., 2013), was also supported with the data with a large amount of variance in depression scores being accounted for by the child's peer and caregiver relationships with R-Squared scored of 20 and 23% (Tables 7 and 8). Peer support was also found to be an important factor in health outcomes which can be argued to be due to the association between one's peer relationships and behavioral problems (Yoon et al., 2021). The fact that peer relationships continued to show a positive association with both physical and mental health measures even when controlling for multiple kinds of maltreatment, regardless of the child's age group (tween or teen), is important because it supports the claim that community efforts can be impactful as an intervention for those who experience maltreatment (Child Welfare Information Gateway, 2017). This supports the choice of this project to do more research to gain a better understanding about the social support systems and to begin thinking about the ways that these support systems are currently being utilized in interventions.

3.4.2 Maltreatment

Introducing maltreatment, outside of the potential maltreatment that brought them to CPS, to the conversation regarding the health outcomes in this project found that exposure to violence and maltreatment as a form of discipline is also associated with negative health outcomes. These findings supported the idea that the cumulative impact of maltreatment is also very important to health outcomes which is supported by the work done by Chartier et al., 2020 who looked at the association between multiple ACEs including abuse and later health outcomes. This makes sense because the process that leads the stress response to be associated with chronic conditions is usually a result of chronic activation (Segerstrom and Miller, 2004; Schneiderman et al, 2005). Impacts on health can also come from a child witnessing a number of mild or severe violence events because their body can identify what they are seeing as a stressful event and begin their stress response process even if they are never the target or physically harmed by this event. This is supported by the results reported in table 4, which show that any exposure and total number of exposures are statistically significantly associated with depression scores, with only any exposure of mild violence not having a statistically significant association. When considered as part of the overall model that included multiple variables that could impact health outcomes in children experiencing maltreatment, the total number of exposures to mild violence had a statistically significant association with health outcomes in both age groups. This is consistent with the fact that the CDC states that exposure to violence is considered an ACE (2019) and ACEs have been associated with negative health outcomes (Gilbert et al., 2015).

3.4.3 Age

The significant association between peer relationships and depression scores for both age groups can mean that people who we choose to have in our life outside of our families, such as friends, can have a strong impact on health outcomes in this population. This study showed that instead of being important at just one developmental stage, the importance of peer relationships across the tween and teen years should not be understated. Since peer relationships across these developmental stages assist children in developing lifelong skills such as self and social awareness along with effective communication which can include asking for and offering assistance (Pepler and Bierman, 2018), these timepoints can potentially serve as a protective factor to other adverse life experiences.

3.4.4 Limitations

Even though unweighted data was used, these results are still important in gaining insight into how some individual's who have had interactions with the child welfare system are faring physically and mentally.

A major limitation is the different ages at which different questionnaires were administered. Since this project specified ages 8 – 17 as being the lens, using only these age groups limited this project's ability to use all questionnaires and instead only questionnaires that covered that full age range were used for specific analyses. As a result, only peer relationships by the children and resources by their caregivers could be analyzed. So, caregiver/familial relationships were unable to be controlled based on the age groups this project defined, and there may be associations for adolescents in this data set that were not analyzed or discussed. Another limitation

to this project was that the restricted release has data that could have been analyzed based on the topic of interpersonal relationships. The restricted data set includes data from the older children about their satisfaction with their caseworker whereas this data set only allowed for caregiver's satisfaction with the caseworker to be analyzed.

Another major limitation lies in the data that was collected and used for this project. This initial study did not include a control due to the population this initial data set sought out was those who had had previous contact with the child welfare system through the recent closing of a case. As a result of this, the data seen here could not be compared to any associations, or lack thereof, between those with no previous recent contact with the child welfare system and those included in this study. There could be other factors that account for the variance in the child's depression scores and two physical health measures that were either not specifically covered by this project or missed because they didn't include a control group. Another limitation in the way the data was used and analyzed for this project is that the caregivers are the only respondents for the questions regarding the child's health. The way the parent interprets the potential severity of their child's health can be based on many factors such as their own health, their involvement in the child's life if they aren't the primary guardian, or many others. As a result, if this study had been able to also get responses from the child, this could've been used as either a comparator or used as a physical health indicator for the child as well.

A fourth limitation would be that fact that the study this data came from was performed in a longitudinal manner, but this project only performed cross-sectional analyses. As a result, predictive effects could not be analyzed and instead associations were focused on.

3.4.5 Future Work

Looking at other aspects of physical health from this data set could provide a more comprehensive overview of health as opposed to just knowing if a child has a specific set of medical conditions. Besides just knowing which health conditions they have, which for some individual's they reported yes to having a health condition that wasn't listed in the questionnaire, understanding how severe their conditions are, if they need to take medications, and how it has impacted their life would be important. Doing research into the questions that provide more information holistically about the health of the child both physically and mentally would add to the conversation about how ACEs are impacting the child in addition to having to suffer from adverse events.

Since the initial NSCAW study was designed and conducted with a longitudinal design, future work can compare data across waves to see if there is any change as children get farther from their initial case of maltreatment and to see if any of the examined factors in this study change or have different associations. The time frame that these questions are being asked for would change as many questions so you could see potential longer-term impacts of that initial maltreatment.

Looking into more relationships besides caregiver and family would also help to understand if proximity to the child has an impact on the strength of that relationships. Since the basis of primary prevention interventions for child maltreatment involve education and strengthening families and communities, more research can always be done about the impact communities, teachers, and other close relationships can have on a child.

In conclusion, this project assessed the associations between the child's physical health, and their depression scores and access to resources in addition to some of their interpersonal

relationships. As a result of these analyses, this project found that peer and caregiver relationships had the greatest number of statistically significant associations with the child's depression scores and those models accounted for the highest percentage of variation in the child's depression scores. Both one-time and multiple exposure to violence as either a victim or witness was positively associated with a child's depression score. Overall, a child's social support systems, measured via interpersonal relationships, and their caregiver's access to resources had varying degrees of association with physical health and depression variables that were used in this project. More work should continue to be done to assess how these variables function in different age groups and with different measures that describe social support systems.

4.0 Public Health Significance

The goal of this study was to cohesively provide an overview of issues related to child maltreatment and factors that can be targeted for analysis when looking to further stress-based research related to child maltreatment. Even though this data is unweighted, it does shed light on the experiences of some children and families who have had contact with CPS. This issue is important because many of the tertiary interventions to reduce the impact of the child maltreatment or to reduce repeat revictimization is aimed at helping the families. This project analysis showed that there are significant associations between the strength of these close relationships, such as caregivers or even peers, to health outcomes that can be a result of stressors such as child maltreatment.

In addition, this analysis supports the idea that there are other experiences that aren't exactly classified as child maltreatment that may also be associated with these later health outcomes. These results show that by only going based on a specific state's definition, cases of maltreatment can be missed and that since once of the essential public health services directly relates to creating and implementing policies, that the lack of uniformity across states is not positively impacting child maltreatment identification and prevention efforts. While it was not explicitly examined in this study, individuals from marginalized communities such as AA and AIAN are disproportionately being impacted by the maltreatment cases, outcomes, and deaths. As a result, even though child maltreatment impacts those across the spectrum of racial and social backgrounds, this can be a potential indicator that interventions to prevent child maltreatment need to be improved upon.

Studies such as the one conducted by NDACAN are important because they work with a very vulnerable group of individuals to understand different facets of their lives after having a case opened and closed with CPS. Such research is crucial to ensuring that a public health system has up-to-date information about an issue and can use it to improve conditions and track changes. In addition, supporting future research allows this issue to continually be monitored and assessed to see if the current interventions are reaching the level of impact intended and improving the quality of life of those impacted. While this research is important, it is also essential to recognize that this is only a subset of people impacted by maltreatment. Only those who have actually had contact with CPS and were still living at the time of the study are included. Since child maltreatment cases are severely underreported, this means that there are even more children experiencing both maltreatment and related poor health outcomes.

The area of stress response research has public health significance because understanding how one's environment can have health and social impacts can inform how the current systems in place might cause later harm. Experiencing adverse events at an important developmental life stage can cause changes that are not seen until adulthood because the changes are epigenetic in nature, result from cumulative exposures, or attributed to another source later in life. Understanding the stress response can enable researchers to focus on how that process changes when it encounters different stimuli at different stages in life. Many health promotion and education campaigns are based on knowing your risk and how to access resources to improve or stabilize your health, which is why research such as this is important in addressing how negative experiences can also cause long term negative health outcomes.

Appendices

Appendix A IRB Approval



NOT HUMAN RESEARCH DETERMINATION

Date:	December 4, 2021
Review Type:	Initial Study
IRB:	STUDY21100064
PI:	Imani Beard
Title:	Long Term Effects of Child Maltreatment through a Biological, Psychopathological, and Intergenerational Lens

The Institutional Review Board determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

If you have any questions, please contact the University of Pittsburgh IRB Coordinator, [Ali Arak](#).

Please take a moment to complete our [Satisfaction Survey](#) as we appreciate your feedback.

Appendix B Codebook

Appendix Table 1

Variable Name	Old Variable	Variable Label
TweenAge	chdAgeY values of 8, 9, 10, 11, and 12	Children aged 8 -12 years old
TeenAge	chdAgeY values of 13, 14, 15, 16, and 17	Children aged 13 – 17 years old
AllAdo	chdAgeY values of 8, 9, 10, 11, 12, 13, 14 ,15 16, and 17	Children aged 8-17
PhysicalHealthSumT	PHS3a1aC + PHS3a7aC + PHS3a9aC + PHS3a10aC + PHS3a14aC + PHS3a15aC + PHS3a16aC + PHS3a21aC + PHS3a24aC + PHS3a25aC + PHS3a28aC + PHS3a31aC	Sum of the Physical Health Condition Questions
PHS3a1aC	Recoded Question PHS3a1a to be remove missing responses and reverse scored	Reversed Scored PHS3a1a
PHS3a7aC	Recoded Question PHS3a7a to be remove missing responses and reverse scored	Reversed Scored PHS3a7a
PHS3a8aC	Recoded Question PHS3a8a to be remove missing responses and reverse scored	Reversed Scored PHS3a8a
PHS3a9aC	Recoded Question PHS3a9a to be remove missing responses and reverse scored	Reversed Scored PHS3a9a
PHS3a10aC	Recoded Question PHS3a10a to be remove missing responses and reverse scored	Reversed Scored PHS3a10a
PHS3a14aC	Recoded Question PHS3a14a to be remove missing responses and reverse scored	Reversed Scored PHS3a14a
PHS3a15aC	Recoded Question PHS3a15a to be remove missing responses and reverse scored	Reversed Scored PHS3a15a
PHS3a16aC	Recoded Question PHS3a16a to be remove missing responses and reverse scored	Reversed Scored PHS3a16a

PHS3a21aC	Recoded Question PHS3a21a to be remove missing responses and reverse scored	Reversed Scored PHS3a21a
PHS3a24aC	Recoded Question PHS3a24a to be remove missing responses and reverse scored	Reversed Scored PHS3a24a
PHS3a25aC	Recoded Question PHS3a25a to be remove missing responses and reverse scored	Reversed Scored PHS3a25a
PHS3a28aC	Recoded Question PHS3a28a to be remove missing responses and reverse scored	Reversed Scored PHS3a28a
PHS3a31aC	Recoded Question PHS3a31a to be remove missing responses and reverse scored	Reversed Scored PHS3a31a
PSF4aR	Recoded Question PSF4a to only show responses if Question PSF1a = 1	PSF4a Answers for those whose PSF1a answer was coded as 1
PSF5aR	Recoded Question PSF5a to only show responses if Question PSF1a = 1	PSF5a Answers for those whose PSF1a answer was coded as 1
PSF7aR	Recoded Question PSF7a to only show responses if Question PSF1a = 1	PSF7a Answers for those whose PSF1a answer was coded as 1
PSF9aR	Recoded Question PSF9a to only show responses if Question PSF1a = 1	PSF9a Answers for those whose PSF1a answer was coded as 1
PSF10aR	Recoded Question PSF10a to only show responses if Question PSF1a = 1	PSF10a Answers for those whose PSF1a answer was coded as 1
PSF11aR	Recoded Question PSF11a to only show responses if Question PSF1a = 1	PSF11a Answers for those whose PSF1a answer was coded as 1
PSF12aR	Recoded Question PSF12a to only show responses if Question PSF1a = 1	PSF12a Answers for those whose PSF1a answer was coded as 1
PSF15aR	Recoded Question PSF15a to only show responses if Question PSF1a = 1	PSF15a Answers for those whose PSF1a answer was coded as 1
PSF17aR	Recoded Question PSF17a to only show responses if Question PSF1a = 1	PSF17a Answers for those whose PSF1a answer was coded as 1
PSF18aR	Recoded Question PSF18a to only show responses if Question PSF1a = 1	PSF18a Answers for those whose PSF1a answer was coded as 1

Appendix C Full STATA Tables with Commands

Figure 1: N/A

Figure 2: N/A

Figure 3

C: twoway (scatter YCD_TOT YRR_TOT), yline(13)

Table 1

**C: Tabulate chdAgeY 2) tabulate chdGendr 3) tabulate servc 4) From Exhibit 4-4 in
DFUM**

Table 2

C: tabulateAllAdo

Table 3

C: pwcorr YRC_ESA YRC_INA YRC_ATA YRC_STA, star(.05)

Table 4

C: regress YCD_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE AllAdo

Table 5

**C: regress YCD_TOT PDS_DS2R PDS_AG2R PDS_AM2R PDS_AT2R
PDS_NG2R PDS_SX2R PDS_SXPR AllAdo**

Table 6

C: pwcorr YRC_ESA YRC_INA YRC_ATA YRC_STA, star(.05)

Table 7

C: regress YCD_TOT YRC_ESA YRC_INA YRC_ATA YRC_STA

Table 8

Part 1

. regress PhysicalHealthSumT YRC_ESA YRC_INA YRC_ATA YRC_STA

Source	SS	df	MS	Number of obs	=	990
Model	6.34045848	4	1.58511462	F(4, 985)	=	1.45
Residual	1078.08883	985	1.09450643	Prob > F	=	0.2160
				R-squared	=	0.0058
				Adj R-squared	=	0.0018
Total	1084.42929	989	1.09649069	Root MSE	=	1.0462

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRC_ESA	-.0392389	.0651548	-0.60	0.547	-.1670971	.0886194
YRC_INA	.0216511	.072052	0.30	0.764	-.1197419	.163044
YRC_ATA	.1073932	.053732	2.00	0.046	.001951	.2128355
YRC_STA	-.0981623	.0612917	-1.60	0.110	-.2184397	.022115
_cons	.6764612	.1912223	3.54	0.000	.3012112	1.051711

Part 2

. regress PHS1a YRC_ESA YRC_INA YRC_ATA YRC_STA

Source	SS	df	MS	Number of obs	=	1,027
Model	6.12221512	4	1.53055378	F(4, 1022)	=	0.65
Residual	2424.14653	1,022	2.37196334	Prob > F	=	0.6303
				R-squared	=	0.0025
				Adj R-squared	=	-0.0014
Total	2430.26874	1,026	2.36868299	Root MSE	=	1.5401

PHS1a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRC_ESA	-.011396	.092057	-0.12	0.902	-.1920383	.1692463
YRC_INA	.0607219	.1032006	0.59	0.556	-.1417874	.2632311
YRC_ATA	-.0115567	.0769724	-0.15	0.881	-.1625986	.1394852
YRC_STA	-.1179157	.0890258	-1.32	0.186	-.2926099	.0567785
_cons	2.066711	.274597	7.53	0.000	1.527873	2.60555

Table 9

C: regress YCD_TOT YRR_TOT

Table 10

Part 1

. regress PhysicalHealthSumT YRR_TOT

Source	SS	df	MS	Number of obs	=	1,423
Model	2.84222737	1	2.84222737	F(1, 1421)	=	3.17
Residual	1273.15215	1,421	.895955067	Prob > F	=	0.0751
				R-squared	=	0.0022
				Adj R-squared	=	0.0015
Total	1275.99438	1,422	.897323754	Root MSE	=	.94655

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.0038588	.0021665	1.78	0.075	-.0003912	.0081088
_cons	.4459597	.0706543	6.31	0.000	.3073618	.5845575

Part 2

. regress PHS1a YRR_TOT

Source	SS	df	MS	Number of obs	=	1,469
Model	21.1433432	1	21.1433432	F(1, 1467)	=	10.12
Residual	3066.1732	1,467	2.09009761	Prob > F	=	0.0015
				R-squared	=	0.0068
				Adj R-squared	=	0.0062
Total	3087.31654	1,468	2.10307666	Root MSE	=	1.4457

PHS1a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.0103621	.0032579	3.18	0.002	.0039714	.0167528
_cons	1.460626	.1061001	13.77	0.000	1.252502	1.66875

Table 11

**C: regress YCD_TOT PSF4aR PSF5aR PSF7aR PSF9aR PSF10aR PSF11aR
PSF12aR PSF15aR PSF17aR PSF18aR**

Table 12

Part 1

. regress PhysicalHealthSumT PSF4aR PSF5aR PSF7aR PSF9aR PSF10aR PSF11aR PSF12aR PSF15aR PSF17aR PSF18aR

Source	SS	df	MS	Number of obs	=	2,935
Model	14.1906872	10	1.41906872	F(10, 2924)	=	1.82
Residual	2286.09756	2,924	.78183911	Prob > F	=	0.0530
				R-squared	=	0.0062
				Adj R-squared	=	0.0028
Total	2300.28825	2,934	.78401099	Root MSE	=	.88422

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PSF4aR	-.036996	.0324487	-1.14	0.254	-.1006206	.0266286
PSF5aR	-.0126448	.0226259	-0.56	0.576	-.0570091	.0317196
PSF7aR	-.0049503	.0247288	-0.20	0.841	-.0534379	.0435374
PSF9aR	.0232638	.0279916	0.83	0.406	-.0316215	.078149
PSF10aR	-.0412513	.0224058	-1.84	0.066	-.085184	.0026814
PSF11aR	.0122886	.017138	0.72	0.473	-.0213152	.0458924
PSF12aR	-.0223354	.0188074	-1.19	0.235	-.0592124	.0145416
PSF15aR	-.0113287	.0129434	-0.88	0.382	-.0367078	.0140503
PSF17aR	.0166231	.0149745	1.11	0.267	-.0127386	.0459848
PSF18aR	.0139571	.0143915	0.97	0.332	-.0142614	.0421756
_cons	.6230174	.1027505	6.06	0.000	.4215466	.8244881

Part 2

```
. regress PHS1a PSF4aR PSF5aR PSF7aR PSF9aR PSF10aR PSF11aR PSF12aR PSF15aR PSF17aR PSF18aR
```

Source	SS	df	MS	Number of obs	=	2,979
Model	26.5258781	10	2.65258781	F(10, 2968)	=	3.12
Residual	2519.7608	2,968	.848976009	Prob > F	=	0.0006
				R-squared	=	0.0104
				Adj R-squared	=	0.0071
Total	2546.28667	2,978	.855032463	Root MSE	=	.9214

PHS1a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
PSF4aR	-.0539495	.0334845	-1.61	0.107	-.1196046	.0117056
PSF5aR	.0399856	.0234939	1.70	0.089	-.0060803	.0860516
PSF7aR	.0031548	.0255612	0.12	0.902	-.0469647	.0532743
PSF9aR	.0016531	.0289612	0.06	0.954	-.0551329	.0584391
PSF10aR	-.0150183	.023088	-0.65	0.515	-.0602884	.0302519
PSF11aR	-.0201557	.0176174	-1.14	0.253	-.0546994	.0143879
PSF12aR	-.0371025	.0192733	-1.93	0.054	-.0748929	.0006879
PSF15aR	.0003313	.0133809	0.02	0.980	-.0259054	.026568
PSF17aR	-.0051515	.0154856	-0.33	0.739	-.0355151	.0252121
PSF18aR	.0426221	.0149033	2.86	0.004	.0134002	.071844
_cons	1.777093	.1061226	16.75	0.000	1.569011	1.985174

Table 13

Part 1

```
. regress YCD_TOT YRR_TOT TweenAge
```

Source	SS	df	MS	Number of obs	=	776
Model	12583.6108	2	6291.8054	F(2, 773)	=	133.80
Residual	36349.223	773	47.0235743	Prob > F	=	0.0000
				R-squared	=	0.2572
				Adj R-squared	=	0.2552
Total	48932.8338	775	63.1391403	Root MSE	=	6.8574

YCD_TOT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.3302529	.0204254	16.17	0.000	.2901571	.3703486
TweenAge	.0171955	.1751114	0.10	0.922	-.3265548	.3609459
_cons	-1.533235	1.971729	-0.78	0.437	-5.403815	2.337344

Part 2

```
. regress YCD_TOT YRR_TOT TeenAge
```

Source	SS	df	MS	Number of obs	=	668
Model	8667.40179	2	4333.70089	F(2, 665)	=	93.31
Residual	30884.6626	665	46.4431016	Prob > F	=	0.0000
				R-squared	=	0.2191
				Adj R-squared	=	0.2168
Total	39552.0644	667	59.2984473	Root MSE	=	6.8149

YCD_TOT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.3444427	.0252492	13.64	0.000	.2948649	.3940204
TeenAge	.2362217	.208291	1.13	0.257	-.1727656	.6452091
_cons	-3.841801	3.173418	-1.21	0.226	-10.07293	2.389325

Table 14

Part 1

. regress PhysicalHealthSumT YRR_TOT TweenAge

Source	SS	df	MS	Number of obs	=	779
Model	6.32950544	2	3.16475272	F(2, 776)	=	4.91
Residual	500.278967	776	.64468939	Prob > F	=	0.0076
Total	506.608472	778	.651167702	R-squared	=	0.0125
				Adj R-squared	=	0.0099
				Root MSE	=	.80293

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.0073182	.0023941	3.06	0.002	.0026185 .0120178
TweenAge	.0235997	.0204923	1.15	0.250	-.0166272 .0638265
_cons	.017148	.2303881	0.07	0.941	-.4351098 .4694058

Part 2

. regress PhysicalHealthSumT YRR_TOT TeenAge

Source	SS	df	MS	Number of obs	=	643
Model	.438486122	2	.219243061	F(2, 640)	=	0.19
Residual	756.914547	640	1.18267898	Prob > F	=	0.8308
Total	757.353033	642	1.17967762	R-squared	=	0.0006
				Adj R-squared	=	-0.0025
				Root MSE	=	1.0875

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.0023976	.0040777	0.59	0.557	-.0056098 .010405
TeenAge	.0059721	.0340754	0.18	0.861	-.0609409 .0728851
_cons	.4985634	.5184711	0.96	0.337	-.5195467 1.516673

Table 15

Part 1

. regress YCD_TOT YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TweenAge

Source	SS	df	MS	Number of obs	=	578
Model	13793.1768	11	1253.92517	F(11, 566)	=	32.98
Residual	21518.292	566	38.0181838	Prob > F	=	0.0000
Total	35311.4689	577	61.1983862	R-squared	=	0.3906
				Adj R-squared	=	0.3788
				Root MSE	=	6.1659

YCD_TOT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.3167646	.0225245	14.06	0.000	.2725228 .3610063
YEV_MVAE	-1.084379	.9649342	-1.12	0.262	-2.979669 .8109098
YEV_SVAE	.3688505	.7475861	0.49	0.622	-1.099531 1.837232
YEV_MVTE	.5899116	.1140997	5.17	0.000	.365801 .8140222
YEV_SVTE	.3823374	.2933103	1.30	0.193	-.1937722 .9584469
PDS_DS2R	3.362167	2.378266	1.41	0.158	-1.309137 8.03347
PDS_AT2R	.3921139	.5497092	0.71	0.476	-.6876051 1.471833
PDS_NG2R	.9185204	.5594127	1.64	0.101	-.180258 2.017299
PDS_SX2R	.8494016	.7807681	1.09	0.277	-.6841552 2.382958
PDS_SXPR	-.8209407	2.006217	-0.41	0.683	-4.761479 3.119598
TweenAge	-.0056553	.1869886	-0.03	0.976	-.3729315 .361621
_cons	-6.806572	3.055214	-2.23	0.026	-12.80751 -.8056304

Part 2

```
. regress YCD_TOT YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TeenAge
```

Source	SS	df	MS	Number of obs	=	450
Model	8834.93018	11	803.175471	F(11, 438)	=	20.52
Residual	17146.6809	438	39.1476734	Prob > F	=	0.0000
				R-squared	=	0.3400
				Adj R-squared	=	0.3235
Total	25981.6111	449	57.8655036	Root MSE	=	6.2568

YCD_TOT	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.3170264	.0294523	10.76	0.000	.2591411 .3749118
YEV_MVAE	-.2.112069	1.249504	-1.69	0.092	-4.567838 .3437008
YEV_SVAE	-.4874828	.8519492	-0.57	0.567	-2.161899 1.186934
YEV_MVTE	.4446089	.1186237	3.75	0.000	.2114664 .6777514
YEV_SVTE	1.030934	.3633319	2.84	0.005	.3168431 1.745024
PDS_DS2R	-.0449608	1.543895	-0.03	0.977	-3.079325 2.989403
PDS_AT2R	1.293773	.6250416	2.07	0.039	.0653198 2.522227
PDS_NG2R	-.2639004	.6211912	-0.42	0.671	-1.484786 .9569856
PDS_SX2R	-.0787986	.8562666	-0.09	0.927	-1.761701 1.604103
PDS_SXPR	3.788399	1.919974	1.97	0.049	.0148916 7.561906
TeenAge	.2432401	.2381465	1.02	0.308	-.2248118 .7112919
_cons	-4.687949	3.965035	-1.18	0.238	-12.48081 3.10491

Table 16

```
. regress PhysicalHealthSumT YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TweenAge
```

Source	SS	df	MS	Number of obs	=	583
Model	15.8719311	11	1.44290283	F(11, 571)	=	2.22
Residual	371.781585	571	.651106104	Prob > F	=	0.0125
				R-squared	=	0.0409
				Adj R-squared	=	0.0225
Total	387.653516	582	.666071334	Root MSE	=	.80691

PhysicalHe-T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.0104783	.0029496	3.55	0.000	.0046849 .0162717
YEV_MVAE	.0945383	.125342	0.75	0.451	-.1516493 .340726
YEV_SVAE	.1224714	.0977104	1.25	0.211	-.0694442 .314387
YEV_MVTE	-.0142425	.014979	-0.95	0.342	-.0436631 .0151781
YEV_SVTE	-.0427382	.0384611	-1.11	0.267	-.1182806 .0328042
PDS_DS2R	-.0474481	.3112177	-0.15	0.879	-.6587193 .5638231
PDS_AT2R	-.0047002	.0716399	-0.07	0.948	-.1454101 .1360096
PDS_NG2R	.0607401	.0729136	0.94	0.346	-.0744715 .2119516
PDS_SX2R	.0759881	.1022061	0.74	0.457	-.1247578 .2767339
PDS_SXPR	.528575	.2625454	2.01	0.045	.0129025 1.044248
TweenAge	.0015981	.0244034	0.07	0.948	-.0463332 .0495295
_cons	.1216885	.3997576	0.30	0.761	-.6634862 .9068632

```
. regress PHS1a YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TweenAge
```

Source	SS	df	MS	Number of obs	=	586
Model	25.7910219	11	2.34463836	F(11, 574)	=	2.67
Residual	503.75164	574	.877616098	Prob > F	=	0.0024
				R-squared	=	0.0487
				Adj R-squared	=	0.0305
Total	529.542662	585	.905201132	Root MSE	=	.93681

PHS1a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
YRR_TOT	.0079017	.0034093	2.32	0.021	.0012054 .0145979
YEV_MVAE	.0252105	.1453931	0.17	0.862	-.2603569 .3107778
YEV_SVAE	-.0587518	.1131923	-0.52	0.604	-.2810733 .1635697
YEV_MVTE	-.0324812	.0173082	-1.88	0.061	-.0664762 .0015139
YEV_SVTE	.0477199	.044554	1.07	0.285	-.0397889 .1352286
PDS_DS2R	-.5986045	.3612837	-1.66	0.098	-1.308204 .1109947
PDS_AT2R	.0077585	.0829729	0.09	0.926	-.1551738 .1707261
PDS_NG2R	.3170944	.0844764	3.75	0.000	.1511739 .483015
PDS_SX2R	.1380134	.1185592	1.16	0.245	-.0948494 .3708762
PDS_SXPR	.1615026	.3048037	0.53	0.596	-.437164 .7601692
TweenAge	.008108	.0282237	0.29	0.774	-.0473262 .0635423
_cons	2.043293	.4630341	4.41	0.000	1.133845 2.952741

Table 17


```
. regress PhysicalHealthSumT YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TeenAge
```

Source	SS	df	MS	Number of obs	=	451
Model	50.178254	11	4.56165946	F(11, 439)	=	3.38
Residual	592.007999	439	1.34853758	Prob > F	=	0.0002
				R-squared	=	0.0781
				Adj R-squared	=	0.0550
Total	642.186253	450	1.42708056	Root MSE	=	1.1613

PhysicalHe~T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.0041534	.0054246	0.77	0.444	-.006508	.0148149
YEV_MVAE	.3924114	.2316322	1.69	0.091	-.0628345	.8476572
YEV_SVAE	-.1806361	.1598887	-1.13	0.259	-.4948752	.133603
YEV_MVTE	-.0736128	.021731	-3.39	0.001	-.1163226	-.0309031
YEV_SVTE	.2351009	.069215	3.40	0.001	.0990668	.3711349
PDS_DS2R	.4690262	.2866052	1.64	0.102	-.0942627	1.032315
PDS_AT2R	.2655634	.1153292	2.30	0.022	.0388975	.4922293
PDS_NG2R	-.0029821	.1148736	-0.03	0.979	-.2287527	.2227886
PDS_SX2R	.3185088	.1586818	2.01	0.045	.0066383	.6303792
PDS_SXPR	.5302758	.3687499	1.44	0.151	-.1944588	1.25501
TeenAge	.0085495	.0442374	0.19	0.847	-.0783939	.0954928
_cons	-.2815495	.7369209	-0.38	0.703	-1.729881	1.166782

```
. regress PHS1a YRR_TOT YEV_MVAE YEV_SVAE YEV_MVTE YEV_SVTE PDS_DS2R PDS_AT2R PDS_NG2R PDS_SX2R PDS_SXPR TweenAge
```

Source	SS	df	MS	Number of obs	=	586
Model	25.7910219	11	2.34463836	F(11, 574)	=	2.67
Residual	503.75164	574	.877616098	Prob > F	=	0.0024
				R-squared	=	0.0487
				Adj R-squared	=	0.0305
Total	529.542662	585	.905201132	Root MSE	=	.93681

PHS1a	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
YRR_TOT	.0079017	.0034093	2.32	0.021	.0012054	.0145979
YEV_MVAE	.0252105	.1453931	0.17	0.862	-.2603569	.3107778
YEV_SVAE	-.0587518	.1131923	-0.52	0.604	-.2810733	.1635697
YEV_MVTE	-.0324812	.0173082	-1.88	0.061	-.0664762	.0015139
YEV_SVTE	.0477199	.044554	1.07	0.285	-.0397889	.1352286
PDS_DS2R	-.5986045	.3612837	-1.66	0.098	-1.308204	.1109947
PDS_AT2R	.0077585	.0829729	0.09	0.926	-.1552091	.1707261
PDS_NG2R	.3170944	.0844764	3.75	0.000	.1511738	.483015
PDS_SX2R	.1380134	.1185592	1.16	0.245	-.0948494	.3708762
PDS_SXPR	.1615026	.3048037	0.53	0.596	-.437164	.7601692
TweenAge	.008108	.0282237	0.29	0.774	-.0473262	.0635423
_cons	2.043293	.4630341	4.41	0.000	1.133845	2.952741

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