

# The Effects of Genetics and Psychosocial Stress on War-Affected Youth

Zaila Brinson<sup>1</sup>

<sup>1</sup>Green Hope High School

## ABSTRACT

The atrocities of war have a negative impact on those who must witness them. Syrian refugees have gone to Jordan to escape the civil war in their home country. The genetics of the youngest among the refugees plays a role in the development of mental illnesses. The importance of studying the effect of psychosocial stress and genetics on war-affected youth can be seen today when many children are being uprooted from their homes in Ukraine. This study was done using a case control study. To get DNA, a gender-balanced group of 417 Syrian refugees and 306 Jordanian non-refugees provided buccal samples to the researchers. The male participants were exposed to more traumatic events, but the female participants had higher rates of perceived stress, insecurity, depression and anxiety, and post-traumatic stress disorder symptoms. The serotonin transporter 5-HTTLPR and the protein coding gene COMT were found to play a role in the response to trauma. 5-HTTLPR was found to be associated with human insecurity and perceived stress. COMT was found to be associated with CRIES-8, also known as PTSD. The results of this study can be used in many ways. They can be used to know which mental health resources should be allocated to those uprooted by wars and the results can be used to advance the study of human behavior.

## **Introduction**

A war is an event that changes both a nation and its people. The focus of this paper is to discuss the effects of genetics and psychosocial stress on youth that have been impacted by war. Children and adults alike in war torn countries are subject to some of the most heinous crimes known to man including sexual abuse, murder, torture, etc. The exposure to those events “raises the chances of developing mental health problems—like post-traumatic stress disorder (PTSD), anxiety, and depression—and poorer life outcomes as adults” (*Social Acceptance Helps Mental Health after War Trauma*, 2019). There is also a genetic factor that comes into play when determining whether or not an individual will develop mental health problems in response to a traumatic event.

For the participants of the study used in this paper, war has become a major component of their lives. The Syrian Civil War has been going on since March 2011. The catalyst for the war was the uprising by pro-democracy protesters against President Bashar al-Assad - he is an authoritarian ruler in Syria. In order to silence and suppress the demonstrators the government in Syria used violence against the civilians and made use of the military and police. In response, militias from opposers to the authoritarian rule were formed causing the conflict to grow into a full blown war in the year 2012 (Britannica, 2018).

Syrian refugees have been fleeing the country since the start of the war. Countries like Jordan have taken in 1.3 million Syrian refugees (Karasapan, 2022). The genetic variants in each of the refugees and non-refugees along with the amount of traumatic events they experienced will impact whether or not they develop mental and behavioral health problems.

## Significance

It is extremely important to investigate the effects of genetics and psychosocial stress on war-affected youth. There are many people who do not realize that genetics play a role in the development of mental disorders; many mental illnesses come about solely because of environmental factors. The topic of the psychological effects of war however gives people the ability to learn that the way the brain is wired plays a role in whether or not people who are exposed to traumatic events will experience mental illnesses like anxiety, depression, and/or post-traumatic stress disorder. This topic is a perfect recipe for the nature vs. nurture discussion. The obscene events a war shows innocent people is the environmental factor that contributes to people being diagnosed with illnesses like PTSD. However, if the gene was not present in the person who was exposed to the event, they most likely would not develop the mental illness.

Studying the psychological effects of war is especially prevalent in this day and age. Currently, many adults and young people in Ukraine are being uprooted from their homes and are being forced to move to neighboring countries like Poland for example. They are experiencing tremendous psychosocial stress. However, just because they are having these experiences does not mean they will definitely develop mental health problems. For disorders like post traumatic stress disorder there must be genetic predispositions in individuals in order for the illness to come to fruition. Studying this topic will allow for a better understanding of the psychological challenges a person who has been affected by war might face. That understanding will lead to better intervention and treatment for the individuals who are in need of it. The new treatment may be able to target the biological factors that cause the illnesses. Also, more research on this topic can be done to make sure that the new treatment is effective so that those who receive it have the best chance of achieving a state in which they are comfortable.

## Research Methods

This study was conducted using “case:control study of refugee and non-refugee youth, with higher and lower levels of lifetime traumatic events, respectively, in order to investigate the effects of genetics and psychosocial environment on response to trauma” (Mulligan et al., 2022). Buccal samples and survey data were collected from 417 Syrian refugees and 306 Jordanian non-refugee youth. The sample of this study was gender-balanced and the participants were between the ages of 12-18 years old. The youth lived in the same neighborhoods in Jordan. The participants were randomly put into trials that were testing the impacts of a stress attunement intervention program. The testing was delivered by Mercy Corps to children and adolescents affected by the Syrian crisis (Mulligan et al., 2022). Data was collected at trials 1, 2, and 3. There were 538 participants at T2 and 273 participants at T3. This means that the population of the study was nomadic so “8% of participants declined to participate at T2 and T3, and the remaining participants were unreachable by phone or had moved away/busy with school/at work/etc” (Mulligan et al., 2022).

The study was approved by the Prime Minister's Office of Jordan and ethical approval came from Yale University. Consent to participate was given by parents or guardians in a written form. Verbal consent was given by each participant as well (Mulligan et al., 2022).

Six mental health and psychosocial stress outcomes were tested in this study. These outcomes were tested “using three international (PSS, SDQ, CRIES-8) and three regional (HD, HI, AYM) questionnaires” (Mulligan et al.). PSS assessed perceived psychosocial stress. Human Distress and Human Insecurity scales assessed symptoms of distress/stress and fear/insecurity. The Arab Youth Mental Health scale was designed to screen for depression and anxiety specifically in Arab youth. The Strength and Difficulties Questionnaire is a widely-used psychometric instrument that was used in this study to assess behavioral and emotional mental health difficulties. Lastly, the Children's Revised Impact of Event Scale measured symptoms of posttraumatic stress (Mulligan et al., 2022).

A buccal sample is a way to collect DNA by swabbing the inside of someone's cheek. Buccal samples were collected using Transport Swabs or DNA Buccal Swabs. The children brushed both sides of their mouth with the

collection swab for at most 30 seconds. Then, the DNA samples were genotyped at least two times for each variant being studied. Discrepancies were resolved by genotyping a third time (Mulligan et al., 2022).

## Limitations to Research

One limitation of this study is the fact that the sample size was small for a genetic study; the sample included 723 people. The reason this is a limitation is due to the fact that if a sample size is too small, the power of the study will be reduced since the study does not have the ability to be generalized. Additionally, there will be a larger margin of error which could make the study meaningless to those who are trying to interpret the results (Mulligan et al., 2022). Kinship from siblings of the participants in the sample population was also not taken into account until the end of the study. Kinship can have an impact on genetic associations which could have skewed the data collected. However, when the kinship element was added to the results of the study at the end after further analyses, the results did not change.

This study only examined two genetic variants while other studies about the same topic studied others or more. While it is true that the two genetic variants studied are important to the response to trauma in individuals, this study did not identify gene times trauma interactions that other studies have identified (Mulligan et al., 2022).

## Results

In this study, genetic data was collected from 415 male participants and 308 female participants for a total of 723 participants in this study. The genetic data from 415 males and 308 females was collected during trial one. 74% of the participants were retained for trial 2 and 38% for trial 3 (Mulligan et al., 2022). It was found that the male participants in the study were exposed to more traumatic events compared to the female participants. In terms of mental health outcomes of the participants “perceived stress (PSS), distress (HD), insecurity (HI), anxiety and depression (AYMH), and behavioral and emotional mental health (SDQ) symptoms were significantly higher in females than males” (Mulligan et al., 2022). When taking a look at the populations included in this study, the Syrian refugees averaged a higher amount of lifetime traumatic events coming in at 6; the Jordanian non-refugees averaged 1 lifetime traumatic event. The Syrian refugees also had higher levels of PSS, AYM, HI, and HD. They also had higher perceived behavioral and mental health symptoms and higher post-traumatic stress disorder symptoms compared to the Jordanian non-refugees (Mulligan et al., 2022). It is important to note that all the scores of mental health symptoms were high for both groups and that there was “no differences in trauma exposure or resilience levels were detected between 5-HTTLPR genotypes or between *COMT* genotypes” (Mulligan et al., 2022).

The direct genetic effects of psychological stress were tested and it was found that 5-HTTLPR, also known as a serotonin transporter, was associated with HI. High expression homozygotes which are two identical inherited alleles had lower levels of HI. (Mulligan et al.) There was not a significant direct genetic impact on the other outcome measures which include SDQ, anxiety and depression, HD, and PSS. There were also follow-up analyses for this study to see if the confounding variable of kinship had an effect on the results. Even after adding in measures of kinship and the time spent in Jordan, for the Syrian refugees, the overall results of the study were not altered. 5-HTTLPR still remained associated with human insecurity or HI (Mulligan et al.).

This study did not find interactive effects between the serotonin transporter and trauma exposure. However, there was a genetic times environmental or GxE interaction “between 5-HTTLPR and resilience on perceived psychosocial stress (PSS)” (Mulligan et al.). The individuals in the study with high resilience had lower levels of PSS while those with low resilience had higher levels of PSS. “The GxE effect of 5-HTTLPR and resilience was revealed within the group of high resilience individuals where the HE allele had a protective effect; among high resilience individuals, HE carriers had sharper declines in PSS relative to LE homozygotes” (Mulligan et al.). There were also follow-up analyses for this study to see if the confounding variable of kinship had an effect on the results. Even after adding in

measures of kinship and the time spend in Jordan, for the Syrian refugees, the overall results of the study were not altered. 5-HTTLPR along with resilience still remained associated with perceived stress or PSS.

When tested, there was only one compelling association between catechol-O-methyltransferase or COMT, a protein coding gene, and the outcome measures. There was an interaction between COMT and PTSD or post-traumatic disorder symptoms (CRIES-8). The participants had recorded increased PTSD symptoms overtime. However, this did not include Val homozygotes with high resilience since they had reported low PTSD symptoms overtime. So, “there was a GxE interaction such that the Val allele in a homozygous state appeared protective against rising post-traumatic stress symptoms but only in individuals with high resilience levels” (Mulligan et al.). There were also follow-up analyses for this study to see if the confounding variable of kinship had an effect on the results. Even after adding in measures of kinship and the time spend in Jordan, for the Syrian refugees, the overall results of the study were not altered. COMT along with resilience still remained associated with perceived stress and CRIES-8, also known as PTSD symptoms.

## Application

The development of mental health issues in the young participants of this study will impact their quality of life in the future when they are adults. Living with mental illnesses is an extremely difficult task to be charged with. The Syrian refugees and the Jordanian non-refugees did not ask to be exposed to the atrocities of war. That is why by examining the results of this study, the government of Jordan and the government of other countries holding Syrian refugees will be able to allocate mental health resources for them. By knowing that the male participants of the study were exposed to more traumatic events than their female counterparts, governments can consider designing mental health resources, like support groups, that are geared towards men. Also, the results revealed that the female participants had higher rates of distress, anxiety and depression, post-traumatic stress disorder symptoms, and insecurity. Knowing these facts, the government can set up even more local services that are designed to provide help and comfort to those who are suffering.

The results of this study can also be used by other individuals who are in war torn countries. If they look at the results of the study they may be able to ask themselves how many lifetime traumatic events they have experienced and consider whether or not they too have some of the mental health problems listed in the study. Recognizing that there is a problem is the first step to recovery. The individuals may be prompted to go to mental health professionals and ask about their own symptoms so that they too can finally put a label on the issues they face and know that there are people out there who can help– they are not alone. If the individuals are children, they will know that the mental health problems they may develop as a result of their childhood trauma will impact their lives as adults. Again, the results of this study will give them a chance to be proactive and seek answers as well as find help early on so that they can start to receive treatment before the mental illnesses do irreparable damage.

## Relevance

The findings of this study are extremely relevant to the field of psychology. By determining that genetic factors play a role in the formation of mental and behavioral illness, the results of this study have shown that the biological perspective is an important perspective to consider when it comes to determining the basis of mental illnesses in individuals. The results have shown that the origin of mental illnesses like anxiety, depression, and PTSD can be found and explained through the biological perspective. An example in this case would be when it was found that PTSD symptoms were not as visible in participants with high resilience because the Val allele, when in a homozygous state, seemed to protect against rising CRIES-8 symptoms. The origins of the symptoms or lack thereof could be linked to a genetic component.

The study of human behavior can also be advanced with this research. The results can be taken and used to answer the question, “Is human behavior hereditary?” The answer can be found in the data that states that the homozygotes, which are inherited from both parents, had an impact on perceived stress and insecurity in the individuals of the study. When the PSS and HI were high, in part because of the genetic variants, so were the behavioral and mental health symptoms in individuals.

Lastly, this study solidifies the fact that environmental and social factors still and will always play a role in the chance of developing mental illnesses. The Syrian refugees averaged experiencing 6 lifetime traumatic events while the Jordanian non-refugees averaged 1. The Syrian refugees as a result had higher levels of PSS, HI, HD, CRIES-8, and AYMB. Those higher levels of mental illness symptoms will impact the children for the rest of their lives. The field of psychology should be able to find a way to help them so that they can live the best life possible.

## Conclusions

The serotonin transporter 5-HTTLPR and the protein coding gene COMT are associated with PSS, HI, and CRIES-8, the psychosocial measures of stress. The results of this study found that 5-HTTLPR along with resilience is associated with perceived stress. 5-HTTLPR is associated with human insecurity. The results of this study show that everyone reacts to stress and trauma differently. A sense of understanding is something that should be offered to those who are struggling with mental illnesses as a result of experiencing a war either in their own countries or elsewhere. This study has shed a light on the biological underlying cause of many mental illnesses and given mental health professionals a possible way to pinpoint the cause of the illness and work to relieve the individual of the pain they endure on a daily basis.

## Personal Discussion

I have always been interested in the many aspects of war. In fact, you could say that I become a rather ardent person when asked about the World Wars. That passion can be attributed to my love of world and American history alike. So when asked to choose a topic for my AP Psychology 4th quarter research project I was immediately drawn to a topic in which I could discuss in depth the psychological effects of war on different people in the world. Another reason why I chose this topic is because I have a few veterans in my family. I also have some active duty members of my family. By studying this topic, I thought that I may gain a bit of insight into the things they may have experienced both on and off the battlefield.

Another reason why I chose this topic is because of my brother and the work he does. He currently studies veterans and active duty soldiers at the Walter Reed Army Institute of Research in Maryland. More specifically, he is involved with running the sleep studies at the institute. Many of the veterans he has the privilege of working with suffer from sleep related disorders like insomnia or versions of insomnia. His work has given me a glimpse into how psychological stress can impact one’s mental health and their overall wellbeing. His passion for his work prompted me to want to do research of my own into the psychological and psychosocial effects of war.

I originally had not planned on choosing a study in which youth were the participants. It’s not like I was avoiding young participants—I simply did not go into this project with that desire. However, now that I have concluded my research and written my paper, I can adamantly say that I am glad I chose this study. Many young people my age around the world are constantly being impacted by wars going on in their home countries. They are being forced to flee their homes and leave everything that they have ever known and loved. I cannot even begin to fathom the things they have experienced in the past and the things they will have to persevere through in the future. Yet, because of the time I spend on this topic, I feel that I now have the ability to empathize with them and hope that more studies like the one discussed in this paper will come out so that professionals can give these individuals the help that they need.

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