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A Hidden Emergency: Transgenerational Inheritance in the Next Generation of Rwandans

Neila Gross
SIT Study Abroad

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A Hidden Emergency: Transgenerational Inheritance in the Next Generation of Rwandans

Neila Gross
Fall 2021

List of Abbreviations

APA : American Psychiatric Association

dIPFC : Dorsolateral Prefrontal cortex

DNA : Deoxyribonucleic Acid

DSM-IV : Diagnostic and Statistical Manual of Mental Disorders, Volume 5

GMV : Gray Matter Volume

ILs : Interleukin receptor

IFNG : Interferon Gamma receptor

MDD : Major Depressive Disorder

PSS-I : PTSD System Scale-Interview

PCL-17: PTSD 17 question Checklist

PTSD : Post Traumatic Stress Disorder

TTT : Transgenerational Transmission of trauma

Abstract

Cases of physiological and psychological health disorders in the generation succeeding generation of the 1994 genocide are rising at an alarming pace. The presented work herein details a qualitative and quantitative approach to understanding the transmission of trauma from the surviving population of the 1994 Genocide Against Tutsi in their offspring using the APA PTSD System Scale-Interview (PSS-I). Several variables including age, gender and background were employed in this study. The results indicate that offspring born of targeted survivors of the 1994 Genocide Against Tutsi show increased trends of experiencing PTSD symptoms with children born in 1994 exhibiting the greatest increase, regardless of gender.

Acknowledgements

“Just because an opinion is different than yours doesn’t mean it is wrong. How the world would be a merrier place if we saw the good in differing opinions rather than the bad.”

-Participant A

To all the subjects who participated in the interviews: it is not easy to be vulnerable with a stranger, no less about your emotions regarding trauma. Each participant was vulnerable about their lives and some even welcomed me into their homes. I learned many great life lessons from them. Some I will share with my friends and family back home and others I will hold in my heart for the rest of my life.

To Agnes, thank you for being the greatest translator and a great source of entertainment throughout this ISP period. It was an honor to watch your comforting presence and words of encouragement that you bestowed upon those that were struggling. Next time we go to Rolex, you must get more than just fries.

I would like to acknowledge my support group that I have had here in Rwanda since the very first day. I never thought I would learn so much about myself and come to understand the opposing side of my opinions like I did with these people. Lauren- thank you for listening to me, editing everything I write, and challenging me in ways I have never been challenged before. You are more inspirational than you will ever know. Steph- Ndagukunda. As my kindred spirit, I am grateful for the friendship we have made that will continue to thrive past this study abroad period. Riley, you get a Turkmenistan flag and Emma you don’t get anything because I will forever be your fake bully. Janvier, thank you for showing me the happiness and goodwill you can have after employing a little bit of bravery in life. Celine, thank you for your smiles and ears that are always ready to listen to me. You are a true Queen and I hope to one day be a role model to others like you are to me.

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Chapter 1: General Introduction and Background

1.1 Background

You would never know the 1994 Genocide Against Tutsi happened 27 years ago, with the bustling streets of Kigali and the general happiness of the surrounding people. But it is true that just 27 years ago, over 1 million Rwandans were murdered in 100 days. That killing rate is almost as efficient as the Nagasaki atom bomb detonated in 1945 during World War II. As the 1994 Genocide Against Tutsi ripped through the populace, many survivors were left traumatized after what they had experienced. Following the genocide, research revealed that 26.1% of the population experienced Post-Traumatic Stress Disorder (PTSD), and the prevalence of PTSD among widows was 41.4%. A negative relationship between stress in mid-pregnancy with risks of Trauma and PTSD was reported in infants and children.¹ The lasting effects of the stress induced by the genocide have given many survivors PTSD, depression, suicidality as well as physical ailments such as cardiac, olfactory, and pulmonary problems. These complications are indicative of most trauma survivors and are well documented within the medical and scientific community.

The phenomenon of epigenetic transgenerational transmission of trauma (TTT) has recently gained popularity within the scientific community. TTT is a concept that trauma can be transmitted through epigenetic markers on a survivor's DNA to their children. From a biological perspective, it is demonstrated as the transfer of DNA methylations and elevated glucocorticoid levels in the children and even grandchildren of Holocaust survivors.

¹ Mutesa, Leon. "The Tutsi genocide and transgenerational transmission of maternal stress: Epigenetics and biology of the HPA axis." *The World Journal of Biological Psychiatry*. April 2014.

Although transgenerational inheritance of trauma has been proven in subjects from the Holocaust, few studies have been able to show TTT as one of the mechanisms underlying the increased rate of suicide and depression in the post 1994 Genocide Against Tutsi generation. The difference in duration between the Holocaust and the 1994 Genocide Against Tutsi are extremely prevalent. It raises the question if DNA can be methylated, and trauma can be passed on in an episode of trauma that lasted only 100 days compared to the 4 years of the Holocaust. Furthermore, there have been no studies that focus on trauma in a particular age group post genocide. If Rwanda is searches for solutions regarding the mental health crisis in their younger generations, then they must look towards the causations and events that happened in their history.

1.2 Statement of Problem

Cases of physiological and psychological health disorders in the generation succeeding generation of the 1994 genocide are rising at an alarming pace. A study recently found that children of survivors suffered more physical and psychological maladies than children of perpetrators.² It has already been proven that trauma can force change on the body and cause the victim to develop large-scale health issues. Transmission of trauma on a psychological scale integrating children of the 1994 Genocide Against Tutsi survivors in an age range of five years has never been done before. Furthermore, there are no studies that compare the trauma of males or females on the biological or psychological scale. If it can be proven that the psychological trauma of the Rwandan parent generation was being transmitted to their children born in a five-year period after the 1994 Genocide Against Tutsi, it could lead to a greater effort to diagnose children who are experiencing the trauma their parents went through in 1994.

² Rudahindwa, Mutesa et. al. "Transgenerational effects of the genocide against the Tutsi in Rwanda: A post-traumatic stress disorder symptom domain analysis." *AAS Open Research*.

1.3 Research Objectives

There are two general objectives of the proposed study. On the biological front, I wish to determine if epigenetic mechanisms play some role in affecting adverse brain function, including PTSD and other possible intergenerational effects, resulting from exposures related to the 1994 genocide. This will ideally be done on a Fulbright grant in 2022. The second aspect, which I will be focusing on for my SIT research period, pertains to collecting verbal data from the children of targeted mothers and fathers who survived the 1994 Genocide Against the Tutsi. The overall objective will be to determine the rate the children of survivors born after the 1994 Genocide Against Tutsi experience PTSD using the PSS-I APA checklist and how these rates correlate to a control.

i. Detailed objectives:

Determine whether children of survivors of the 1994 Genocide Against Tutsi experience symptoms of PTSD using the PTSD 17-item checklist (PSS-I).

- a. Determine whether age plays a role in increased symptoms.
- b. Determine whether gender plays a role in increased symptoms.
- c. Determine which APA PTSD check list criteria has the most activity.

Determine whether trauma is transgenerational or shared via parents.

1.4 Relevance

The lasting effects of the stress induced by the 1994 Genocide Against Tutsi have stricken many survivors with PTSD, depression, suicidality, and these effects of the genocide are manifesting in the rising rates of suicide and depression within the surviving population.

Curiously, these trends are also exhibited in the generation following the 1994 Genocide Against Tutsi. This study could increase awareness among mental health practitioners that children born

from targeted parents can potentially have an increased biological and psychological vulnerability to developing trauma. The proposed project will deepen our understanding of this transmission and will set us up to investigate in the future whether the generations born after the 1994 Genocide Against Tutsi are also potentially born with an increased biological and psychological vulnerability to developing PTSD.

Chapter 2: Research Methodology

2.1 Scope

The first part of this study will be conducted in Rwanda as a social study and not biological one. It will be completed in the span of four to five weeks to allot enough time to write up a paper. This study will only pertain to children of targeted parents who experienced targeting in the 1994 Genocide Against Tutsi. The subjects are to be born after July 1994 to December 1999. Male and Females are both welcome in the study and will be grouped accordingly. Ideally, interviews will be conducted in the morning when glucocorticoid levels (fear factor regulator) are highest. There will be at least ten participants in the study, to give an adequate sample size for data analysis. However, in further research, larger population sample sizes should be considered.

Other targeted populations may be considered at another time along with a control population of people born of perpetrators or a non-targeted population. In the current research a base line of someone experiencing no trauma will be used as the control.

i. Inclusion Criteria:

Any child born from a targeted mother who was pregnant during the genocide and a five-year period after (i.e., July 1994-1999).

ii. Exclusion criteria:

Subjects with severe mental health problems.

Eligible subjects who refuse to participate in the informed consent process.

2.2 Data Collection Techniques

In the first stage, interviews were conducted with children of targeted parents who were pregnant in the five-year period following the 1994 Genocide Against Tutsi (1994-1999).

Interviews were conducted at similar times in the similar areas to reduce differences in an environment that may trigger the subject in various ways.

i. Interview introduction

The PTSD System Scale-Interview (PSS-I) was designed as an interview system for qualified clinicians to determine if a patient has Post Traumatic Stress Disorder (PTSD) and rate how severe the symptoms are. In most cases, the symptoms can be linked to a specific “target” trauma. This “target” trauma is linked to an event that causes the most distress in the patient and will refer to it throughout the interview process.

In this research, the allowed age was any person born of a survivor 5 years after the 1994 Genocide Against Tutsi (e.g., July 1994-1999). The timeframe of scrutiny in the subject’s life was predetermined to be a lifetime period. Therefore, subjects could choose any time in their history in which they wanted to apply the questions from the checklist to. Each subject was recommended to focus on one event in their life that brought them the most trauma, instead of choosing many events to base their answers on. Furthermore, it was strongly advised that the traumatic event did not have to be genocide related but rather any event in their life that had affected them in a memorable way.

In addition to the checklist, open ended questions were incorporated within the interview. A list of these questions can be viewed in Appendix C. These questions were asked first to understand the subject’s history with their parents and the 1994 Genocide Against Tutsi. The goal of asking these questions were to pull information from the subject before going into the questions so they might take an objective view to their responses and not base them on stories. Based on their answers, age, and gender, they were grouped into different categories of prior exposure to trauma via their parents. Answers from the checklist were then incorporated into a

grouping system based on severity of symptoms. Ultimately this is a subjective grouping system done with the incorporation of all the information obtained during the interview.

ii. PSS-I framework and grouping

Administration:

There are four criteria the PSS-I checklist has that are used to determine the presence of PTSD.

Criteria A determines if the subject has experienced any DSM-IV criterion A trauma.

DSM-IV, or Diagnostic and Statistical Manual of Mental Disorders is a publication by the American Psychiatric Association (APA) using common language and standard criterion. Version five, DSM-IV, was published in 1994 and deviated from other versions based on its inclusion of clinical-significance criterion—symptoms must be sufficient to cause significant distress or impairment in daily activities.³ The DMS-IV definition of a Criteria A trauma is as follows:

Exposure to a traumatic event in which both of the following were present:

- 1.) The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or the threat to the physical integrity of self or others.

³ American Psychiatric Association. 2000. Diagnostic and statistical manual of mental disorders: DSM-IV-TR. Washington, DC: American Psychiatric Association.

- 2.) The persons response involved intense fear, helplessness, or horror. In children this may take the form of disorganization or agitation. (APA, 2000, DSM-IV-TR, Washington DC).

Point one in Criteria A is meant to assess the objective view of a traumatic event and point two focuses on the subjective reaction. In this study, point one correlates with the open-ended Question Two: if the subject's parents had ever explained to them their experiences during the 1994 Genocide Against Tutsi (See Appendix C). Learning of their parents potentially traumatic experience during the genocide counts towards a traumatic event that the subject was confronted with or learned about. If the answer to Question Two was yes, it was assumed that the target trauma was due to the 1994 Genocide Against Tutsi unless stated otherwise. It was noted in the interviews that the subjects current subjective experience that plagues them is determined to be the target trauma. However, questions related to discerning the specific traumatic event the subject experienced were not employed in this study.

The following criterion is related to the checklist questions. The administrator of the interviews task was to determine whether the symptom was present and evaluate the severity of the symptom. The rating of the symptom is based on its severity and frequency along with any physical signs of discomfort or anxiety. Frequency was determined from the rating of 1, 2, 3, 4 or 5. A rating of 1 correlated with "Not at all", 2 "A little bit", 3 "Moderately", 4 "Quite a bit", and 5 "Extremely".

Criteria B determines the severity of re-experiencing symptoms and pertains to Question 1 – Question 5.

Question 1: refers to trauma-related intrusive thoughts or images that are currently distressing: they can be random or triggered by trauma reminders. Grouping was determined based on the

frequency rating and physical reaction. Physical reaction was included in grouping for this because the subject had to recall the reaction and therefore, the memory.

Question 2: refers to trauma related nightmares or bad dreams. Grouping was determined based on the frequency rating.

Question 3: refers to flashbacks of trauma. This one tended to be ambiguous as the target trauma was related to the 1994 Genocide Against Tutsi, although many of the subjects gave high frequency ratings on an event, they were not alive for. This is further discussed in the Discussion section of the report. Grouping was determined based on the frequency rating as well as the intensity rating and physical reaction of the subject.

Question 4: refers to emotional upset in response to trauma reminders. Grouping was determined based on frequency rating as well as physical reaction. Physical reaction was included in grouping for related reasons to Question 1.

Question 5: refers to physical reactions in response to trauma reminders. The subject was given three examples: heart palpitations, sweating and trouble breathing. Grouping was determined by frequency ratings. By this time the subject had enough time to talk about the trauma enough that their physical reactions were probably not due to being reminded of the trauma but the environment of the interview.

Criteria C determines the severity of avoidance of a traumatic event and pertains to Question 6 – Question 12.

Question 6: relates to cognitive avoidance. Grouping was determined by frequency ratings. If the answer was unclear, the subject was asked if they felt fear when thinking about the event. If the case was yes, the rating was increased and incorporated into the grouping.

Question 7: related to behavioral avoidance. This avoidance is prevalent if the subject is motivated by not wanting to confront trauma reminders or be in situations that remind the person of a traumatic event. Grouping was based on frequency and elaboration of what the motivation behind avoidance was.

Question 8: related to psychological amnesia. Like Question 3, this question can be ambiguous as the subjects did not participate in the 1994 Genocide Against the Tutsi. Therefore, the “target” trauma was highlighted in this section. The score is based on whether the memory of the subject has important or significant gaps based on the traumatic event. Emphasis was put on the subject not to base it on small details or the deterioration of memory over time. Most amnesia is determined organic unless the subject elaborated on specific gaps that were meaningful. Grouping was then determined on the frequency of the gaps or intensity of the lost memory.

Question 9: related to behavioral loss of interest. This was specified to be trauma related loss of interest, i.e., not due to aging or other forms of losing interest. Like Question 6, fear and discomfort were incorporated into the frequency rating. Final grouping was determined by the frequency rating.

Question 10: refers to behavioral detachment from others. This is a general question that pertains to feelings of isolation in any form (emotional, physical, mental). Furthermore, trust is a big component of this question and generally a follow up question that helped determine the frequency rating. Grouping was determined from the frequency rating.

Question 11: refers to emotional numbness. Frequency rating was determined based on how many relationships the subject could think of and their response to trust. It was further classified if the subject felt the exclusiveness of negative emotions or the exclusion of positive emotions

rather than just “nothing”. Specifications regarding when and where emotional numbness was incorporated into the frequency rating. Grouping was determined based on frequency rating.

Question 12: refers to subjective opinion towards a shortened future. This question was based on whether they see a future in a positive or negative light. Their perception of whether the trauma induced a permanent change in their future (e.g., they will never have kids, they do not like to walk on crowded streets). Grouping was determined from severity of response and frequency rating.

Criteria D determines the severity of arousal and pertains to Question 13 – Question 17.

Question 13: refers to sleep difficulty. The ease at falling asleep and staying asleep were considered. Physical reactions were considered as physical stress related to sleep can induce insomnia. Grouping was based on frequency rating and physical reaction.

Question 14: refers to irritability. The frequency rating was determined based on how irritable the subject was before and after they experience the target trauma. Personal background was included in the frequency rating. Grouping was based on frequency rating and severity of episodes.

Question 15: related to concentration in all areas of life. Grouping was related to frequency and severity of loss of concentration episodes.

Question 16: related to an increased focus in all areas of life. Subjects were asked to consider in their house as well as outside their home environment. Grouping was based on frequency.

Question 17: related to the physical reaction to scenarios that would not be considered “surprise scenarios”. Frequency was determined based on how often it would happen and where it would

happen (in the house or outside the home environment). Grouping was determined based on frequency ratings.

The grouping was then determined by the four criteria.

Generally, to qualify as potentially having a negative response to trauma such as PTSD or Major depressive disorder, the subject had to have a form of Criteria A trauma. However, as the children of the 1994 Genocide Against Tutsi survivors, the target trauma related to the 1994 Genocide Against Tutsi was either induced by the introduction of a loved one's experience in the genocide, determined to be inherited from their parents through transgenerational inheritance or a combination of both. All participants met the requirements for Criteria E: symptoms have a duration of *at least* one month and Criteria F: symptoms interfered with their daily lives.

From Criteria B, C and D, the subject had the capacity to gain 85 points. From Criteria A, a severe introduction adds 5 points, moderate adds 3 points and facile adds 0 points to the frequency score. Scores above 17 were considered higher than normal (any score above 1 signify presence of a symptom of PTSD or major depressive disorder).

2.3 Ethical Values observed during the Study

Ethical considerations included the following:

- i. Study Risks

Some participants may experience secondary distress to answering questions about traumatic lifetime experiences, and traumatic experiences/emotions stemming directly from their traumatic event experiences. The nature of each question to be asked is explained upon contact and all participants can refuse to answer questions and to terminate the survey. There are also potential social and legal risks related to confidentiality and anonymity. For instance, confidentiality could

be compromised if others present overheard an interview in the home of the respondent.

However, to maximize anonymity and confidentiality to greatly minimize such risks, steps including ensuring that participants have privacy while they respond to questions will be taken.

2.4 Limitations of the Study

This study was not done by a clinician or certified psychologist. Therefore, there are no *diagnosis* in the conclusions of this study. As a student with an engineering background, my job was to simply report trends in the data that was collected. Generalizations about the population of the generation born after the 1994 Genocide Against Tutsi were not made as the sample size population was too small.

The settings for interviews ranged from classrooms to houses potentially inducing different levels of comfort. Furthermore, although interviews began in the morning, some tended to run into the afternoon. The data might therefore reflect this and was incorporated into human error.

Chapter 3: Literature Review and Key Concepts

3.1 Mental Health Succeeding Trauma

Studies involving disaster victims demonstrated six discrete groups of outcomes following major trauma: specific psychological disorders such as PTSD, depression, or anxiety; nonspecific distress; health problems; chronic problems in living and loss of resources. Among these six outcomes, PTSD is the most experienced disorder followed by depression and anxiety after unhealed trauma⁴. In national probability samples from the United States, the lifetime prevalence of PTSD is estimated at 6.8%⁵. In South Africa, one of the most violent places on Earth, the prevalence of exposure to at least one traumatic event was 73.8% in the total sample, while the average lifetime traumatic event exposure was 4.3%. The traumatic event reported by the highest number of respondents was the unexpected death of a loved one (39.2%) followed by physical violence (37.6%), accidents (31.9%), and witnessing violence (29.5%)⁶. These studies concluded that the risk of developing PTSD after exposure to trauma and the probability of symptom chronicity after the initial onset of PTSD was highest in those who witnessed a traumatic event.

3.2 PTSD in Children and Adults

Post-traumatic stress disorder is present in both adults and children. Specifically, for children and adolescents, exposure may come from direct exposure or from indirect or direct

⁴ Housen T, Lenglet A, Ariti C, et al. Prevalence of anxiety, depression and post-traumatic stress disorder in the Kashmir Valley. *BMJ Glob Heal*. 2017;2(4):e000419. doi:10.1136/bmjgh-2017-000419

⁵ Kessler RC, Aguilar-Gaxiola S, Alonso J, et al. Trauma and PTSD in the WHO World Mental Health Surveys. *Eur J Psychotraumatol*. 2017;8(sup5):1353383. doi:10.1080/20008198.2017.1353383

⁶ Bromet EJ, Atwoli L, Kawakami N, et al. Post-traumatic stress disorder associated with natural and human-made disasters in the World Mental Health Surveys. *Psychol Med*. 2017;47(2):227-241. doi:10.1017/S0033291716002026.Post-traumatic

transmission⁷. The rate of PTSD in 4 post-conflict zones, Algeria, Cambodia, Ethiopia, and Gaza, using the Composite International Diagnostic Interview Post Traumatic Stress Disorder module (CIPI-PTSD) were studied. The study reported PTSD prevalent in 28.4% of the population surveyed in Cambodia compared to 37.4% in Algeria, 15.8% in Ethiopia, and 17.8% in Gaza⁸. The following risk factors were associated with PTSD in Cambodia: conflict-related trauma after age 12 years, psychiatric history and current illness, youth domestic stress, death or separation in the family, and alcohol abuse in parents. The incidence of prevalence in a community of children and adolescents and their results yield that 3% of girls and 1% of boys met the criteria of PTSD according to the DSM⁹. This is in line with the study that showed children who experienced child abuse are at high risk for PTSD, however holocaust survivors have been reported to have more cumulative stress over their lifetime although they experience similar traumatic life events as the children who were abused. Furthermore, rates for PTSD and other psychiatric diagnoses, mostly mood and anxiety disorders, were several times higher among adult children of holocaust survivors.¹⁰ A particular consideration in the African context is more widespread exposure to community-level and interpersonal violence, exposures with some of the highest conditional risks of PTSD.

⁷ Bromet EJ, Atwoli L, Kawakami N, et al. Post-traumatic stress disorder associated with natural and human-made disasters in the World Mental Health Surveys. *Psychol Med*. 2017;47(2):227-241.
doi:10.1017/S0033291716002026.Post-traumatic

⁸ Atwoli L, Stein DJ, Koenen KC, McLaughlin KA, Health M, Africa S. HHS Public Access. 2015;28(4):307-311.
doi:10.1097/YCO.000000000000167.Epidemiology

⁹ Eroglu S., Toprak S., Urgan O, MD, Ozge E. Onur, MD, Arzu Denizbasi, MD, Haldun Akoglu, MD, Cigdem Ozpolat, MD, Ebru Akoglu M. *DSM-IV Diagnostic and Statistical Manual of Mental Disorder*. Vol 33.; 2012.
doi:10.1073/pnas.0703993104

¹⁰ Yehuda R, Daskalakis NP, Desarnaud F, et al. Epigenetic biomarkers as predictors and correlates of symptom improvement following psychotherapy in combat veterans with PTSD. *Front Psychiatry*. 2013;4(SEP):1-14.
doi:10.3389/fpsy.2013.00118

3.3 Transgenerational Trauma

Different African countries, including the DRC, Sudan, Nigeria, and others, have been highlighted as being at risk for currently suffering from genocide¹¹, which justifies the urgent need to observe the transgenerational impact of extreme trauma exposure and its resilience to PTSD. Recent work has provided evidence that prenatal exposures increase the risk to develop PTSD and leave imprints of trauma exposure that persist postnatal¹². For example, maternal, but not paternal, PTSD was shown to be independently associated with increased risk for PTSD in adult offspring of Holocaust survivors compared to demographically similar Jewish study participants who were born to parents free of PTSD and trauma exposure¹³. In addition, it has been reported that Holocaust exposure was associated with differential DNA methylation in FK506 binding protein 5 (*FKBP5*) in both exposed parents and offspring, when compared to DNA methylation levels observed in demographically matched parent and offspring control groups. Thus, these differences observed suggest that genocide exposure itself may leave DNA Methylation and gene imprint in exposed individuals and their offspring.

The dorsolateral prefrontal cortex (dlPFC) plays a role in fear extinction has been found to be the most vulnerable to the adverse effects of childhood trauma. Anatomical MRI studies have found that brain structural abnormality may be one major mediator provoking childhood trauma to PTSD. Lu et al. confirmed that reduced GMV of the left dlPFC, which was usually recognized as psychopathology of Major Depressive Disorder (MDD), was associated with childhood trauma independent of MDD diagnosis. From a genomic standpoint, PTSD and MDD can be characterized

¹¹ Atwoli L, Stein DJ, Koenen KC, McLaughlin KA, Health M, Africa S. HHS Public Access. 2015;28(4):307-311. doi:10.1097/YCO.000000000000167.Epidemiology

¹² Rieder H, Elbert T. Rwanda - Lasting imprints of a genocide: Trauma, mental health and psychosocial conditions in survivors, former prisoners and their children. *Confl Health*. 2013;7(1):1-13. doi:10.1186/1752-1505-7-6

¹³ Yehuda R, Daskalakis NP, Desarnaud F, et al. Epigenetic biomarkers as predictors and correlates of symptom improvement following psychotherapy in combat veterans with PTSD. *Front Psychiatry*. 2013;4(SEP):1-14. doi:10.3389/fpsy.2013.00118

by dysregulated levels of circulating inflammatory markers in the periphery. Yet, it is unclear how excessive inflammation is induced in PTSD patients. Interleukins (ILs) represent a subtype of cytokines and are key signaling proteins in the immune and inflammatory systems; at baseline, ILs play an important role in responding to injury, infection, and disease, and they are also involved in cell signaling mechanisms between diverse cell types of the brain as well as immune and non-immune tissue types. Greater circulating concentrations of the proinflammatory cytokines interleukin with trauma exposure increased levels of pro- and anti-inflammatory cytokine gene expression in the prefrontal cortex of PTSD cases. Bam et al found that pro-inflammatory cytokines, interferon gamma (IFNG) and ILs were increased in PTSD patients, and their expression correlated with their associated epigenetic markers. DNA methylation on IL-12B promoter was lower in PTSD, and thereby, the methylation-mediated suppression might be increased in PTSD.

Chapter 4: Presentation, Analysis, and Interpretation of Data

Each participant's data was considered individually and then analyzed. As mentioned in the Methods Section, physical reactions, frequency ratings and individual comments made from the open-ended questions were useful tools in the grouping portion of this research. All these answers were unique to the subject that was being interviewed and will be presented in the following sections for further discussion.

4.1 Criteria Ratings for the Subjects

Ten subjects born in the timeframe between 1994 and 1999 were tested. A copy of the test given can be found in Appendix A along with data entries. Five of the participants were born in 1994, months after the genocide stopped. The IDs of these participants were A, C, E, F, and J. Subjects B and I were both born in 1996. Subject H was born in 1998 and Subject D was born in 1997. The preliminary results for the different criteria ratings are depicted in Table 1 below.

Table 1. Criteria Ratings for the Subjects.

Participant ID	Criteria A	Criteria B	Criteria C	Criteria D
A	Yes- Facile +0	19	19	12
B	Yes- Facile +0	17	9	9
C	Yes- Moderate +3	17	18	13
D	Yes- Facile +0	7	18	12
E	No	15	20	16
F	Yes- Moderate +3	17	18	13
G	Yes- Moderate +3	21	25	13
H	No	19	13	13
I	Yes- Facile +0	16	16	19
J	Yes- Severe +5	25	24	18

Participant A's interview was the only interview conducted in the participant's house. It was done at 6:00PM, a very late time compared to the rest of the participants. Generally, fear factor regulators are lower at night making people more on edge. However, throughout the interview, Participant A was calm and showed little hesitation in her responses. This irregularity was not incorporated into the scoring section as her answers were taken at face value due to her physical responses and calm nature. Overall Participant A had a total score 4 points above the average and 38 points above the control.

Participant B's interview was completed at the University of Business and Technology at 11:51 AM. Participant B had the lowest scores out of all the participants. He was generally very calm and composed during the interview. He noted that some of his answers were due to the poverty he grew up in and this was considered when scoring. His overall score was 16 points lower than the average and 18 points above the baseline.

Participant C's interview was completed at the University of Business and Technology at 12:31 PM. This participant was agitated and fidgeted a lot during the interview. It is imperative to note that Participant C's mother died in 1995 and his father died in 1997, both killed by the Interahamwe. Therefore, his Criteria A score was a severe case and added +5 to his frequency score. However, since his mother was pregnant with him during the 1994 Genocide Against Tutsi, and that substantial research has been done on prenatal trauma in inherited trauma, transgenerational trauma could not be ruled out. He held one of the top three highest scores for Criteria C, which focuses on avoidance of trauma. These added to a final score of 1 point above the average.

Participant D's interview was completed at the University of Business and Technology at 1:45PM. Participant D was noted to be very calm and collected during the interview. She was

born three years after the 1994 Genocide Against Tutsi and was introduced to it at a young age for historical purposes.

Participant E's interview was completed at the University of Business and Technology at 2:25PM. This participant was born in 1994 after the genocide, indicating that his mother was pregnant with him during the 1994 Genocide Against Tutsi. His father died during the genocide and his mother did not share any of her experiences with him leading to a +0 Criteria A score. Participant E showed many physical ticks throughout the interview, was sullen and made little to no eye contact. The most interesting point of this participant's score was his Criteria D score. Participant D scored 3 points higher than the average and 11 points higher than the baseline. This was in tune with his physical responses throughout the interview. He was one of two to answer Question 14 (See Appendix A for reference), which referred to angry outbursts, as a high mark.

Participant F's interview was completed at the University of Business and Technology at 8:42AM. Participant F was the only subject who held a position in Rwanda's army that was included into the study. Born right after the genocide, both of his parents did not survive in the post genocide period, and he was adopted. His adopted parents told him about the genocide when he was 7 years old in a detailed manner. He was very animated when talking about his experience with trauma and scored the average for Criteria A, B and C. His overall score is 34 above the baseline.

Participant G's interview was completed at the University of Business and Technology at 9:12AM. Participant G was unique in her high score and the way in which she learned about the 1994 Genocide Against Tutsi. Her father had been beaten in the head during 1994 and subsequently blinded so she stayed with her mother. However, her father kept a register of all the

events that happened during the 1994 Genocide Against Tutsi, and she was given this register at 10 years old.

Participant H's interview was completed at the University of Business and Technology at 11:15AM. Participant H is the youngest participant interviewed, born in 1998. The subject was very calm and collected throughout the interview. The participants parents shared their stories when she was 16 years old and were not detailed.

Participant I's interview was completed at the University of Business and Technology at 11:46AM. Participant I was introduced to the 1994 Genocide Against Tutsi by her parents when she was 21 years old. During her interview, Participant I was very quiet and subdued. She fidgeted often and rarely made eye contact. Her Criteria D score, however, was the highest out of the sample at 6 points above the average. This shows that she has coped more mentally with her trauma than physically as evident in the way she conducted herself during the interview

Participant J's interview was completed at the University of Business and Technology at 12:12PM. Participant J was the final interviewee of this study and perhaps the most interesting. Participant J was introduced to the trauma of the 1994 Genocide Against Tutsi when he was 7 years old, and his father abandoned his family to live in a nearby village as a hermit. Participant J describes this as his introduction because he, "wondered where his family had all gone". The subject was in utero during the genocide and born shortly after which points to transmission of trauma due to the prenatal effects stress has on pregnant women and their babies. Furthermore, Participant J had the highest Criteria B score 8 points above the average and 20 points above the baseline. He was the only participant out of everyone in the study to answer "Yes" to Question 12 (See Appendix A) in response to if he thought his life would be cut short.

4.2 Average Criteria Scores Based on Birth Year

The averages of the criteria data were taken and compared to each other by age and to a control. Criteria A data was not included into this section because it resembles subjective data made by the proctor. Note: 1999 has no data and are therefore, not depicted. The result of this data is exhibited in Figure 1.

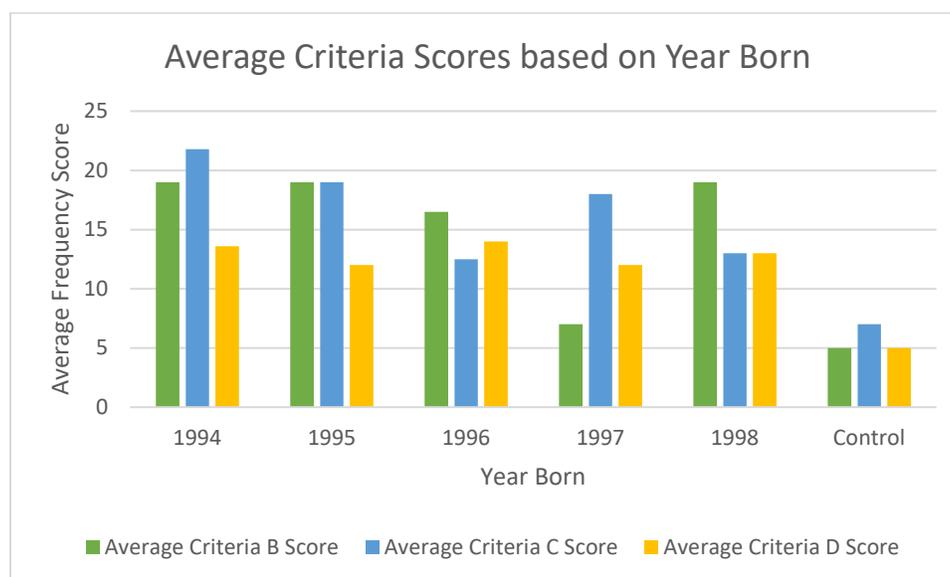


Figure 1. Average Criteria Score based on the five-year period (1994-1999).

Figure 1 depicts the average criteria score according to each year in the inclusion period compared to the control. 1994 shows the highest deviation from the control with the highest Criteria B and C scores. This aligns with previous research done on unborn children and transmission of trauma. Children are more susceptible to trauma if their mother experiences it while the baby is still in utero. 1996, on the other hand, shows the highest deviation in the Criteria D score. This could be due to the small sample size and considerable error should be included when analyzing this. However, general trends show that all years were adversely affected by increased PTSD rates.

4.3 Comparison of Average Frequency Scores to the Control

A similar comparison was done averaging the entire five-year period and comparing it to the control. Data from 1994, 1995, 1996, 1997 and 1998 were taken and averaged, however, for similar reasons above, Criteria A was not included. This data is illustrated in Figure 2.

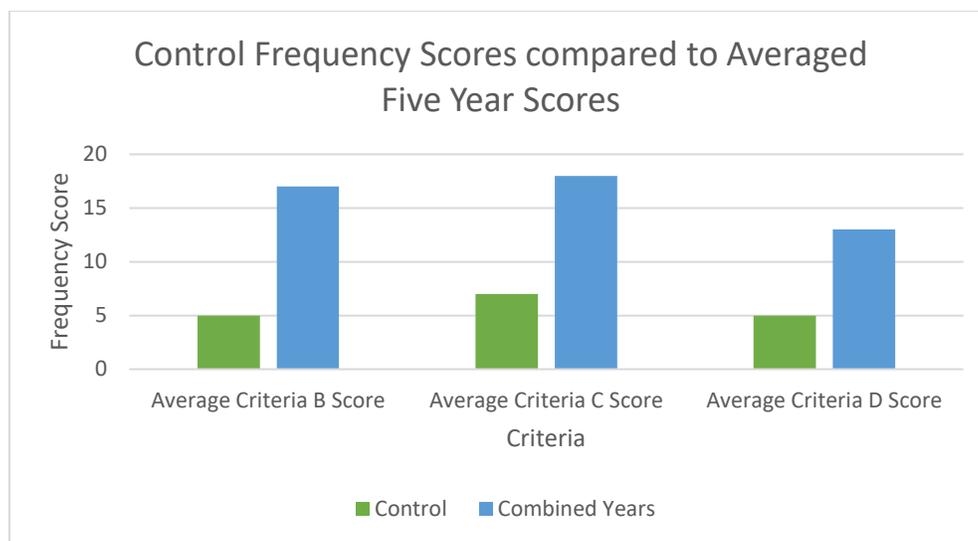


Figure 2. Comparison of frequency scores for 1994, 1995, 1996, 1997 and 1998 vs. control frequency scores.

A more cohesive graph in Figure 2 highlights the disparity between the average of all five years of the inclusion period to the control. The averages of each criteria score are far above the baseline scores, indicative that all participants are facing some sort of PTSD or phenomena that gives them the symptoms of PTSD. It is noticeable that Criteria B and Criteria C have a larger disparity between the control and the measured value. This indicates that the subjects are more susceptible to emotional and mental trauma than physical trauma.

4.4 Final Grouping Based on Category Scores

Criteria data was then analyzed, and trends of trauma type was identified. Each participant was then given a category of “Transgenerational Trauma”, “Shared Trauma” or “Both” based on their category scores. Category A was the main defining factor for grouping in this set of data. Table 2 below depicts the grouping.

Table 2. Final Grouping Based on Category Scores.

Participant ID	Transgenerational Trauma	Shared Trauma	Both
A	X		
B	X		
C			X
D		X	
E	X		
F	X		
G			X
H	X		
I	X		
J	X		

Table 2 depicts the grouping of each participant. In this section, due to the small sample size, I will detail the logic behind each placement and any outlying factors taken into consideration during the grouping.

Participant A’s trends glaringly point towards experienced trauma. Due to the mother sharing her traumatic experiences with Participant A at an older age and divulging very little, resulting in a +0 of Criteria A score, the high nature of her Criteria B score after not having been a part of the

1994 Genocide Against Tutsi, and her overall high score, she was determined to trend towards having transgenerational trauma.

Participant B was harder to place as many of his answers were muddled with his experiences in poverty. However, his trends still point towards something wrong with his score 18 points above the control. Participant B had a low Criteria A score which ruled out shared trauma. As a result of a high Criteria B score and no additional points by Criteria A, it was determined that Participant B trended towards transgenerational trauma.

Participant C experienced the 1994 genocide prenatally as well as suffering through the deaths of his parents in the post genocide era. Due to the subject's youth when his parents were murdered, high Criteria C score and the physical reactions to the questions this subject trended towards shared trauma and transgenerational trauma.

Participant D has the lowest score for Criteria A leading me to believe the transgenerational trauma in this participant is unlikely. Due to Participant D's collected nature, her introduction to the genocide in a structured way at a young age, and her low criteria scores, Participant D trends towards shared trauma.

Participant E was born in 1994 succeeding the 1994 Genocide Against Tutsi. Grouping considered the prenatal data that points towards transgenerational inheritance of trauma. Due to his mother sharing nothing about the 1994 Genocide Against Tutsi, and his high scores in all Categories, Participant E was grouped in transgenerational trauma.

Similarly, Participant F's mother was pregnant during the 1994 Genocide Against Tutsi with him, and prenatal data was once again considered for decisions based on what trauma Participant F trended towards. Due to his very stable introduction to the stories of his adopted parents, his high scores in Criteria A—the criteria based on re-experiencing trauma—and being

in utero during the 1994 Genocide Against Tutsi, Participant F was found to trend towards transgenerational trauma.

Participant G was uniquely introduced to the 1994 genocide through the accounts her father wrote in which he detailed everything. The trends that were observed in her criteria scores are indicative of physical (Criteria D) and not mental coping (Criteria B) with trauma. Due to this, Participant G trended towards both shared and transgenerational trauma.

Participant H's vague and late introduction into her parent's experiences during the genocide ruled out shared trauma. Her scores, however, were far above the control, other participants, and averages. As a result of her late and vague introduction to the genocide and her incredibly high scores, Participant H was grouped in transgenerational trauma.

Participant I's exhibit of high Criteria D scores in both her mannerisms and verbal scores were unique in the study. Due to the late introduction by her parents and the high Criteria D score, Participant I was grouped with transgenerational trauma.

Participant J deals with both emotional, mental, and physical stress of trauma related to the 1994 Genocide Against Tutsi that he never experienced. Due to this, and his trauma surrounding the abandonment of his father, he trends towards having both transgenerational and shared trauma.

Table 2 depicts the conclusions above. Nine out of the ten participants had transgenerational trauma while one had shared trauma and two of the nine had both transgenerational and shared trauma. *All the participants* had some form of trauma they were handling.

4.5 Male and Female Comparison

Finally, once the data was compiled, trends between male and female data were observed. In the trial there were five men and five women who participated. Trends in the averaged final Frequency Scores as well as averaged criteria data were analyzed. Figure 3 below depicts the comparison.

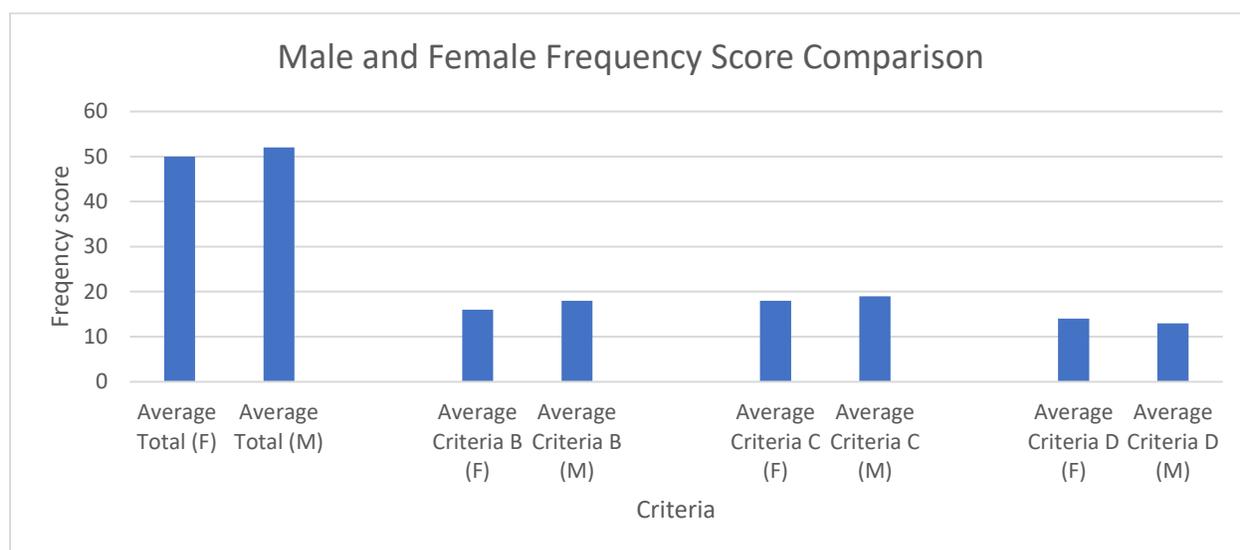


Figure 3. Male and Female PTSD Score Comparison.

Figure 3 exhibits the trends of the male and female participants. On the left, the averages of the total frequency scores are depicted. The numbers, 50 for female and 52 for male do not have a statistical significance in terms of their difference. The females had the lowest outlier, and the males had the highest outlier, so it is telling that their averages are nearly the same. Both scores deviate significantly from the baseline of 17 points.

Furthermore, the criteria scores are very similar as well. For Criteria B, which describes the mental response to trauma, males have a higher score by two points. Both scores, deviate from the baseline of 5 points. In Criteria C, which describes the emotional response to trauma, males have a one-point increase over females. These scores deviate less from the control than Criteria

B, but still hold a significant difference. Finally, in Criteria D, which describes the physical response to trauma, the average female score is higher by one point. This has the lowest difference from the control; however, it is again, significantly different.

Chapter 5: Conclusions and Future Work

5.1 Conclusions

This psychological study was not intended to diagnose any of the subjects but look at the trends related to PTSD in the generation succeeding the 1994 Genocide Against Tutsi. Forms of trauma that were studied were transmission of trauma and shared trauma via the parental generation. Of course, there are more forms of trauma, however being the children of trauma survivors, a particular interest of this study was to see if the subjects would be more susceptible to trauma or might have trauma of the genocide they never experienced.

The following conclusions of the study were observed:

2. Trends of the generation succeeding the 1994 Genocide Against Tutsi illustrated a potential presence of transmission of trauma as well as shared trauma via parental generation. (See Table 2 and Fig. 2).
3. Subjects born closer to the genocide experienced higher rates of PTSD symptoms than those born later. (See Fig. 1).
4. Generation proceeding the 1994 Genocide Against Tutsi struggled with more mental and emotional PTSD symptoms (Criteria B and Criteria C) than physical PTSD symptoms (Criteria D). (See Fig. 2).
5. Results of all participants in the trial indicate facing some form of PTSD or trauma. (See Table 1).

5.2 Future Work

There is quite a bit of work to be done in this field. With the rising cases of depression and suicide, it is paramount that Rwanda begins to take action to find the origins of these trends.

I believe that it might have something to do with the transgenerational trauma from the 1994 Genocide Against Tutsi. This study is one of few that highlights this poorly researched phenomena; however, further steps are needed to validate these preliminary findings.

1. As I am not an accredited clinician or psychologist, these trials would better be done by someone in tandem with the researcher who has a license to officially diagnose instead of highlighting trends seen in the data.
2. On the biological front, many genes that regulate fear and fear responses have yet to be analyzed in the transmission of trauma. DNA methylation is a novel way to do this and has already shown that some genes such as the FKBP1 gene plays a role in this.
3. Another biological domain is the prefrontal cortex, which deals with decision making and emotion processing, and is important to the treatment of fear and trauma. Imaging GMV is important to understand how PTSD might affect the brain, specifically the dPFC, and how it might impact the resulting offspring.
4. This study will need to be done with a larger sample size to make any serious generalizations of a population.
5. Females and males share a similar response to trauma in their mental, emotional, and physical frequency scores.
6. Study if prenatal babies whose mothers experience trauma have more mental effects than physical

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Appendix

Appendix A- Merged Interview Data

Name: *Participant A*

DOB: 1995

Date and Time: 11/11/2021, 6:00PM ****Late interview****

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories, thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?		X			
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?			X		
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?				X	
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?					X
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?					X
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?			X		
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?				X	
9.	Loss of <i>interest</i> in things you used to enjoy?	X				
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving					X

	feelings towards those close to you?					
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?					X
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?					X
15.	Having <i>difficulty concentrating</i> ?					X
16.	Being “ <i>super alert</i> ” or watchful or on guard?	X				
17.	Feeling <i>jumpy</i> or easily startled?	X				

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they? *Detailed*
 - b. How old were you when they shared?
Much much older. Her younger siblings don't even know yet.
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya, Ari comfortable.
4. Is there anything you would like to share with me?
I don't have relatives; mother clearly has trauma. Cried at one point during an interview with her.

Criteria A: Older when mother shared trauma, quite stable emotionally, no physical ticks. +0-Facile

Criteria B: 19

Criteria C: 19

Criteria D: 17

Frequency score: 55

3 years Post Genocide

Criteria A not observed, high B and C scores -> TRANSGENERATIONAL TRAUMA.

Name: *Participant B*

DOB: 1997

Date and Time: 11/16/2021, 11:51AM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?		X			
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					X
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?					X
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?				X	
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?	X				
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?	X				
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?	X				
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?	X				
9.	Loss of <i>interest</i> in things you used to enjoy?			X		
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?	X				
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?					X
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?	X				

16.	Being “ <i>super alert</i> ” or watchful or on guard?	X				
17.	Feeling <i>jumpy</i> or easily startled?	X				

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?

Yes

2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi?

- a. If (yes), how detailed were they?

- i. *Yes very detailed as he heard the testimonies during commemoration*

- b. How old were you when they shared?

- i. *15 during commemoration where I come from everyone participates, during the night of commemoration they gave the testimonies*

3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?

Oya he feels comfortable to talk about it

4. Is there anything you would like to share with me?

One of my siblings who was four years old during the genocide has trauma and I see the trauma in him and my parents. During genocide his mother had 6 children and they escaped in the stadium. She came out of the stadium to find food and while digging yams when the Interahamwe came and beat the oldest child to death, and they tried to rape the mom but a priest came and saved them. Surviving was very hard but God protected them and they were sent to a very high hill to die from there where there was no food which was cold but even they did not die, they were beaten but God saved them. His mother cannot carry anything.

Criteria A: Yes, younger introduction (secondary school), very detailed. Grew up in poverty.

Severe.

Criteria B: 17

Criteria C: 9

Criteria D: 9

Frequency score: 35

2 years Post Genocide

Detailed introduction into the parents trauma, grew up in poverty (most of the responses were harshups due to this). NO TRAUMA SIGNS.

Name: *Participant C*

DOB: 1994

Date and Time: 11/16/2021, 12:31

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?		X			
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?					X
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?		X			
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?			X		
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?			X		
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?		X			
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?					X
9.	Loss of <i>interest</i> in things you used to enjoy?			X		
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?				X	
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?	X				
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?		X			
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?	X				

16.	Being “ <i>super alert</i> ” or watchful or on guard?	X				
17.	Feeling <i>jumpy</i> or easily startled?			X		

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego , cyane cyane
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi?
 - a. If (yes), how detailed were they?
No, my mother died in 1995 and my father was killed by the Interahamwe in 1997. Secondary school his adopted parents told him the stories
 - b. How old were you when they shared?
12 years old
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya he is comfortable.
4. Is there anything you would like to share with me?

My adopted mother used to faint because she was attacked with an impanga on her head and her brain was affected. You can heal physical scars, but you cannot always heal the mind.

Question Explanations:

Especially during commemoration (3)

Where you can look at your self and see you are alive strengthens me. Rwandan Government empowers the youth, survivors fund (4)

Criteria A: Yes, saw his father die 3 years after the genocide. Mother had injuries sustained from the genocide and died a year later. Adopted parent told him stories. Severe.

Criteria B: 17

Criteria C: 22

Criteria D: 8

Frequency score: 52

0 years Post Genocide

Witnessed a lot of trauma as a child. Hard to discern between transgenerational and shared trauma. SHARED TRAUMA and TRANSGENERATIONAL are qualified.

Name: *Participant D: Child*

DOB: 1997

Date and Time: 11/16/2021, 1:45PM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?		X			
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	X				
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?	X				
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?		X			
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?	X				
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?				X	
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?					X
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?					X
9.	Loss of <i>interest</i> in things you used to enjoy?	X				
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?	X				
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?		X			

14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?	X				
16.	Being “ <i>super alert</i> ” or watchful or on guard?					X
17.	Feeling <i>jumpy</i> or easily startled?			X		

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they? *To make them know the history her parents told her about the history in the last year of primary school but not in detail. As they got older, they shared more detail.*
 - b. How old were you when they shared?
Primary School
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya ariko Rosine’s sisters from another father are uncomfortable.
4. Is there anything you would like to share with me?
Hating cant bring back our people who have gone. We are all human

Criteria A: Yes, young entrance into the history of the 1994 Genocide against Tutsi. Very stable.

Criteria B: 7

Criteria C: 18

Criteria D: 12

Frequency score: 37

3 years Post Genocide

Gradual introduction into parents’ trauma for history related reasons. Considered SHARED TRAUMA.

Name: *Participant E*

DOB: 1994

Date and Time: 11/16/2021, 2:25 PM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?		X			
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	X				
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?		X			
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?					X
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?				X	
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?				X	
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?				X	
9.	Loss of <i>interest</i> in things you used to enjoy?			X		
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?		X			
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?		X			
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?	X				
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?					X
15.	Having <i>difficulty concentrating</i> ?				X	

16.	Being “ <i>super alert</i> ” or watchful or on guard?	X				
17.	Feeling <i>jumpy</i> or easily startled?					X

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Oya. His dad died during genocide but he heard some of his mother’s story during commemoration. Genocide happened when he was 1 month old*
 - a. If (yes), how detailed were they?
 - b. How old were you when they shared?
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya, ariko during commemoration period he used to be very quiet and angry and changed
4. Is there anything you would like to share with me?
*Of course, if you see that your mom is angry, you go into your thoughts and think about it too. Even delayed in his schools because of trauma, I felt like in my mind things were not good I was not able to memorize because of many thoughts, **thinking about my family’s future wondering if they will be alive in the future.***

Comments:

Mother clearly has PTSD

Criteria A: No stories were not shared.

Criteria B: 15

Criteria C: 20

Criteria D: 16

Frequency Rating: 51

2 months post genocide, mother was pregnant with him during.

Mother did not share much about the genocide with him. Considered TRANSGENERATIONAL TRAUMA.

Name: Participant F

DOB: 1994

Date and Time: 11/18/2021, 8:42AM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?				X	
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?	X				
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?		X			
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?	X				
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?				X	
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?					X
9.	Loss of <i>interest</i> in things you used to enjoy?					X
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?	X				
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?	X				
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?					X

16.	Being “ <i>super alert</i> ” or watchful or on guard?					X
17.	Feeling <i>jumpy</i> or easily startled?	X				

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *His biological parents are not alive*
 - a. If (yes), how detailed were they?
Detailed—adopted parents told him everything
 - b. How old were you when they shared?
7 years old
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya
4. Is there anything you would like to share with me?

When I am with people talking about genocide I feel better. Overcome the history by sharing it with everyone. I like to take care of people. I have raised many orphans and even now two of them have gotten married.

Comments:

Mother has signs of trauma. Especially during commemoration week, she gets quiet and can't get out of bed. Theo joined the army shortly after. Seeing his parents trauma made him want to take revenge, my mind works wondering how something like this could have happened.

Criteria A: Did not grow up with biological parents. Young introduction to genocide but very animated and stable when talking about it. Yes- Moderate +3.

Criteria B: 17

Criteria C: 18

Criteria D: 13

Frequency score: 51

0 years Post Genocide

Young introduction but very comfortable with talking about genocide and shared in a healthy way. Considered TRANSGENERATIONAL.

Name: *Participant G*

DOB: 1994

Date and Time: 11/18/2021, 9:12AM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					X
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?			X		
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?			X		
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?	X				
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?					X
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?				X	
9.	Loss of <i>interest</i> in things you used to enjoy?					X
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?			X		
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?					X
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?		X			
13.	Trouble <i>falling</i> or <i>staying</i> asleep?					X
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?	X				

16.	Being “ <i>super alert</i> ” or watchful or on guard?	X				
17.	Feeling <i>jumpy</i> or easily startled?					X

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they?
Very detailed and her dad had a register about everything that happened during genocide that she was given
 - b. How old were you when they shared?
10 years old
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya she is very comfortable and likes that conversation.
4. Is there anything you would like to share with me?

Comments:

*She remained with her mother because her father was beaten in the head and went blind and had brain damage. He passed after the genocide was over from brain cancer.
Both of her parents had trauma. Her dad was especially angry at everyone and died without forgiving the perpetrators.*

Criteria A: Yes, read her dads register about what happened, father was impaired due to injuries and she was young (primary school). Moderate (she was emotionally very stable during the interview).

Criteria B: 21

Criteria C: 25

Criteria D: 13

Frequency score: 62

0 years Post Genocide

Detailed introduction into parent’s trauma. Very high frequency score. Considered SHARED TRAUMA and TRANSGENERATIONAL.

Name: *Participant H*

DOB: 1998

Date and Time: 11/18/2021, 11:15

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?			X		
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?	X				
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?					X
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?			X		
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?					X
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?	X				
9.	Loss of <i>interest</i> in things you used to enjoy?	X				
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?	X				
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?	X				
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?					X

16.	Being “ <i>super alert</i> ” or watchful or on guard?					X
17.	Feeling <i>jumpy</i> or easily startled?	X				

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Oya
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they?
*They were **not** detailed*
 - b. How old were you when they shared?
16 when they shared
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya
4. Is there anything you would like to share with me?

Comments:

During commemoration period I see some trauma in my parents. My mother isolates herself. I used to get angry seeing her upset.

Criteria A: No. Older and not detailed in sharing.

Criteria B: 19

Criteria C: 13

Criteria D: 13

Frequency score: 45

4 years Post Genocide

Later introduction into parents’ trauma and not detailed (hard to consider Category A as marked). Considered TRANSGENERATIONAL.

Name: *Participant I*

DOB: 1996

Date and Time: 11/18/2021, 11:46AM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?		X			
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?			X		
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?					X
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?	X				
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?					X
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?	X				
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?				X	
9.	Loss of <i>interest</i> in things you used to enjoy?	X				
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?	X				
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?			X		
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?	X				
13.	Trouble <i>falling</i> or <i>staying</i> asleep?					X
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?	X				
15.	Having <i>difficulty concentrating</i> ?					X

16.	Being “ <i>super alert</i> ” or watchful or on guard?					X
17.	Feeling <i>jumpy</i> or easily startled?			X		

Open ended questions:**For Children:**

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they?
Everything was in detail
 - b. How old were you when they shared?
21 years old
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
Oya
4. Is there anything you would like to share with me?
Let me tell you about the consequence of the children- our parents had no hope of life, everything they wanted to do or work was very complicated. It had led to the children to not go to school because their parents did not have the idea of sending their children to school. There are some children who have trauma but because of our history. Even to not have family relatives (My mom does not have any left).

Comments:

Her father is deceased

Mother is clearly traumatized, shouting angry outbursts, headaches, and isolation. She does not like the people who has made her mother hurt so much.

Criteria A: Yes, but late. No additional points added.

Criteria B: 16

Criteria C: 16

Criteria D: 19

Frequency score: 51

2 years Post Genocide

Older introduction into mother’s trauma. Considered TRANSGENERATIONAL.

Name: *Participant J*

DOB: 1994

Date and Time: 11/18/2021, 12:12PM

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					X
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					X
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?					X
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					X
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?					X
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?	X				
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?				X	
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?					X
9.	Loss of <i>interest</i> in things you used to enjoy?	X				
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?				X	
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?				X	
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?					X
13.	Trouble <i>falling</i> or <i>staying</i> asleep?			X		
14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?					X
15.	Having <i>difficulty concentrating</i> ?	X				

16.	Being “ <i>super alert</i> ” or watchful or on guard?					X
17.	Feeling <i>jumpy</i> or easily startled?				X	

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
Yego
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi? *Yego*
 - a. If (yes), how detailed were they?
In detail—I had so many questions as a young boy because he wondered where his family was
 - b. How old were you when they shared?
7 years old
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
He is comfortable but can only converse with survivors or people who are not perpetrators
4. Is there anything you would like to share with me?
oya

Comments:

His father has major trauma. His father abandoned the family and went back to his village and did not even remarry because he isolates himself and has turned to drugs, alcohol and even joined the army before retiring.

Criteria A: Yes, young entrance and in detail.

Criteria B: 25

Criteria C: 24

Criteria D: 18

Frequency score: 67

0 years Post Genocide

Detailed introduction at a young age to 1994 Genocide against Tutsi. Abandonment by father who is clearly struggling with trauma. Considered TRANSGENERATIONAL and SHARED TRAUMA.

Appendix B - Blank Interview sheet

Name:

DOB:

Date and Time:

No.	Response (English)	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> or <i>images</i> of a stressful experience from the past?					
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					
3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience were happening again (as if you were reliving it)?					
4.	Feeling very <i>upset</i> when something reminded you of a stressful experience from the past?					
5.	Having <i>physical reactions</i> (e.g., heart pounding, sweating, trouble breathing) when something reminded you of a stressful experience from the past?					
6.	Avoid <i>thinking</i> or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?					
7.	Avoid <i>activities</i> or <i>situations</i> because they remind you of a stressful experience from the past?					
8.	Trouble <i>remembering</i> important parts of a stressful experience from the past?					
9.	Loss of <i>interest</i> in things you used to enjoy?					
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?					
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings towards those close to you?					
12.	Feeling as if your <i>future</i> will be <i>cut short</i> ?					
13.	Trouble <i>falling</i> or <i>staying</i> asleep?					

14.	Feeling <i>irritable</i> or having <i>angry</i> outbursts?					
15.	Having <i>difficulty concentrating</i> ?					
16.	Being “ <i>super alert</i> ” or watchful or on guard?					
17.	Feeling <i>jumpy</i> or easily startled?					

Open ended questions:

For Children:

1. Do you feel as though you are a victim of the 1994 genocide against Tutsi?
2. Did your parents ever share stories about their experiences during the 1994 Genocide against Tutsi?
 - a. If (yes), how detailed were they?
 - b. How old were you when they shared?
3. Do you feel uncomfortable talking about the 1994 Genocide against Tutsi?
4. Is there anything you would like to share with me?

Criteria A:

Criteria B:

Criteria C:

Criteria D:

Frequency score:

Years born after genocide:

Explanation for grouping: