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Impact of Violent Rapes Among Women in Eastern Democratic Republic of Congo

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Abstract

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by

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MPH, Tulane University, 2005

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Dissertation Submitted in Partial Fulfillment

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Abstract

For the last 22 years, systematic rapes and punitive violence against women in the Democratic Republic of Congo (DRC) were utilized as weapons of war and a control strategy. This quantitative study built upon the ecological model of impact of sexual assault on women's mental health to investigate the relationship between the health impacts and chronic pain and depression among women survivors of sexual rape in eastern DRC. The sample included 156 female rape survivors, between 18–80 years old, and raped between 2010 and 2014 while residing in the conflict area. The research questions focused on the association between fistulas, other sexual rape-related injuries, post-traumatic stress disorder (PTSD), feelings of worthlessness, social rejection, support from family/friends, and chronic pain and depression among women victims of sexual rape in eastern DRC. Results from multinomial logistic regression and ordinal regression tests showed strong links between independent and dependent variables: Fistula was strongly linked with chronic illness over 6 months ($p = 0.003$), and with upset all the time ($p = 0.033$); PTSD was associated with chronic illness due to violent rapes ($p = 0.004$) and sadness ($p = 0.000$); feelings of worthlessness was related to prolonged illness over 6 months ($p = 0.024$) and feeling blue ($p = 0.006$); social rejection was linked to avoidance ($p = 0.003$); and support from family/friends was associated with prolonged illness over 6 months ($p = 0.025$) and lack of excitement ($p = 0.011$). The results of this study could assist health care providers in formulating response strategies for identifying public health priorities in conflict area, addressing health needs, and defining approaches for reducing war-related sexual violence, chronic pain, and depression among rape survivors.

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Dedication

Praise, honor, and glory to the Lord God, my Maker, He Who made this plan for me and allowed it to be a dream in me and kept me alive to achieve it. He has blessed me with many blessings, breathed in me the spirit of life, lifted me up from the dust, protected me against flying arrows, strengthened me in my brokenness, and loved me in my worthlessness. At His will, He filled me with the gifts of knowledge, wisdom, and understanding. For He has done so many great things and has made them all possible for me, Holy is His Name. To Him all the praises and glory forever.

This work is dedicated to my lovely and dearest spouse, Sylvie S. Mirindi, whose patience and continued support have made this journey bearable, and to my lovely children, Gracia Ali'Eka, Aldrich Nabugobe, Alina Binty, and Joseph-Gabriel Busane, who have been my greatest inspiration for this accomplishment. Without your continued support, my effort could have been fruitless.

This work is in honor of my dearest parents, Maurice Mirindi and Leocadie Mujijima, who taught me the way of life, emptied themselves so that I could live, and helped me to understand that it is never enough to do good if you have a chance to do better or best. To my brothers and sister who have been the greatest source of encouragement, and particularly to my brother-in-law, Steven (Etienne) Bundi Mushegerha, who, since my younger age lifted and believed in my abilities.

To the honor of all the 13 million people who have died as a result of violence in DR Congo, and to the victims of violent sexual rape, you will never be forgotten.

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Chapter 1: Introduction to the Study

Introduction

The war and violent conflict have remained the leading cause of political, social, and economic instability in the Democratic Republic of Congo (DRC) during the last two decades (Arieff, 2014). The DRC war involved over a dozen armed factions and armies from several foreign countries, all of whom are said to have carried out acts of violence, including mass killing of civilians, sexually raping, enslaving, torturing, and genitally mutilating women and girls (Autesserre, 2010; Coulson, 2011). In the past 20 years, the impacts of war and violence against women in DRC have become an important area of scholarly investigation.

In recent studies, Brown (2013), Gettleman, (2011), Popiden (2013), Coleman (2014), and Kasangye, Avevor, Yu & Xiao (2014) discussed the cycle of violence that took place in DRC. The authors showed that targeted violence severely impacted the demographic, economic, social well-being, and health of the Congolese population. In other studies, Coulson (2011), Duroch, McRae, & Grais (2011), and Peterman, Palermo, & Brendenkamp (2011) indicated that the complex features of the DRC war and the atrocities that resulted from it might have contributed to the degradation of health and economic status. The authors in those studies also suggested that widespread killing, the rapes of women and girls, and overwhelming deaths in families might have affected the physical, mental, and social health status of the population (Coulson, 2011; Duroch et al., 2011; Peterman et at., 2011).

Approximately, over 5.6 million lives were lost in the Congo war between 1996 and 2011, and more than 1.8 million women were violently and sexually abused in the eastern provinces of North Kivu and South Kivu alone during that period (Kasangye et al., 2014; Peterman et al., 2011). It is also maintained that of all the DRC populations, peoples in South Kivu and North Kivu suffered the most severe consequences of the war (Kasangye et al., 2014). The authors also emphasized the heavy burdens of harsh violence experienced by the victim populations, including massive killing, brutal sexual rapes of women, looting of possessions, and destruction of livelihood. In their study, Kaboru, Andersson, Borneskog, Adolfsson, & Namegabe (2014) also suggested that the Congo war was known as a forgotten holocaust that took the lives of an estimated 8 million people since the beginning of the conflict in 1996.

Bosmans (2011), Mossi and Duarte (2006), Mechanic (2004), and Patel and Kleinman (2003) maintained that mass violence and sexual rape in DRC severely affected aid efforts for victims, endangering the life of the women and children. In other studies, Duroch et al. (2011) and Bartels, Scott, Leaning, Mukwege, Lipton & VanRooyen (2010) showed that the violent sexual rape of women imposed undue economic burdens on survivors and the population as a whole. Akinsulure-Smith (2014) suggested that women and girls particularly experienced brutal acts of violence, including sexual captivity, forced rapes, forced labor, torture, and genital mutilation as deliberate punishment, which resulted in severe physical, psychological, and social health effects among the survivors.

Violent sexual rape during the Congo war was a reflection of widespread violations of human rights (Fergus, 2012; Johnson, Scott, Rughita, Kisielewski, Asha, J., Ong & Lawry, 2010; Mossi & Duarte, 2006; Notar, 2006). Cassimon, Engelen & Reyntjens (2013), Baaz and Stern (2009), and Bedont and Martinez (1999) suggested that sexual violence against women and the desire to inflict shame, pain, and intimidation were deliberate heinous acts of which the perpetrators have escaped prosecution or potential punishment. Atrocities were carried out as means of control and dominion over the eastern region, its peoples, and their natural resources (Bartels, Kelly, Scott, Leaning, Mukwege, Joyce, & VanRooyen, 2013; Cohen & Nordas, 2014; Lincoln, 2013; Meager, 2010; Mukwege & Nangini, 2009; Patt & Werchick, 2006). Several authors indicated that violent sexual rape was commonly used in DRC as a weapon of war or a control mechanism (Carlsen, 2009; Clifford, 2008; Jones, 2013; Pratt & Wechick, 2004). Bartels et al., (2010), Leibling & Slegh (2011), Mukwege and Nangini (2009), and Schalinski, Elbert & Schauer (2011) agreed that the widespread violent sexual rapes of women may have been the cause of traceable patterns of increased sexually-transmitted diseases (STDs) and HIV/AIDS infections in eastern DRC. The gap in the literature is that presently there has been no quantitative relationship established between these war-induced traumas and chronic pain and depression among women victims of violent sexual rape in eastern DRC.

In this study, I tested the associations between the consequences of sexual violence on the physical health effects (including fistulas and other sexual rape-related injuries) and the chronic pain and depression experience of women victims in eastern

DRC. In addition, the associations between the mental health effects (Post Traumatic Stress Disorder (PTSD) and feelings of worthlessness) and the chronic pain and depression experience were tested. Results of these tests could fill the gaps in the literature on this association feelings of worthlessness among victims in eastern DRC. Further, the associations between social health effects (including social rejection and support from family/friends) and the chronic pain and depression experience were tested. Results of these tests could extend knowledge on relationships between the chronic pain and depression experience and the experience of social health effects of violent sexual rape.

This study was needed because the correlations between the chronic pain and depression experience and the selected independent variables (i.e., physical health effects, mental health effects, and social health effects status) could provide public health professionals, humanitarians, and health care providers with new insights on how to identify urgent health needs among victims. The results of this study could also provide new acumens for protecting and improving the health of women and children as well as preventing or reducing violent sexual rape in conflict-affected areas. Further, the findings of this study could also provide helpful information that may assist affected populations in their healing and recovery process. In eastern DRC in particular, the results of this study could provide information on how to improve the life and health of violent sexual rape victims.

A considerable body of extant literature has described wide-ranging human rights violations including mass killing, the looting of natural resources and properties, and

widespread sexual violence as direct consequences of the last 22 years-long civil war in DRC. However, the depth of physical, mental, and social health effects and their associations with chronic pain and depression among the victims in Eastern DRC has not been studied. In this study, I used the ecological model of impact of sexual assault on women's mental health (EMISAWMH; Campbell, Dworkin, & Cabral, 2009) to analyze variables, including the physical health effects, psychological health effects, and social health effects. Knowledge of the relationship between these variables and the chronic pain and depression experience among the target population could inform healthcare services providers and health educators on formulating better strategies for providing, protecting, and improving the physical, psychological, and social health of victims during armed conflict.

For positive social change, knowledge resulting from this study could assist afflicted populations and violent sexual rape victims in seeking and receiving quicker assistance for their urgent health needs during armed conflicts, including protection, health care, and recovery. Results from this investigation could assist health care professionals in formulating armed conflict- and area-related strategies and guidelines for identifying the health needs of violent rape victims and proving appropriate and timely intervention. In this chapter, I will discuss the background, problem statement, and purpose of the study. In addition, I will present the research questions and hypotheses, conceptual framework, nature of the study, definitions, assumptions, scope and delimitations, significance, and a summary.

Background

In 1996, a violent conflict erupted in the Eastern DRC region of South Kivu (Coleman, 2014). This deadly war was fueled by external conflicts and instability, including the ethnic conflicts and civil war with targeted assassinations in Burundi in 1993 and the 1994 ethnic genocide in Rwanda (Nzongola-Ntalaja, 2002; Uvin, 2010). Led by foreign troops from Rwanda, Burundi, Uganda, and armed rebel factions, this armed conflict quickly spread throughout DRC and plunged the eastern part of the country into unruly brutality and human rights violations (Coleman, 2014; Gettleman, 2013). The conflict spread even more quickly when Rwanda, Uganda, and Burundi launched an offensive against Hutu populations in Eastern DRC, including the perpetrators of the Rwandan genocide and the Ugandan and Burundian rebels who had established their operation bases in North Kivu and South Kivu provinces DRC (Boshof, Very, et al. 2010; Nzongola-Ntalaja, 2002). The intensified Burundi-Rwanda-Uganda coalition offensive operated in Eastern DRC without political or military resistance (Patt & Wechick, 2004). One of the main factors that may have contributed to the prolonged conflict in DRC included the involvement of 14 foreign national armies and the emergence of seven armed rebel groups (Autesserre, 2010; Coleman, 2014; Gettleman, 2013).

Response to the massive killings of civilians by fighting factions in the eastern region of the country, including Katanga, Kisangani, Maniema, North Kivu, and South Kivu provinces, prompted negotiations and the signature of a fragile ceasefire in 1999 (Duroch et al., 2011). When President Kabila was killed in January 2001, the presidential

powers were immediately passed to his son, Joseph Kabila Kabange, as the new DRC President (CITE). The new president eventually negotiated and reached a new peace agreement in South Africa in 2002 (Duroch et al., 2011). Unfortunately, despite the peace deal, the occupation of natural resources-rich regions was intensified. In addition, massive property looting, mass killings, and widespread violent sexual rape and human rights violations continued (Coulson, 2011; Duroch et al., 2011).

The conflict in DRC has largely affected the populations, especially women, girls, and children in the eastern regions of Katanga, Maniema, North Kivu, Oriental, and South Kivu (Roka, Van den Bergh, De Plecker, Zachariah, Manzi, Lambert, Abi-Aad, Nanan-N'Zeth, Nzuya, Omba, Shako, MuishaBaroki, Banimuoneye, Moke, Lampaert, Masangu, & Weggheleire, 2014). DRC is the second largest nation of the African continent and 11th largest nation on the planet (CIA World Book, 2015). Located at the center of Africa and the Great Lakes region, DRC is administratively restructured into 25 provinces with the neutral Capital City of Kinshasa, following the 2015 structuring proposal (Trefon, 2010). Figure 1 shows the administrative map of the DR Congo before and after 2006.

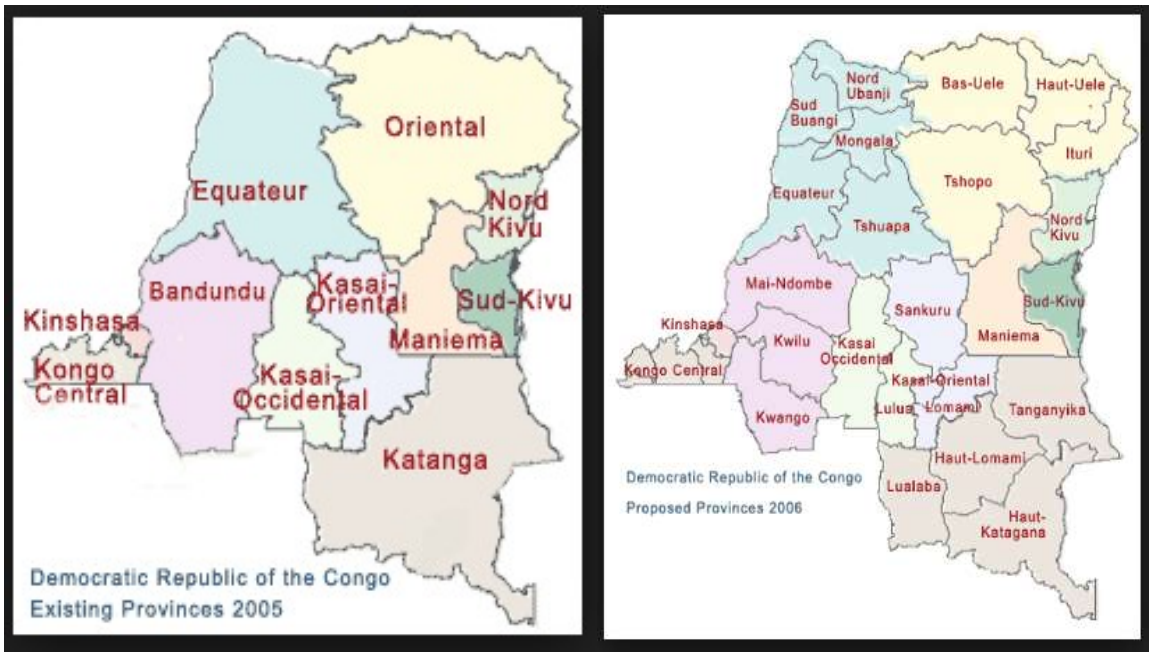

Figure 1. Administrative map of the DR Congo: Provinces before and after 2006 LiteSpeed Web Server (2006).

The country is abundantly rich in natural resources, including minerals, water, forests, and agricultural potential (Arieff, 2014). The country plays an important economic role in Central Africa with its vast rich natural resources and the export in high global supply of numerous precious materials at an increased commodity prices that topped 5% in recent years (Arieff, 2014).

Historically, the peoples of the Congo have suffered the most brutal kind of colonial rule. In a work on African colonial experience, Khapoya (1998) gave an account of how the Congolese peoples experienced atrocities, exploitation, forced labor, slavery, and extermination under King Leopold II who owned and ruled Congo as a private property. The author also stated that in 1908, Congo Free State was handed to Belgium as a Belgian colony as King Leopold II transferred the rule to the Belgian government,

which in turn, created an administrative and judicial form of regime to avoid forced intervention from other international powers. In 1960, the country gained independence from Belgian, but the independent state lacked appropriate leadership (CITE). The political and social instability that followed gave rise to the dictatorship of Mobutu Sese Seko (Khapoya, 1998). From 1965, Mobutu ruled the country without much improvement in living conditions for the Congolese citizens until he was deposed in 1997 by Desire Kabila, leader of the 1996 rebellion which impacted the country for the next 20 years (Roka et al., 2014).

From the 1960s through the 1980s, racial, political, and ethnic ideologies in the countries of Burundi and Rwanda became the justification for regimes to function in survival mode as they faced the growing challenges of socio-economic and socio-political crises and a culture of social divisions (Nzongola-Ntalaja, 2002; Uvin, 2010). The ethnic conflict culminated in both countries with the 1993 assassination of the Burundian democratically-elected president, Melchior Ndadaye, and many of his ministers (Boshof et al., 2010). Ndandaye's death was also followed by the 1994 assassinations of his replacement, President Cyprien Ntaryamira, and the Rwandan President, Juvenal Habyarimana, as their shared fight was landing at the Kigali International Airport (Boshof et al., 2010). These assassinations paved the way for the 1994 Rwandan genocide against ethnic Tutsi and a mass movement of Hutu refugee populations from both Rwanda and Burundi into the neighboring DRC (Boshof et al., 2010; Nzongola-Ntalaja, 2002; Roka et al., 2014; Timpson, Ndura, & Bangayimba, 2015; Uvin, 2010).

The absence of any form of resistance gave easy access to the exploitation of the nation's natural resources. This changed the entire purpose of the war from pursuing the Hutu population to removing President Mobutu and his government from power (Nzongola-Ntalaja, 2002). The coalition of foreign invaders quickly identified and promoted Laurant Desire Kabila, the old political rival of Mobutu, to lead the war towards the new objective (Boshof et al., 2010). The Human Right Watch Report (1997) reported the widespread killing of several thousands of refugees and unarmed men, women, and children and horrifying violence against civilians committed by both the foreign troops and Congolese armed forces during the war from the first day of attack in Eastern DRC in 1996. As shown in Figure 2, in 1997, Kinshasa, the capital of DRC was captured, and Mobutu's autocratic power came to an end (Boshof et al., 2010; Nzongola-Ntalaja, 2002). Mobutu's departure from power and the succession by the rebel leader, Laurent Desire Kabila, marked the end of the first civil war in DRC (Duroch et al., 2011).

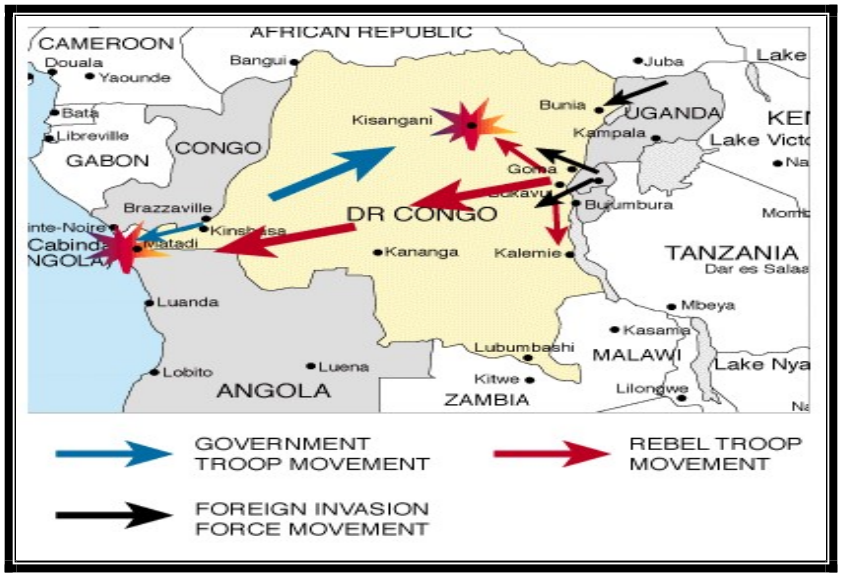

Figure 2. Map of 1st Congo Invasion/War 1996–1997 (Merket Enterprise, 1998).

In 1998, however, the relations between President Kabila of DRC and elements of his coalition deteriorated over their diverging interests and end game strategies (Nzongola-Ntalaja, 2002). A new war was started when Kabila broke from his Rwandan and Ugandan allies and sought to drive them from the country (Boshof et al., 2010). President Kabila's decision provoked Rwanda and Uganda to strengthen their troops aiming for the removal of Kabila from power (Boshof et al. 2010; Nzongola-Ntalaja, 2002). Kabila however received strong backing from the new ally countries of Angola, Chad, Namibia, and Zimbabwe who came to protect him and his regime from collapsing (Nzongola-Ntalaja, 2002). By the end of 1998, eight countries' armies and more than a dozen armed factions were actively involved in fighting in DRC (Boshof et al., 2010; Nzongola-Ntalaja, 2002), as shown in Figure 3.

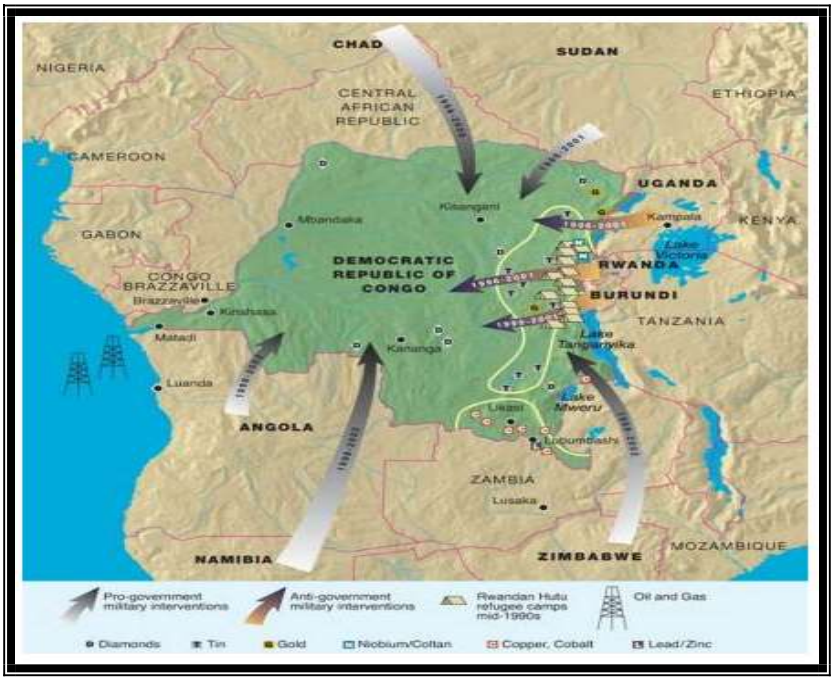

Figure 3. Map of Regional Actors in Second DRC War - 1998 and beyond – government and foreign occupation by Branca (1998).

Also implicated in the fighting were sponsors from international corporations and foreign governments who fueled the war with money and weapons in exchange for easy access to the country's natural resources (Boshof et al., 2010; Nzongola-Ntalaja, 2002). A combination of the country's mineral-rich reserves, poor governance since the colonial rule to the present, and the greed of foreign states and organizations have resulted in the perpetuation of the violence and conflict (Coleman et al., 2014; Popiden, 2013). Given the complexity of the DRC war between 1996 and 2011 and the magnitude of violence, the human right abuses resulted in over 5.6 million deaths and the sexual abuse of over 1.8 million women victims, with many of the victims left with severe physical, mental, and social effects (Coleman, 2014; Kelly, VanRooyen, Kabanga, Maclin, & Mullin, 2011). In a number of studies, the nature of atrocities against women during the DRC war have caused the country to be referred to as the Rape Capital of the world (Arieff, 2014; Brown, 2012; Coleman, 2014: Kasangye et al., 2014).

Problem Statement

Wartime sexual rape is a major problem in the DRC. Researchers have published reports on the use of violent sexual rape and other violations of basic human rights against civilians during armed conflicts in DRC (Bartels et al., 2013; Bartels et al., 2010; Cohen, 2013; Coulson, 2011; Peterman et al., 2011; Schalinski et al., 2011;). Data from these studies indicated that the rate of sexual violence against women was particularly high in Eastern DRC provinces of South Kivu and North Kivu. For instance, Mukwege and Nangini (2009) and Schalinski et al., (2011) showed that 96.2% of women reported experiencing sexual violence, of which 73.6% experienced physical assault and over 60%

survived sexual captivity. Other research discussed the issues of human right abuses, women's and children's vulnerability, the absence of social norms, and the ongoing deterioration of health and living conditions of ordinary citizens as a result of a dysfunctional and corrupt government system (Arieff, 2014; Coulson, 2011; Daley, 2013; Kelly et al., 2010; Lazaro, 2012; Patt & Wechick, 2004). Recent studies also demonstrated that the brutal nature and level of violence against women in Eastern DRC were selected weapons deliberately used as a strategy of war that aimed at shaming the Congolese women in order to terrorize, intimidate, and control the men and the entire population (Cohen, 2013; Steiner, Benner, Sondorp, Schmitz, Mesmer & Rosenberger, 2009). Researchers also agreed that women survivors of violent sexual rape experienced a number of health consequences, including physical health, mental health, and social health effects (Bartels et al., 2010; Dollan, 2010; Gilliars, 2011; Hall et al., 2014; Kohli, Tosha, Ramazani, Zahiga, Mbika, Safari, & Glass, 2012; Manjoo, 2010; Meger, 2012; Trenholm, Olsson, & Ahlberg et al., 2011).

There is a gap in the literature because most studies covering the war and sexual violence in DRC only identified the sexual violence, massive killing, foreign occupation, looting of resources, poor health condition of the victims, and deterioration of family and social fabric because of the war. Only a few researchers discussed the physical health and psychological implications of violent sexual rape in DRC. I found no existing study that addressed the relationship between the effects of war-related violence and chronic pain and depression among the women survivors of sexual rapes. The current body of literature does not provide documentation on any demonstrated relationship between

physical health effects, mental health effects, or social health effects and the chronic pain and depression experience among the women survivors of violent rape in Eastern DRC.

Purpose of the Study

This research was primarily aimed at assisting armed conflict emergency responders (including public health and health policy professionals, health care providers, governmental and nongovernmental organizations, and peacekeeping and humanitarian missions) with strategies for identifying public health priorities during violent armed conflicts. The goal was to help to better identify strategies for the prevention or minimization of the occurrence of widespread brutal sexual rapes and determine service areas that may improve the physical, mental, and social health quality and recovery of vulnerable populations. In this quantitative study, I investigated the relationship between physical health effect variables (including fistula and other sexual rape-related injuries), mental health effect variables (including PTSD and feelings of worthlessness), and social health effect variables (including social rejection and support from family/friends) and the chronic pain and depression experience among the victims of violent sexual rape in Eastern DRC.

Research Question and Hypotheses

In this quantitative study, I determined the relationships between the variables feelings of worthlessness and the chronic pain and depression experience among violent sexual rape victims in Eastern DRC by using the Demographic Health Survey's (DHS) and U.S. Agency for International Development's (USAID) DHS7-Module-Fistula Questionnaire; the Measuring Conflict Exposure in Micro-Level Surveys (LSMS),

developed by Bruck et al. (2013); the Medical Outcome Study (MOS) Social Support Survey (SSS) developed by the Rand Corporation (Sherbourne & Stewards, 1991); and the Positive Affect and Negative Affect Scale – Extended (PANAS-X), developed by Watson, Clark, and Tellegen (1988). I developed the following research questions and hypotheses to guide this study:

RQ1: Is there an association between physical health effects (including fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X?

$H_0$1: There is no association between physical health effects (including fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

$H_1$1: There is an association between physical health effects (including fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

RQ2: Is there an association between physical health effects (including other violent rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X?

$H_0$2: There is no association between physical health effects (including other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

$H_1$2: There is an association between physical health effects (including other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

RQ3: Is there an association between mental health effect (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X?

$H_0$3: There is no association between mental health effect (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

$H_1$3: There is an association between mental health effect (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

RQ4: Is there an association between mental health effects (including feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X?

$H_0$4: There is no association between mental health effect (including feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

$H_1$4: There is an association between mental health effect (including feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X.

RQ5: Is there an association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X?

$H_0$5: There is no association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-

Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X.

$H_1$5: There is an association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X.

RQ6: Is there an association between social health effects (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X?

$H_0$6: There is no association between social health effect (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X.

$H_1$6: There is an association between social health effect (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS SSS, and the PANAS-X.

Theoretical Framework

I used the EMISAWMH developed by Campbell et al. (2009) as the theoretical model that guided this inquiry. The EMISAWMH describes the impacts of violent sexual rapes and defines the mental health issues in the community, and the relationship of the victims with the community and environment that surround them (Campbell et al., 2009; Kelly, 1996). The EMISAWMH advances the ideas of many previous theories: It builds on Kelly's (1996) theory of ecological community psychology, which emphasized that the approach to address community mental health must not only focus on understanding peoples' attitudes and behaviors in their community but must also seek to understand the relationships between them. It also builds on Bronfenbrenner's (1977) ecological model of developmental psychology, which explained the sexual violence and mental health because of victims' relationship with their social environment. Further, the EMISAWMH builds on the ecological model of rape and recovery by Koss and Harvey (1996), which emphasized that in a community of people, individuals are differently affected by distressing events, respond differently to events, have different chances of accessing care, and recovery may never be guaranteed. Lastly, the EMISAWMH extends Neville and Heppner's (1999) culturally inclusive ecological model of sexual assault and recovery (CIEMSAR), which listed the victims' high levels of anxiety and fear, depression, and PTSD as the three primary psychological consequences of sexual rape.

Campbell et al.'s (2009) EMISAWMH blended all these theories together by using the multiple factors approach to address the health impacts of sexual rape among victims at different levels of influence, including the individual, assault, microsystem,

mesosystem or exosystem, macrosystem, and chronosystem levels. The benefit of the EMISAWMH is that it helped me identify the importance of factors at multiple levels of analysis. The physical health effects variables (including fistulas and other sexual rape-related injuries) were connected with the individual level of influence because at this level the EMISAWMH addressed each victim's factors and coping responses. Analyzing the physical health effects variables at this level tied the theory to Research Question 1.

The assault level of influence addressed the sexual violence characteristics (including physical, psychological, and social health injuries), and this level of influence connected with the physical health effects variables (including fistulas and other sexual rape-related injuries) of this study. The assault level also connected with the psychological health effects variables (including PTSD and feelings of worthlessness) and the social health effects variables (including social rejection and support from family/friends) in this study. The connection with the above three sets of variables aligned with Research Questions 3, 4, and 5. The microsystem level of analysis connected to the social health variable (including support from friends/family), which aligned with Research Question 4 in this study. The mesosystem or exosystem level of analysis connected to the psychological variables (including PTSD) and to the social health variables (including support from family/friends), which were tied to Research Questions 3 and 4.

The macrosystem level of analysis connected with social health factors because this level of influence helped in clarifying the cultural beliefs and attitudes towards rape that might influence the cultural acceptance and support or rejection of violent sexual

rape victims in the community. The macrosystem level of influence tied the study theory to Research Questions 1 and 4. I used the chronosystem level to analyze individual developmental changes over time and past life history as an impact of the sexual violence event (see Bronfenbrenner, 1994; Campbell et al., 2009). This level of influence connected the physical health factors (including other sexual rape-related injuries) and social physical health factors (including PTSD) to the location of the victim (rural/urban) at the time of rape and was associated with Research Questions 1 and 4. My application of the EMISAWMH theory was appropriate for this study because it facilitated in identifying the approach to addressing and understanding the impacts of violent sexual assaults on victims' mental, physical, and social health well-being.

Nature of the Study

In this study, I used a quantitative method to investigate the consequences of violent sexual rape and its relationship between chronic pain and depression. Survey questionnaires were used to collect data on defined independent variables, which were comprised of physical health effects, mental health effects, and social health effects. I also survey questionnaires to collect data on dependent variables, including the chronic pain and depression experience among women who survived violent rapes in Eastern DRC.

I recruited participants among the women who survived violent sexual rape in the eastern DRC province of South Kivu. The recruitment was conducted in two of the most affected towns of eastern DRC. The recruitment of participants was facilitated by a local nonprofit organization dedicated to empowering women and educate children in the DR

Congo. I administered the questionnaires to assess the relationship between independent variables (i.e., the physical, psychological, and social health effects) and the chronic pain and depression experience.

Multiple data collection instruments were used in this study. I used the LSMS, developed by Bruck et al. (2013), to gather participants' demographic background information and their injury and health history. The DHS7-Module-Fistula Questionnaire, developed by DHS and USAID (2016), was used to assess participants' history of fistula and their chronic pain experience. I also used the MOS - Social Support Survey developed, by Sherbourne and Stewards (1991) at the Rand Corporation to evaluate the level of social support, including that received from family and friends as well as the PANAS-X, developed by Watson et al. (1988), to evaluate their PTSD and depression symptoms. I assessed the relationships between the independent variables and chronic pain and depression among participants using regression analysis. Because multiple independent variables (including those describing or identifying physical health, mental health, and social health effects) were also used to predict the relationships with the dependent variables (including those describing or identifying chronic pain and depression), multinomial logistic regression analyses and ordinal regression analyses were performed to assess these associations.

Definition of Terms

Chronic pain: The past and current experience of an emotional or unpleasant feeling and the persisting pattern of physical pain associated with potential tissue damage in the body or with potential mental illness (Clark, 2011; Huijer, 2010). The PANAS-X

scale (Watson et al., 1994) was used to assess the past and current chronic pain experience.

Depression: Symptoms are determined by the presence of serious disorder of the brain involving an individual's body, mind, and mood, and affect the person's normal mental, behavioral, and physical well-being and functions of the body (American Psychiatric Association (APA), 2013; Greenberg, Fourner, Sisitsky, Pike, & Kessler, 2015). Past depression characteristics, including feelings of guilt, loss of pleasure, pessimism, sadness, self-dislike, and suicidal thoughts were assessed using the PANAS-X scale (Watson et al., 1994).

Mental health effect variables: Mental health conditions experienced by violent sexual rape victims included PTSD, shame, helplessness, feelings of worthlessness, anxiety, and suicidal thoughts (Kalisya, Justin, Kimona, Nyavandu, Eugenie, Jonathan…& Hawkes, 2011). Of these mental health variables, PTSD and feelings of worthlessness were addressed in this study. PTSD is defined as an anxiety disorder (Javidi & Yadollahie, 2011) or a psychiatric condition that is experienced by individuals' post violent, life-threatening events (Shiromani, Keane, & LeDoux, 2014). Feelings of worthlessness included the feelings of uselessness, without motivation for living (Dossa. Hatem, Zunzunegui, & Fraser, 2014; Broekaert, Derluyn, Schryver, & Verelst, 2014). I assessed feelings of worthlessness using the MOS-Social Support Survey and PANAS-X scale.

Physical health effect variables: Physical health conditions experienced by violent sexual rape victims included fistula and other sexual rape-related injuries

(Kasangye et al., 2014). Fistula are defined as permanent abnormal passageway or connection formed between two organs or between one organ and a blood vessel in a body or skin, and which may be an anal or vaginal fistula (Asadi, 2014; Douma & Hilhorst, 2012; Maedl, 2011; Morrison & Gasper, 2012). The fistula experience was assessed using LSMS Section D, Questions D1, D2, and D8 and DHS7-Module-Fistula Questionnaire. Other injuries resulting from violent sexual rape (see Asadi, 2014; Douma & Hilhorst, 2012; Maedl, 2011) were assessed using the LSMS Section D, Questions D1, D2, and D8 and the DHS7-Module-Fistula Questionnaire.

Social health effect variables: Social characteristics that affect social life included rejection and support from family/friends (Kasangye et al., 2014). Social rejection was defined as the abandonment or rejection by society or family (Autesserre, 2012; Bass, Annan, McIvor Murray, Kaysen, Griffiths, Cetinoglu, & Bolton, 2013; Kelly 2012). The variable of support from family/friends was defined as psychosocial and psychological support interventions of violent rape victims (Bass et al., 2013; Christian et al., 2011; Kelly et al., 2011). Both social rejection and support from family/friends were assessed using the MOS-Social Support Survey.

Violent sexual rape: Forcible rape in which weapons, including guns and sharp and broken objects, were used to deliberately inflict physical damage to the body and the mental state of the victims (Bartels et al., 2010; Farr, 2009).

Assumptions

The central assumption in this study was that in armed conflict, women of all ages are the potential target for violent sexual rape, with some being more physically,

psychologically, and socially affected than others (Cohen et al., 2013; Kelly et al., 2011; Trenholm et al., 2011). This assumption was critical for this study because all the targeted participants were women survivors of violent sexual rape. Regardless of their socio-demographic status and political environment, women victims of violent sexual abuse experienced physical, psychological, and social health effects. In this study, I assessed the links between these independent variables and their chronic pain and depression experience. Another assumption I made was that victims' participation in this study would not bias the study results and that the level of their experience of suffering was their motivating factor. I also assumed that all study participants would truthfully participate in the completion of the study questionnaires to the best of their knowledge. All survey instruments that were used in data collection were appropriate for measuring the selected variables.

Scope and Delimitations

I recruited the study participants from two villages in eastern DRC. The selection criteria of the target population included 18–80 years old females, who survived violent sexual rape in eastern DRC between 2010 and 2014. I selected the study period between 2010 and 2014 because the targeted victims could still be easily traced and identified. Those who were victims of violent sexual rape prior to 2010 were excluded because of the possibility that many of them might have died due to harsh life circumstances or moved from the area to survive. Those who were victims of sexual rape after 2014 were also excluded because they could still be under treatment or could still be experiencing

continuous emotional and psychological memories and traumas as result of the violence and sexual assault experience (Hall et al., 2014; Kohli et al., 2012; Peterman et al., 2011).

In this study, I limited the investigation to understanding the associations between physical health effect and chronic pain and depression, between mental health effect and chronic pain and depression, and social health effects and chronic pain and depression among the females who survived violent rapes in eastern DRC. The reasons for selecting this population was the fact that 1996, women of eastern DRC had an increased the risk of being raped or the risk of being exposed to traumatic events including being victims of extreme violence, watching tortures, killings, or the sexual mutilation of another person or a relative (Kohli et al., 2012; Lawry et al., 2011; Mukwege & Nangini, 2009; Steiner et al., 2009). Such exposure highly increased the risk of experiencing physical, psychological, and social suffering (Casey, Gallagher, Makanda, Meyers, Vinas & Austin, 2011; Hall et al., 2014; Shalinski et al., 2011). I selected the chronic pain and depression variables because there is no prior study that has investigated this issue among the study population. The data collection instruments for this study were translated and printed in English and French, both being official languages in the country. A trusted local non-governmental organization verified the translations of the instruments. All communications with study participants were conducted in the French language and for the participants with French language limitations, I provided the interpretation/translation in Swahili language. There was no marital status or tribal restrictions in the study.

Other theories that I considered but did not use in this inquiry included the theory of reasoned action (TRA) and the theory of planned behavior (TPB) by Montano and

Kasprzyk respectively (Gnalz, Rimer, & Viswanath, 2008). According to the authors, both the TRA and TPB focus on theoretical concepts that explain specific motivational factors as behavioral determinants. The authors also explained that the TRA and TPB emphasize attitude and social normative perceptions as determinants of behavioral intention. Although these theories focus on critical constructs that motivate behavioral actions, they lack connection with most constructs of violent sexual rape against women. I also considered *The Feminist, Foucault, and Rape: A Theory and Politics of Rape Prevention*, by Henderson (2007) for this study. In this theory, the feminists disputed Foucault's argument that the crime of sexual rape is nothing different from any form of physical violence, and therefore, should only punished as such (Henderson, 2007). In his arguments, Foucault also pleaded for self-reflexivity, demanding feminists to understand the natural reason of sexual violence, but he also emphasized that man's identity as a powerful and violent subject that instills fear while female's position of universal vulnerability makes them predisposed for rape (Henderson, 2007).

To counter Foucault's views, feminists and opponents of sexual rapes have supported their position with a development of consciousness-raising model aimed at giving women the voice they need to speak of their concerns and experiences of rapes as a largely serious problem (Henderson, 2007). In addition, feminists have argued for developing thorough police procedures and practices, expanding the legal definition of rape, and increasing the penalties for rape in effort to prevent rape from occurring in the first place (Henderson, 2007). Other theories that I considered for this study included the structural models of the relations of assault, severity, social support, avoidance coping,

self-blame, and PTSD among sexual assault survivors by Ullman et al. (2007), the theory of sexual offending by Kirsch and Becker (2005), and the social support and recovery from sexual assault by Ullman (1999).

Limitations

The limitations of this study extended to my use of a nonprobability sampling method for convenience because of the specific characteristics of the target population (i.e., women victims of violent sexual rape in Eastern DRC), in a specific event (i.e., war with extreme violence), and during a specific period (i.e., 2010 – 2014). Due to a unique circumstance of unstable political conditions in a conflict-affected or post conflict area of study and the convenient accessibility and proximity to the inquirer, I used nonprobability sampling or convenience sampling for the target population that could be reached. Depending on the selected population or group, the place, and time of study when using convenient sampling, a convenient sampling poses a threat to the external validity of the study because it may reduce the chance for generalizability of findings (Drost, 2011; Trochim, 2006). In other words, conventional sampling can decrease the general applicability of these analyses; however, the conditions in the sampling area suggested such data accumulation methods. Brock et al. (2013) and Polit & Beck (2012) suggested that convenient sampling does not easily allow for the probability specification of the target population, but rather, it might increase the chance for selection bias and might limit the ability for generalizing from the sample to a larger population.

To explain the effect of people, place, and time, I conducted this study in an area impacted by armed conflicts and extreme violence, where the target populations self-

reported their experiences of violent sexual rape between 2010 and 2014. The study outcomes could have been influenced by biases, including recall bias and selection bias. Recall bias may be a challenge when conducting demographic and epidemiologic assessment in post conflict areas because respondents try to recount the events after a certain period has gone by (Bruck et al., 2013; Deaton, 2001). Selection bias may also affect the outcomes of the study in a conflict-affected area where a planned survey may fail to reach the intended target population due to insecurity, sensitivity, and political constraints (Arkona & Kalvas, 2008; Kalvas & Kocher, 2009). Survivors who experienced one or more traumatic events may still be physically, mentally, and socially/emotionally affected and unable to provide a full account, or may willingly or unwillingly omit important information, causing context bias, misleading information, and misstatement of the measures of association (Bruck et al., 2013).

To address these limitations, I assured the validity of the data collection interview process by using a theory of proximal similarity. This is a theory that focused on describing how the selected sample would differ from an ideal sample if it were randomly selected (Polit & Beck, 2012; Trochim, 2006). This issue was also investigated by providing a description of possible effects of the people who might have been overly represented in the sample or those who might be left out during the selection process.

In terms of internal validity, the threats could include the existence of confounding, which comprise variables other than the independent variables of interest for the study (CITE). Confounding variables in this study may have included preexisting chronic pain and depression before the rape event; age, income, and education of the

victim; and other situational variables (see Polit & Beck, 2012). Spiengelman, Rivera-Rodriguez, & Haneuse (2016), who studied the challenges in evaluating public health interventions, suggested that confounding variables often lead to confounding biases, which threaten the internal or external validity of the study. Confounding may occur in the event the association between the selected variables (independent and dependent) is adversely affected by a third variable (Spiengelman et al., 2016). To address this threat to internal validity and eliminate or minimize the systematic effects of confounding variables, I focused the approach of the inquiry on assessing the causal relationships between independent variables and the chronic pain and depression experience of the victims of violent sexual rape. This approach also required the use of a timeline in describing the event to avoid history bias.

Significance of the Study

Serious physical damages and psychological effects have been reported associated with sexual violence (Autesserre, 2012; Baaz & Stern, 2011; Casey et al., 2011; Hall et al., 2014; Kasangye et al., 2014). In this study, I incorporated four validated models to measure the relationship between the physical health, mental health, and social health effect characteristics and chronic pain and depression experience of women victims of violent rapes in the conflict-affected eastern DRC. The findings from this investigation could fill the gaps in the literature on the topic in this location. Assessing the association between chronic pain and the impacts of violent rapes among the victims in eastern DRC could contribute to advancing public health knowledge and understanding the association

between demographic characteristics; the physical, mental, and social health experience; and the chronic pain and depression experience of armed conflict-affected populations.

In terms of positive social change implications, the results of this study could serve as knowledge base for health care providers, researchers, and health educators and could be used to reframe better strategies to promote and protect the physical, psychological, and social health of the populations in armed conflict settings, especially the women, girls, and children who are the most vulnerable to violent sexual rape. As humanitarians and activists, including medical, health policy, and public health officials; aid organizations; peacekeeping missions; and government and nongovernmental organizations continue to seek answer to complex emergencies in armed conflicts, the findings in this study could help in identifying public health priorities and strategies for the reduction of the occurrence of violent sexual rapes in war and postwar settings. Due to the distinct and extreme nature of violent sexual rapes in eastern DRC, the results of this study could provide more helpful information on the impacts of violent sexual rapes in designing new approaches for addressing the physical, mental, and social health effects and the suffering of vulnerable populations in armed conflict zones. If basic health care could be restored, violent sexual rapes prevented, priorities identified, and human catastrophe prevention strategies established, local populations (i.e., individuals, families, and communities) would benefit in terms of improved quality of life, including improved physical, mental, and social health status; stability in families and communities; and socioeconomic status.

Summary

In this chapter, I presented background information and briefly outlined the rationale for studying the health impacts experienced by women survivors of violent sexual rape in eastern DRC. The political instability and civil unrest in the neighboring countries of Burundi and Rwanda in the early 1990s may have greatly contributed to the complexity of the armed conflict in DRC, the widespread sexual violence, and the unprecedented loss of lives (Duroch et al., 2011; Coulson, 2011; Peterman et al., 2011). The problem statement for this study was also provided. Although the associations between sexual violence and mental health are recognized globally (Claude, Lungombe & Ruminjo, 2008; Cohen, 2013; Maedl, 2011), the direct burden of chronic pain and depression associated with health (physical, mental, and social) damages among victims of violent sexual rape in eastern DRC is unknown (Babalola, 2014; Dossa et al., 2014; Hall et al., 2014).

I discussed the four validated instruments that were used to assess the research questions and hypotheses regarding the associations between physical, mental, and social health damage characteristics and the chronic pain and depression experience of violent sexual rape survivors in eastern DRC. The other sections in this chapter included the theoretical framework, nature of the study, definition of terms, assumptions, scope of delimitation, limitations, significance of the study, and a summary.

In the next chapter, I will provide an in-depth summary of the extant literature on the topic and discuss the attribution theory and the theory of EMISAWMH to establish

the background for understanding the important issues, the gaps of knowledge, implications, and future direction in research.

Chapter 2: Literature Review

Introduction

My primary intent with this literature review was to provide background information on the physical, mental, and social health consequences of the violent sexual rapes against women during war in eastern DRC. Beginning in 1996, the people of DRC experienced a civil war fueled by internal conflicts across the borders following the 1994 genocide in Rwandan and civil conflict in Burundi (Nzongola-Ntalaja, 2002). The conflict spread to DRC when Rwanda, Uganda, and Burundi initiated a joint offensive against Hutu populations who fled to eastern DRC (Nzongola-Ntalaja, 2002; Turner, 2007).

The invasion of the eastern DRC encountered no military or political obstacle; therefore, the motives of the war were quickly changed from pursuing the Hutu population to overthrowing President Mobutu and his dictatorial government from power (Nzongola-Ntalaja, 2002). Laurant Desire Kabila, the old foe of the Mobutu regime, was contacted by the invasion force and was asked to lead the opposition to the new objective (Boshof et al., 2010). The violence spread quickly through the country and caused internal chaos that continued until 1997 when the opposition captured the capital Kinshasa and ended the 32 years of Mobutu's autocratic power, despite some peace negotiation efforts led by late President Nelson Mandela (Boshof et al., 2010; Nzongola-Ntalaja, 2002). The capture of Kinshasa and the departure of president Mobutu marked the end of the first Congo Civil War of 1996–1997 and the ascension to power by Laurent Kabila, who became the country's new head of state (Duroch et al., 2011).

In 1998, a new war broke out when the President Kabila purged elements of his Rwandan allies as his relations with his backers deteriorated (Boshof et al., 2010). President Kabila's decision prompted Rwanda and Uganda to back a new rebellion that aimed at removing Kabila from power; however, Kabila sought and received backing from the countries of Angola, Chad, Namibia, and Zimbabwe (Boshof et al. 2010; Nzongola-Ntalaja, 2002). Also, heavily implicated as conflict sponsors were international corporations and other foreign governments who fueled the war with money and weapons in exchange to easy access to the country's natural resources (Boshof et al., 2010; Nzongola-Ntalaja, 2002).

As a result of the outcry against the atrocities committed on civilians in eastern provinces, especially in Maniema, North-, and South-Kivu provinces, a ceasefire was signed in 1999, but the fighting continued (Duroch et al., 2011). After the death of President Kabila by assassination in 2001, one general from the occupying forces, General Joseph Kabange Kabila, ascended to power as a son of the assassinated president and whose identity and national origin has since then been disputed (Duroch et al., 2011). In 2002, a peace agreement was reached in South Africa (CITE). Despite the peace accord, fighting, occupation, and human rights violations continued in eastern regions of South and North Kivu resulting in massive killing, destruction, looting of resources, and massive violent sexual rape against over 1.8 million women by 2008 (Coulson, 2011; Duroch et al., 2011). Figure 4 is a map showing the eastern DR Congo regions mainly affected by atrocities of sexual rape and violence.

Figure 4. Map of the foreign troops (AFDL) offensive

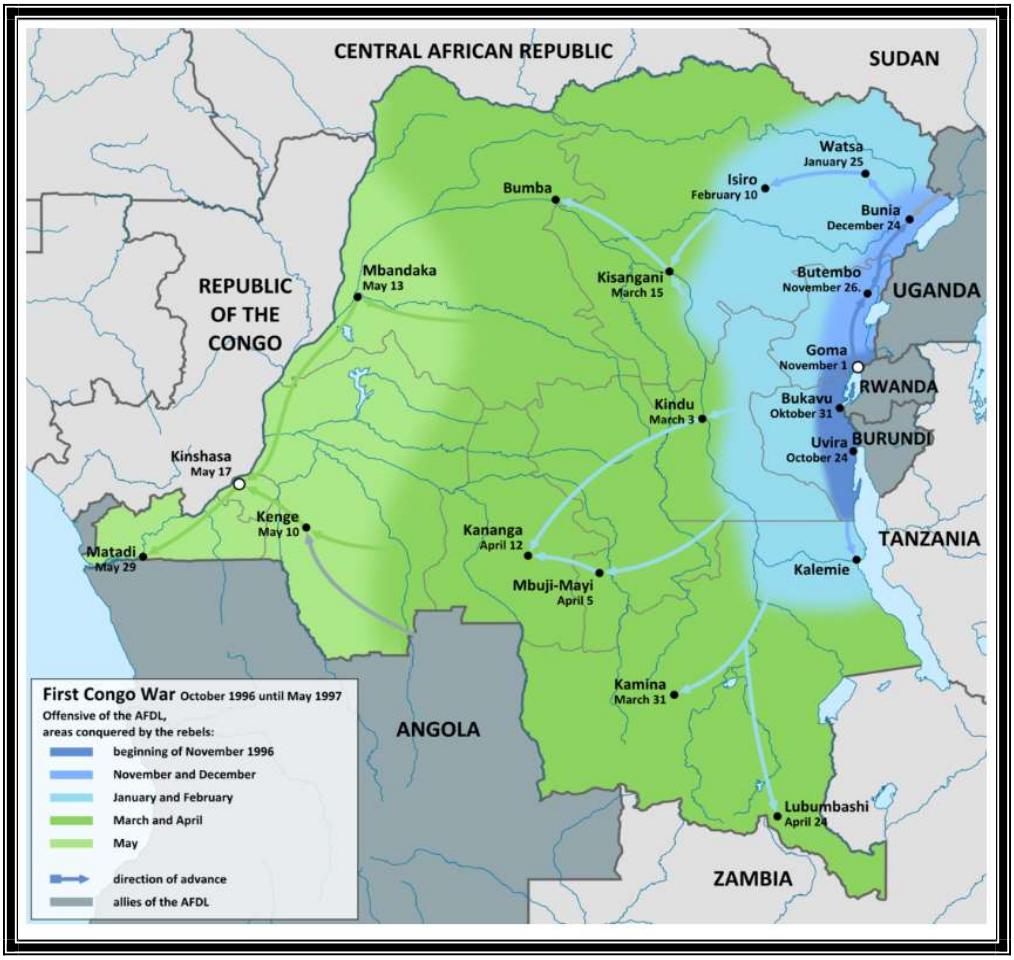

Figure 4. Map of the foreign troops (AFDL) offensive affecting eastern DRC (Wikipedia.org, 2018).

In this study, I intended to examine the association between the consequences of violent sexual rapes and the chronic pain and depression experience among female victims of violent sexual rapes in eastern DRC. The findings would add to scientific knowledge that could assist health providers in addressing the physical, social, and psychological health damages related to the rapes. In terms of social change, the information from this study could serve as a knowledge base for health care providers, researchers, and health educators and could be used to reframe better strategies to protect

the physical, mental, and social health of residents of the DRC, especially those affected by violent sexual rape. The study results could also help public health professionals in governmental and nongovernmental organizations, peacekeeping missions, and health policy experts to identify public health priorities for minimizing the occurrence of war-related violent rapes. Due to the distinct nature and magnitude of the violent sexual rapes in eastern DRC, the results of this study might provide insights into the need for improved access to basic and mental health care services for sexual rape victims.

In this chapter, I will discuss the literature search strategy, theoretical framework of the study, theory background, and the literature review related to key variables and concepts. I will also present the prevalence and incidence of violent sexual rape in DRC, chronic pain and depression, and key variables for analysis. This chapter will include a review and synthesis of studies related to the research questions, followed by a chapter summary and conclusions.

Literature Search Strategy

To conduct this literature review, I searched multiple sources and databases, including Academic Search Premier, BioMed Central, CINAHL Plus, Google Scholar, MEDLINE, PLOS Medicine, PsycINFO, and PubMed. I accessed these sources and databases using the Human Sciences and Human Services Library of the University of Maryland Baltimore, the National Library of Medicine of the National Institute of Health, the National Science Library of the National Research Council Canada, and the Walden University Library.

I performed the literature search using a single or a combination of keywords including those related to physical health damages, such as *child born from VSR, chronic pain, extreme sexual violence, disability, fistula, fistulas, gender-based violence, gynecological injuries, illness, pain feeling or suffering, physical health consequences, physical health damages, physical impairment, sexually transmitted disease (STDs),* and *unwanted pregnancy*. The keywords used related to mental health damages were *depression, feelings of guilt, feelings of punishment, loss of pleasure, loss of interest in activities, disinterest, mental health effects, PTSD, post-traumatic stress disorder, sadness, shame, self-dislike, suicidal thoughts,* and *worthlessness*, while keywords used related to social health damages, included *abandonment, community support, family support, friend or family support, helplessness, social exclusion, social health effects, social norms, social protection, social rejection, social withdrawal,* and *victims' relationship*. I also used the following keywords for an overall search of the literature: *age, controlling practices, cultural attitudes, DRC, Eastern DRC, education, ethnic group, health care access, health consequences, individual environment, interactions with others, location (rural/urban), marital status, mass rape, past failure, rape, sexual assault, sexual violence, violent sexual rape,* and *widespread rape*.

In this study, I measured the consequences of violent sexual rape that resulted from brutal sexual assault events that occurred from 2010 through 2014 in the eastern DRC. The theoretical framework was an advancement of the ecological model that was introduced in 2009 (Campbell et al. 2009). The original ecological model has been extensively used since the 1960s (Kelly, 1966, 1969, 1971). Several other considerations

regarding the ecological model have been discussed in number of articles published since the 1960s, including Kelly (1966, 1968, 1971); Bronfenbrenner (1979, 1986, 1995); Koss and Harvey (1991, 1996); Harvey (1996); Neville and Heppner (1999); and Campbell et al. (2009). For this reason, and for the purpose of using primary source data, I did not restrict the search process in terms of years in which the literature was published in order to capture valuable literature sources covering the period of the events being studied. The literature sources I used in this study included peer reviewed articles, book chapters, case studies, theses, health reports, and dissertations.

Theoretical Framework

For this study, the theoretical framework consisted of the EMISAWMH by Campbell et al. (2009). The EMISAWMH has been extensively investigated in recent decades by public health professionals and psychologist scholars (Campbell et al., 2009; Fergus, 2012; Gottemoeller, 1999; Heise, Ellsberg, & McCarthy, 2003). Previous studies of the EMISAWMH have been focused on understanding, not only the complexity of the sexual violence phenomena, but also the interrelated risk factors for violent rapes at multiple levels of influence and the public health implications among the victims (Campbell et al., 2009; Fergus, 2012; Gottemoeller, 1999; Heise et al. 2003). The EMISAWMH was also used by Jordan, Campbell, and Folligstad (2010) to understand the phenomenon of mental health in post assault and the effectiveness of the metal health system's response to the complex needs of victims of sexual violence.

Theory Background

The EMISAWMH was developed from two leading ecological theories: the ecological theory of community psychology (Kelly, 1966, 1969, 1971) and the theory of developmental psychology (Bronfenbrenner, 1977, 1979, 1986, 1995). From these emerged three ecological models: (a) the ecological model of rape recovery (EMRR; Harvey, 1996; Koss & Harvey 1991, 1996); (b) the CIEMSAR (Campbell et al., 2009; Neville & Heppner 1999); and (c) the EMISAWMH (Campbell et al., 2009). In the following subsections, I will provide a detailed background on these formative theories.

Theory of Ecological Community Psychology (1966)

The theory of ecological community psychology emerged from community mental health as an approach for addressing individual's attitudes, behaviors, and communities, and the relationships between them (Dalton, Elias, & Wandersman, 2001). The theory emphasizes the context of individuals' lives in the community and their relationships to the communities and society as the ecological perspective of the person-environment fit (Dalton et al., 2001; Orford, 2008). Kelly (1966) used the ecology of community mental health model as the most relevant approach for describing mental health program in a community. Kelly's ecological theory argued that ecological analysis of mental health is directly linked to at least three important issues. First, ecological theory is linked to the analysis of social or organizational systems and the interdependent relationships between community services and mental health services (Kelly, 1966). Second, the author highlighted the importance of studying the relationship between physical environment and individual behavior to understand the effects of non-personal

structures upon behavior. Third, there is a need to study the relationship between an individual with immediate social environment to understand their interactions in their specific behavior settings (Kelly, 1966). Kelly's ecological theory of community mental health can be used to help to explain the relationship between peoples' mental health and their interaction with the socio-environment in the community.

Ecological Model of Developmental Psychology (1977)

Humans' relation to and interaction with their environment may shape their development and their way of reacting to violent events. Bronfenbrenner (1977) introduced the ecological model of developmental psychology or ecological system theory and define the humans' continuous connections with their environment. Bronfenbrenner's concept of human development claims that human development is dependent on a continuing and evolving interconnection between individuals and their interrelated environmental events (Bronfenbrenner, 1977, 1994). According to the author, such development can only be understood by analyzing the components of the ecological system in which human development occurs. Both Kelly's and Bronfenbrenner's theories provide the fundamentals for understanding the relationship between an individual's social environment, human interactions, subsequent sexual violence, and mental health.

Ecological Model of Rape Recovery (1996)

The ecological model of rape recovery builds on the assumptions that there exists interdependence between the roles of individuals in communities and community organization (Koss & Harvey, 1996). The ecological model of rape recovery also assumes that experience in diverse ecological environments and situations greatly shapes

the difference in how people respond to ecological situation in their community (Campbell et al., 2009; Harvey, 1996; Koss & Harvey, 1991). Harvey (1996) adopted the ecological perspective of psychological trauma and trauma recovery to define the ecological approach in the context of community psychological trauma, trauma treatment, and trauma recovery (Koss & Harvey 1991). Three important arguments were advanced to explain the interconnectivity of rape, the individuals' psychological attributes, and individuals' reactions to events (Harvey, 1995). First, individuals are differently affected by and respond differently to traumatic events because of involved multilevel factors (Harvey, 1995). Second, affected individuals may or may not have access to clinical care in the aftermath of violent events exposure (Harvey, 1995). Third, clinical intervention in the aftermath of traumatic exposure is no guarantee of recovery (Harvey, 1995).

Culturally Inclusive Ecological Model of Sexual Assault and Recovery (CIAMSAR) (1999*)*

In 1991, Neville and Heppner extended Bronfenbrenner's theory of developmental psychology and introduced the CIEMSAR. The CIEMSAR models the various aspects that control the impact of violent rapes on the victims' mental health condition and the post-rape recovery or adjustment (Heppner & Neville, 1999; Campbell et al., 2009). Heppner and Neville (1999) identified three types of rape-related sequelae that negatively affect the health of sexual assault victims. Primarily, the authors identified the elevated levels of anxiety and fear, depression (suicidal thoughts), and PTSD as the major psychological sequelae associated with sexual rape (Heppner & Neville, 1999). Also, the authors consider as major life change sequelae related to sexual assault, and that

eating disorder, substance abuse, reduced social life (unable to enjoy life, hopelessness feeling, and social adjustment problem) and behavioral sequelae among sexual violence survivors are directly associated with sexual assault (Heppner & Neville, 1999). The authors also outlined the primary CIEMSAR factors, which included the macrosystem (focusing on socio-cultural, racial, and ethnic contexts); the microsystem (looking at demographic factors, rape and copying characteristics and response); and the mesosystems (which focuses on social support systems contexts and institutional intervention contexts, Heppner & Neville, 1999).

Ecological Model of Impact of Sexual Assault on Women's Mental Health (EMISAWMH)

As stated earlier, the EMISAWMH has been retained as the appropriate theoretical framework for this research because it addresses the health impacts of sexual rape on the victims. Campbell et al. (2009) empirically analyzed the psychological impacts of adult sexual assault victimization and integrated Heppner and Neville's CIEMSAR to explain the fundamentals of the EMISAWMH. Using the EMISAWMH was appropriate because it helped in describing the impacts of violent sexual rapes and defining the mental health program in the community of eastern DRC (Kelly, 1966). Exploring *ecological psychology* was critical in describing the violent sexual rape victims' relationship with their surrounding environment and community.

Addressing the needs of sexual violence victims required a better comprehension of the human dynamics that lead to the occurrence of violent rape events, the health implications of these events, and the various approaches for effective health

interventions. The EMISAWMH elucidates the various ways by which multiple factors that influence the risks of negative health outcomes among violent rape victims. Figure 4 four below highlights the various six levels of the EMISAWMH, including community/culture individual, microsystem, meso/exosystem, macrosystem, and chonosystem levels as shown in Figure 5. Each level of influence addresses numerous variables that may influence violent sexual rape and physical, mental, and social health damages (Campbell et al., 2009; Heppner & Neville, 1999).

Figure 5.

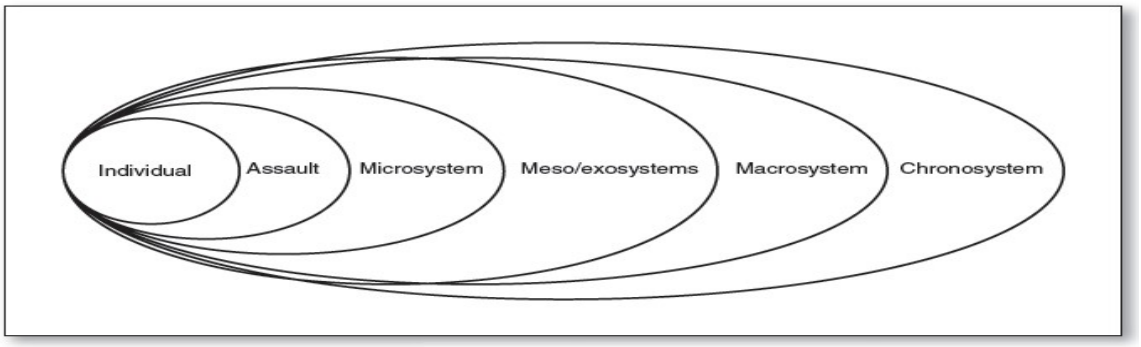

Figure 6: Scheme of the EMISAWMH different levels of influence (Campbell et al. 2009).

Individual level. The ecological analysis at this level examines the individual characteristics and maladaptive coping responses related to mental health suffering among the victims who suffered violent sexual rape (Heppner & Neville, 1999). The individual level of analysis emphasizes the contributions of specific individual factors such as personal experience affecting family and cultural values, self-identity, race, gender, abilities and life status (Heppner & Neville, 1999). At the individual level of analysis, the physical health effect variables (fistulas and other sexual rape-related injuries) were analyzed. Also, at this level of analysis, I analyzed the psychological health

effect variables (PTSD and feelings of worthlessness), and social health variables (social rejection and support from family/friends).

Assault level. At the assault level, the ecological analysis identifies the relationship between the victims of violent sexual rape and the perpetrator. This level of analysis focuses on numerous factors that characterize the sexual assault including the location when the violent rape took place (urban/rural) and the victim's association with the predator (familiar or stranger, Campbell et al. 2009). The analysis also often considers the rape-related injuries and psychological outcomes such as depression, anxiety, and PTSD resulting from the severity of the injury due to abuses, beatings, inflicted suffering, terrorization, threats, and use of weapons. In relation to this this level of analysis, I analyzed physical health effects variables (including fistulas and other sexual rape-related injuries) and mental health effect variables (including PTSD and feelings of feelings of worthlessness).

Microsystem level. At the microsystem level, the analysis seeks to understand the peers and family social relationships with immediate relatives, family members and friends, as formal or informal providers' influence. The analysis at this level also focuses on the role of the proximal situation that significantly impacts the victim's development and behavior. The microsystem level of analysis looks at the importance of positive actions in fostering support (Heppner & Neville). In post assault, the presence of and assistance by informal providers may predict reduced psychological distress (Baynard, 2011; Campbell et al., 2009). The microsystem level helps to address the relationship between situational characteristics of the violent rape events (such as being at a high-risk

location, being pulled or pushed to a hidden location, being in a controlled environment, any other situational context that increase the level of danger), the likelihood of violent sexual assault, and the mental health outcomes. This level of analysis was related to the mental health effect variables (including PTSD and feelings of worthlessness) and social health effect (rejection and support from family/friends) variables assessment.

Mesosystem or Exosystem level. The first normal course of action of a victim of violent sexual rape is to seek help from the legal system at the community level (Campbell et al., 2009). At the mesosystem and exosystem level, the ecological analysis focuses on societal variables of community settings in which the individual is not directly involved (Baynard, 2011). When the legal system is broken and corrupt, legal authority in the community may unfairly side with the perpetrator, causing more harm and secondary victimization, which in turn leads to increased psychological health problems, including depression, and PTSD. The mesosystem/exosystem level also assesses the impacts of the victim seeking mental health service and how it benefits violent sexual rape victims (Campbell et al., 2009). Clinical officials may use the same questioning techniques as the legal system to collect information on the victims with victim-blaming statements placing the victims in a more stressful situation with a feeling of shame, guilt, depression, distrust, and unwillingness to seek care (Campbell et al., 2009; Campbell & Raja, 2005). Through the medical care or health care system, victims may seek health services for pregnancy tests, forensic assessment, physical injuries and STD treatment.

Lastly, the mesosystem and exosystem level of analysis looks at the impacts of available advocacy services within the community, which is crucial for the recovery

process of a violent sexual rape survivor in terms of reducing mental health impacts. This level of analysis helps in understanding the socio-cultural factors that influence the violent sexual rape behavior (poor social norms, weak governance, weak legal system, corruption, poor law enforcement system), and their impacts on the community (Bronfenbrenner, 1977; Campbell, 2009; Campbell & Martin, 2001). The exosystem analysis focuses more on the variables in the social systems capable of providing victims of violent sexual rape with needed social support or intervention to facilitate recovery (including legal system, medical care system, mental health system, and community advocacy, Campbell et al., 2009). In this study, the exosystem level assisted in understanding variables, including the 'social reactions' and family/friends support' to the violent rape survivors.

Macrosystem level. The macrosystem level uses socio-cultural perspectives to analyze the social health effects variables including social rejection and supports from family/friends. Such analysis may help elucidate how the social health factors may impact the victims' well-being and recovery (Heppner & Neville, 1999). Understanding the socio-cultural features helps clarify how beliefs and norms about violence and family support align with the cultural values in the family, community, or nation (Campbell et al., 2009; Koss & Rozzee, 2001). In this process, the analysis attempted to understand the characteristics of cultural acceptance, beliefs, and norms about violent sexual rapes resulting from violence exposures during war, and the psychological impacts on the victim.

Chronosystem level. The chronosystem level of analysis focuses on factors such as prior history of victimization or revictimization that may directly or indirectly affect rape survivors' recovery outcomes. Bronfenbrenner (1994) highlighted the importance of normative transitional events including the change of location of residence (voluntary or involuntary), and non-normative events such as sexual violence. Both types of events (normative and non-normative) highly affect the person-environment interactions and the environmental response (Bronfenbrenner, 1994). The chronosystem process is often used to analyze the effects of several sequences affecting individual developmental changes over time and past life history of violent sexual rape as an important factor that may affect victim stress and recovery (Bronfenbrenner, 1994; Campbell et al., 2009; Heppner & Neville, 1999). This chronosystem level of analysis helps to elucidate the time-based dimension that influences the interactions between individuals and their environment, and how the change in these principles may influence the occurrence of rape events and mental health outcome over time.

The EMISAWMH was used to analyze the impacts of violent sexual rape. The use of this model was critical in elucidating the correlation between the perpetration of sexual violence and physical, mental, and social health outcomes and chronic pain and depression experience among the victims. The multiple systems analysis of the EMISAWMH has been previously and successfully used and the results provided understanding of the impacts of sexual assault and gender-based violence among victims, and how to design prevention strategies for public health interventions (Campbell, 2009;

Dahlberg & Zwi, 2002; Heise, 1994; Heise et al., 1996; Krug, Mercy, Dahlberg & Krug, 2002).

Therefore, using the EMISAWMH in this study was appropriate because it facilitated the understanding of the impacts of violent sexual rape on mental health (Campbell et al., 2009; Moylan, 2014). The EMISAWMH was also important for this study because it suggests the importance of factors at multiple levels of analysis. Analyzing physical health effects factors at the individual level aligns with research questions one and two (RQ1, RQ2). At the assault level, analyzing the assault characteristics including physical health effects, psychological health effects, and social health effects injuries and the victim-perpetrator relationship influence aligned with research questions one, two, three, four, five, and six (RQ1, RQ2, RQ3, RQ4, RQ5, RQ6). Additionally, analysis at the microsystem and mesosystem/exosystem levels of analysis aligned with research questions five and six (RQ5, RQ6) of this study. At this level, positive reactions and informal support or negative reactions and blames from family and friends may predict the health outcomes. For the meso/exosystem level, the ecological influence of formal legal systems or environment may predict health outcomes.

The macrosystem level examines the individual's change or improvement overtime, the difference in society's response to the rape events, its acceptance, and its impact on recovery, addressing research questions three, four, five, and six (RQ3, RQ4, RQ5, RQ6). Lastly, the chronosystem studies the events of sexual rape traumas and revictimization over lifetime and aligns with research questions one, two, three and four

(RQ1, RQ2, RQ3, RQ4). Using the EMISAWMH and the multiple levels analysis in this study helped in gaining an in-depth comprehension of the impacts of violent rapes, as well as the relationship between the physical, mental, and social health damages experienced and chronic pain and depression experience among the targeted population.

Literature Review Related to Key Variables and Violent Sexual Rape

Sexual violence in DRC has been sufficiently investigated during the past decades through empirical studies using qualitative, quantitative, and mixed methods. Most of the previous studies focused on sexual assaults and their health consequences among the victims. However, there are no existing studies that address the association between ecological variables (physical health effects variables, mental health effects variables, and social health effects variables) and chronic pain and depression experience among violent sexual rape victims in DRC. Jordan et al. (2010) suggested that women victims in post assault phase face serious difficulties in responding to the complex violence they experienced, making it challenging for both clinical intervention and outcome research. Lima (2014) also stressed the current need for applying biopsychosocial and interdisciplinary approaches for the analysis of the experience of chronic pain and mental health condition.

Researchers who conducted previous studies on sexual assaults in DRC have mostly concentrated their effort on describing various sexual violence issues and war. Violent sexual rape in DRC affects aid efforts to victims and worsens poverty (Bosmans, 2011; Mossi & Duarte, 2006; Mechanic, 2004; Patel & Kleinman, 2003), and imposes economic burdens on survivors (Duroch et al., 2011; Bartels et al., 2010). The lack of

economic means limits the victims' ability to access adequate healthcare (Culbert et al., 2007). Researchers of the war-related violent sexual rape in DRC have also observed noticeable physical, mental, and social health conditions that could be considered as directly associated with violent sexual rape (Abraham, Jewkes, & Matthews, 2013; Aryee, 2012; Baas et al., 2013; Babalola, 2014; Bartels et al., 2010; Bastick, Grimm, & Kunz, 2011; Benyard, 2011; Chabwine, Masheka, Balol'ebwami, Maheshe, Rutega, Wa Lola, Mutendela, et al., 2011; Dossa et al., 2014; Duhlberg & Krug, 2002; Annan, Bolton, Cetinogu, Hall, Kaysen, Robinette, et al., 2014; Johnson et al., 2010; Krug, 2002; Mukwege & Nangini, 2009; Campbell, Ford-Gilboe, Lent, Merritt-Gray, Varcoe, & Wuest, 2008).

Violent sexual rape in DRC reflects unrestrained practices of human rights violation (Duarte & Mossi, 2006; Farmer, 2005; Fergus, 2012; Johnson et al., 2010; Notar, 2006), which are perpetuated by the status of impunity of the perpetrators (Baaz & Stern, 2009; Bedont & Martinez, 1999; Cassimon et al., 2013). Violent sexual rape in DRC may be associated with the desire to inflict shame, pain, and intimidation, as means of domination and natural resources exploitation (Bartels et al., 2013; Bartels et al., 2010; Carlsen, 2009; Cohen & Nordas, 2014; Lincoln, 2013; Meger, 2010; Mukwege & Nangini, 2009; Patt & Werchick, 2006). Violent rape against women was effectively utilized as a strategic weapon to win the war in DRC (Carlsen, 2009; Clifford, 2008; Jones, 2013; Pratt & Wechick, 2004). In numerous studies, authors have also shown traceable patterns of increased sexually transmitted diseases STDs and HIV/AIDS rates in Eastern DRC (Bartels et al., 2010; Culbert, Ellman, Ford, Frontières, O'Brien, Mills, ...

& Tu, 2007; Heise et al., 1999), which might be associated with increased physical and mental traumas (Gray, Hill, Khan, Latthe & Mignini, 2006; Leibling & Slegh, 2011; Mukwege & Nangini, 2009; Schalinski et al., 2011). Sexual rape in Eastern DRC is associated with victims' vulnerability (Casey et al. 2011; Steiner, et al., 2009).

Chronic Pain and Depression Variables

To better understand the specifics about violent sexual rapes in DRC, it was critical to analyze any relationship between sexual rape-related physical, social, and mental health consequences and the simultaneous existence of chronic pain and depression. Chronic pain and depression are the outcome variables in my study. Both chronic pain and depression have been addressed in the literature to explain the physical and mental suffering.

Chronic pain. Bogduk & Merskey (1994) and Blyth, Cousins, March & Nicholas, (2001) provides the meaning of pain, which they referred to as "an unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage" (p. 209). Pain can also be understood as a complex perceptual experience determined by sensory as well as psychological and social influences (Asmundson, Stein & Wright, 2004; Bogduk & Merskey, 1994). Chronic pain refers to a persisting pattern of pain that lasts for twelve or more weeks, does not resolve in response to treatment or beyond the normal process of repair, and is usually mild, excruciating, episodic or continuous, inconvenient, or completely incapacitating (Bogduk & Merskey, 1994). Huijer (2010) agreed with Bogduk & Merskey's definition and added that chronic pain is a continuous pain that is experienced for a prolonged period no less

than three months to six or more months. Chronic pain symptoms may vary from one person to another. For some people, chronic pain may result from a variety of health problems, including original physical injury, mood change, fatigue, loss of appetite, and sleeplessness; and for others, it may be a result of ongoing illness (Bogduk & Merskey, 1994). In their studies, Bogduk & Merskey, have shown that chronic pain may become disabling because it reduces strength, stamina, and flexibility, an conclusion that was also reached by Asmundson & Katz (2009) and Clark (2011).

Depression. Depression is a serious illness that involves an individual's body, mind, and mood, and affects the individual's feeling, eating, sleeping, and thinking behavior (Bogduk & Merskey, 1994). Unlike chronic pain, which arises from physical injuries or pre-existing health conditions, depression is defined as the presence of depressive illnesses or disorders of the brain typically manifested by a number of psychological, behavioral, and physical symptoms (Akiskal & Judd, 2000; American Psychiatric Association (APA), 2013; Cassano & Fava, 2002; Gardner & Kendlers; Greenberg et al., 2015, 1998). Depression is usually a severe, disabling, and chronic illness (APA, 2013; Cassano & Fava, 2002).

Despite the common depressive illness characteristics among depression sufferers, the depressive disorders are usually grouped into three categories (APA, 2013; Dobscha, Corson, & Gerrity, 2004; Greenberg et al., 2015; Perlis, 2005). The major depression (MD) category consists of a depressive disorder that usually appears with severe symptoms affecting the sufferer's ability to work, eat, sleep, and engage in normal activities of daily living with one or several episodes in a lifetime (APA, 2013; Dobscha,

Corson, & Gerrity, 2004; Greenberg et al., 2015; Perlis, 2005). The persistent depressive disorder (PDD) category, is a disorder characterized by depressed mood for a period of 2 years or more, including psychotic depression shown through disturbing illusory thoughts or delusions, or through hallucinations, and other types of depressions including seasonal affective disorder (SAD), PTSD, and postpartum commonly experienced by women after giving birth (APA, 2013; Cassano & Fava, 2002; Dobscha, Corson, & Gerrity, 2004; Perlis, 2005). In these studies, the authors characterized the bipolar disorder (BD) or manic illness (MI) category, unlike the MD and the PDD, by cycling mood changes from extreme high to extreme low (from mania to depression).

The severity of chronic pain and depression cannot be ignored as a potential issue that may affect most victims of violence, especially those who sustain violence-related injuries or had previous painful conditions. While chronic pain is understood as a painful condition that occurs beyond the normal remedial process and depression as an illness involving the body, mind and mood, both conditions affect normal functioning of the body. Understanding how chronic pain and depression as result of physical, mental, and social experience affect the victims of violent sexual rape, may require a thorough analysis of the various influences. The literature above does not provide evidence that chronic pain effects among violent sexual rape victims in eastern DRC have been adequately studied. Also, there is no existing study in which specific types of depression are described or identified with any victims of sexual violence in eastern DRC.

Socio-demographically, this study included women age 18-80 years old women victims of violent sexual rape. Steiner et al. (2009) analyzed data from 20,517 female

survivors of violent sexual rape in DRC and concluded that women ages 4 to 84 years old were the main targets. The authors also noted that as many as 12 to 26% of survivors suffered social exclusion or rejection by husbands or family, and many rape victims received medical care several years after the occurrence of rape event. An early study by Bosmans (2007) reported that the age of most victims of violent rapes in DRC was between 23 months to 84 years and many of them were shamed with forceful rape in public or while their family members watched. These findings suggest that sexual violence has remained the main source of risks for social, psychological, and physical health damages affecting women and the whole population in eastern DRC. Perpetrators of violent sexual rape in eastern DRC targeted women and men of all ages. In a study by Bartels et al. (2010), the demographic of rape victims included 9.2% of young girls aged 15 years or below; 90% of victims aged 16-55 years, and less than 1% of adults aged 56% and older.

Another researcher of violent sexual rape and related atrocities against women in DRC explored the nationwide data and the monthly human rights report by United Nations peacekeeping mission from 2005-2007 and found that 96% of victims were females of which 30% were minors (Peterman et al., 2011). Cannon (2012) noted that about 400,000 violent sexual rape cases occurred between 2006 and 2007 in a very horrifying manner targeting 15-49 years old women and girls. The author also stated that for every twenty-one violent sexual rapes that took place in eastern DRC, only one was reported, making DRC the second worst place to be a woman on earth.

In their study, Bartels et al. (2010) also found the median age of 35 among the victims of violent sexual rape who were receiving follow-up treatment at the Panzi hospital in Bukavu, eastern DRC and their ages ranged from 3 to 80 years. The authors found that most of the violent sexual rape victims (84%) were between 16 and 64 years of age, while 6 % of the victims were younger than 16 years of age, and 10 % were 65 years old or more. Bartels et al. indicated a deliberate destruction of the social mechanisms due to widespread violence targeting women, and atrocities were often committed with impunity. Women were attacked everywhere, but the majority were sexually assaulted while sleeping at night (57%), working in their field (34%), and during the evening 7% (Bartels et al., 2010). Sexual violence in eastern DRC was largely militarized, and mostly perpetrated by armed combatants (52%) and armed assailants (42%), and 60 % of the victims were gang raped practicing (Amnesty International, 2004; Doctors Without Borders, 2007).

Armed groups display hyper-masculinity through physical and sexual violence particularly targeting women and girls (Broekaert et al., 2014). Peterman et at., (2011) stated that the act of extreme violence through sexual attack was perpetrated by occupying armed forces to cause both suffering in the community and as an opportunity to demonstrate their masculinity against vulnerable women. In line with Peterman et at. and Bartels et al. (2010) also held that that sexual rapes against women perpetrated by civilians sharply increased by 17-fold at 1,733% in Eastern CRD between 2004-2008, while the perpetration of the same crime by armed groups in the same period decreased by 77%. These data suggest that there was a shift in acts of sexual violence against

women, as local men were taking advantage of the chaos to display their masculinity to further terrorize their already vulnerable beings in the community, including women and girls.

Physically and mentally harming women and girl severely destroys the social fabric of the family, community and society (Broekaert et al., 2014). Coulson (2011) and Cruz & Smith (2011) demonstrated that gender-based violence against women aimed at bringing mental, physical, and social destruction of women's life through intimidation, murder, rape, shame, and lasting pain. Violent sexual rapes, gang-rape, sexual assault, sexual enslavement, forced prostitution, forced labor, forced child marriage, female genital mutilation, gendercide, honor killings, castration, were all defining components and driving forces of gender-based violence which was used to destroy the women, culture, and society in DRC (Coulson, 2011). In his investigation, Coulson noted that the lack of civilian protection in DRC was an important factor influencing gender-based violence, with an underlying effect of HIV/AIDS and STDs infections, damages to the physical, psychological, and social health damages of women in the community. The author concluded that such psychological traumas could have severe impact on individual's overall health.

In eastern DRC, the perpetration of severe physical and mental damage against women has been successfully used to destroy and demoralize families, and undermine cultural and political solidarity (Broekaert et al., 2014). Undoing the devastating damages of violent sexual rape requires addressing the issue of gender-targeted violence. Targeting gender-based in armed conflict has been identified as the chief challenge to peace and

healing in Eastern DRC (Baaz & Stern, 2013; Lander, 2014). War-related rape in eastern DRC can be referred to as a *sexed story* because it has been a result of men's sexual desire (Lander, 2014; Mertens, 2013; Price, 2013,). Specifically, Pierce and Mertens argued that in eastern DRC, the war empowered armed men to uncontrollably expose their unchecked sexual tendencies. As a *gendered story*, these tendencies became a display of militarized ideals of masculinity through which perpetrators targeted women as means to humiliate and feminize the male enemies, their community, and their nation (Baaz & Stern, 2013; Lander, 2014; Mertens; Price, 2013, 2013).

The rampant violent sexual rape in eastern DRC, however, targeted both women and men. Several empirical studies have shown that violent sexual rape during war in eastern DRC affected millions of men and women, both young and adults since 1996 (Bartels et al., 2013; Johnson et al., 2010; Lawry et al., 2011; Meger, 2010). However, female experience of violent sexual rape may differ from that of males, in terms of physical, mental and social health consequences. In his study of sex variances in pain and PTSD, Tolin (2006) analyzed data from previous research works and he suggested that women were at a higher risk of experiencing PTSD than men and boys. The author also stated one chief reason why females are more likely than male to be at a higher risk of developing PTSD is that they are more likely to be victims of potentially traumatic events (PTEs).

Autesserre (2012) stated that the violent rape and cruelty again women and girls have been taking place more than any other form of violence. The author stated that both men and women victims bore the consequences with serious physical and emotional

impacts characterized by inflicted bodily injury, horrific torture, stigma, and rejection and that looking at violent sexual rape in the DRC as an issue only affecting women was counterproductive. Ignoring the experience of men as violent rape victims would hinder the advocacy efforts for the cause of thousands (4% to 10%) of affected men and boy survivors of brutal sexual rape and would prevent any effort and possibility of engaging other men constructively into the process of breaking the cycle of rape-related sexual violence (Autesserre, 2012).

In a study of 998 households, Johnson et al. (2010) examined the occurrence of violent rapes and violence against human rights in Eastern DRC. Women participants of the study reported experiencing more sexual violence 39.7% than men 23.6% with a 98.9% response rate (Johnson et al. 2010). The authors also examined the link between the types of atrocities that the victims experienced and the physical and mental health damages among the resident populations in eastern DRC. For measures, the authors utilized the violent rape occurrence, major depressive disorder (MDD) symptoms, PTSD symptoms, human rights violence, and basic health needs (physical and mental) among the affected populations (Johnson et al. 2010). The authors stated that the majority of households (67%) reported human rights incidents related to the armed conflict, and 41% of all adult populations met the criteria for MDD wile over 50% met the criteria for PTSD (Johnson et al., 2010).

In a study of the patterns of sexual violence, Bartels et al. (2010) stated that single women 35 years old or younger, and those with no prior marriage history were at an elevated risk (six time higher) to be taken in captivity as sex slave than those who were

married, had prior history of marriage, or were over 35 years of age. In their findings, the authors indicated that 42% of those who were taken into sexual slavery where unmarried women, compared to 36% who were married; 6% who were widowed, and 14% who were abandoned (Bartels et al. 2010).

In an analysis of the socio-demographic characteristics, the authors also found that the majority of women victims of violent sexual rape were married (53%). The Bartels et al. (2010) stated that of the total count of unmarried victim participants, 22% were widowed and 9% were abandoned by their husbands. In a report from Joosse, Hall, & Veling (2013), it was also shown that 50% of victims who experienced violent sexual rape were married, 30% were single 13% were widowed, and 7% were divorced.

In recent history, it has been recognized by scholars, human rights activists, and humanitarian organizations that violent rapes have been utilized against women as a strategic weapon in armed conflicts. In a report by the UN Secretary General (2004) it was stated that widespread rape against women was nothing else than a weapon of warfare, a war tactic for the domination, humiliation, terrorization, intimidation, and forcible relocation of a civilian community. Rape was used in many countries, including Afghanistan, Haiti, Kosovo, Sierra-Leon, Sudan, Rwanda, and recently in DRC, however, the description of crimes in the later was much worse, as many women were violently raped, injured, and left to die (Cohen, 2013; Lungobe et al., 2008; Maedl, 2011). To argue about the ethnically motivated violent sexual rape during conflict such as in DRC, Cohen advanced three hypotheses: First, the author argued that in order to have widespread rape during conflict, the conflict must be ethnically motivated (Cohen, 2013).

Second, when a conflict was complicated by government and foreign armies and several insurgents, their conflicting interests pushed them all to perpetrate genocide, knowing that the other group would carry the blame (Cohen, 2013). Third, when the conflict involves secessionism, ethnic cleansing becomes the aim of war (Cohen, 2013).

These three characterizations seemed to be borne out by the war in DRC. The civil war in DRC was mainly brought to eastern DRC by armed groups from the Rwandan and Ugandan National Armies and their affiliated groups (Maedl, 2013). Mass rape and mass killing were practiced as means to intimidate, control, and humiliate the local community (Maedl, 2013).

The Congolese state army fought competing secessions in the eastern regions of South Kivu and North Kivu, where culture and ethnicity were being cleansed in order to infect the bloodlines and to compulsorily impregnate women (Barlets et al., 2010; Coulson, 2011). In their study of the demographic composition among the 4,311 participants and victims of violent sexual rape in South Kivu, Bartels et al (2010) found that most of the victims (64.6%) were ethnic Shi or Bashi, followed by the Batembo 11.8%, and the Barega 10.4%, and others (Havu, Fulero, and Babembe) were under 6% each. Figure 6 shows the areas of the South Kivu province with documented violent rapes

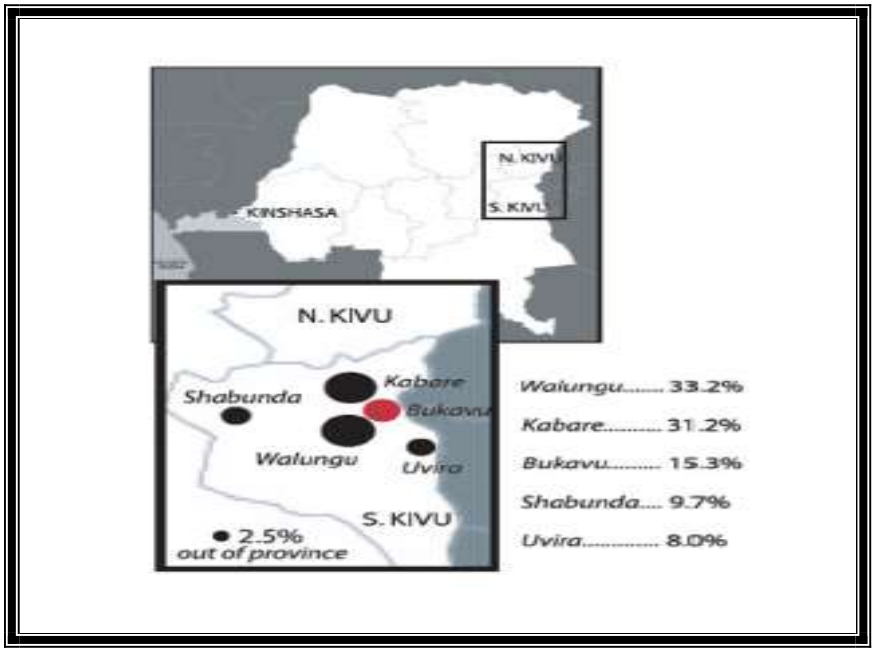

Figure 6*:* Map of most violent rape-affected areas in South Kivu (Mukwege & Nangini, 2009). The thicker mark indicated the intensity of violent rape activity. The red color indicates a concentration of identified horrifying events of violent sexual rape.

In most of the literature discussed, women were identified as the major target of violent sexual rape in eastern DRC and reports discussing men as victims of rape were limited. One explanation might be the fact that most men victims of violence may have been either taken captive into forced labor, forcibly recruited as combatants, or executed, and therefore, had no chance to seek care and to be counted among the victims. Also, in eastern DRC, armed groups had more interest in raping women not only to satisfy their sexual ego, but also destroy them physically, mentally, and socially in order to subjugate their rival men in the community (Kelly et al. 2012; Kelly et al. 2011; Trenholm et al. 2011; . DRC is home to more than 477 ethnic groups that have lived in harmony for many decades. There was limited literature focusing on a comprehensive description of ethnic groups affected by the war. However, considering the extent by which the eastern

provinces of South Kivu, North Kivu, Maniema, Katanga, Kisangani and Equateur were affected by widespread violence, the available data of ethnic groups affected by violent sexual rape includes only some ethnic groups in South Kivu and North Kivu provinces and does not represent the entire spectrum of the consequence of war in Eastern DRC. In this study, I proposed to extend the investigation of the relationships between physical health effects variables, mental health effects variables, and social health effects variables and chronic pain and depression experience among victims in Eastern DRC.

Physical Health Effect Variables

This section described the physical health consequences by analyzing the factors influencing devastating obstetric and reproductive health issues and gynecological disorders (including fistulas and other sexual rape-related injuries). In their studies, Brednkamp, Linos, Kawachi, & Peterman, (2012), Christian et al. (2011), Gray, Hills Lathe, Khan & Mignini (2006), Johnson et al. (2010), and Liebling & Slegh (2011) showed that more women than men experienced violent sexual rapes and rape-related physical health damages. The authors in the above studies agreed that sexual violence-related physical damages could have disabling physical, mental, and social health implications among the victims.

Several researchers who have examined the consequences of violent rapes in DRC reported that women victims of violent sexual rape in DRC experienced torture before, during, and after rape (Brown, 2013; Carlsen, 2009; Ohambe, Muhigwa, & Mamba, 2005). This view was also affirmed by Acquire Project (2005), Amnesty International (2004), Claude, Lingombe, & Ruminjo (2008), and Culbert et al. (2007)

who maintained that violent sexual rape survivors suffered from constant long term physical traumas due to gynecological damages, including vesico-vaginal and recto-vaginal fistulas, prolapsed uteruses, and other extreme genital damages, untreated STIs/HIV, rape-originated pregnancy or rape-originated births.

In a study of 998 victims of sexual violence who were screened for psychological disorders in South Kivu and North Kivu regions, it was reported that both women and men, 73.3% and 64.5% respectively, experienced targeted brutal rapes by armed groups through the practice of abduction, reckless rape, gang rape, and forced incest (Johnson et al., 2010; Wakabi, 2008). In another study, Cannon (2012) used data from medical records of violent sexual rape victims who received medical care intervention between 1999 and 2010 and reported 25,411 gynecological conditions, many of which were severe cases of trauma treated at Panzi Hospital in Bukavu. The author also reported that 5,812 gynecological surgeries were performed, including 2,551 severe cases of fistula repair (Cannon, 2012).

Armed groups systematically raped women in eastern regions of DRC and caused as much physical damage as possible, including pregnancy, destruction to woman's reproductive system, and infection with STDs and HIV/AIDS (Bartels et al. 2010). Among reported difficulties that rape victims experienced included physical health consequences resulting from violent sexual rape. In their study, Bartels et al. (2010) reported that many rape survivors who showed up for care experienced one or more of the following conditions, including pregnancy (6%), severe pain in the pelvis (22%), lumbar region (11%), and abdomen (7%). The authors also stated that 36% of the

survivors were concerned after rape about their chances of being infected with HIV/AIDS and other STDs due to their inability to access immediate seek care and prophylaxis. Davis (2009) who addressed the consequences of sexual rape violence against women in eastern DRC indicated that the effects of STI infection were disastrous in terms of permanent damages to the women's reproductive organs. The author expressed concern that the effects of violent sexual rape extended to 27% HIV infection among survivors in Eastern DRC, with devastating fistulas, urinary and fecal incontinence, and the destruction of the whole physical, moral, and emotional being (Davis, 2009).

Another form of atrocity that was practiced in eastern DRC was foreign object insertion type of rape, by which perpetrators adopted torturous methods of brutally injuring women's genital and reproductive body parts (Gingerich & Leaning, 2004; Mehta & Rumble, 2007; Reseau des Femmes pour un Development Associative, Reseau des Femmes pour la Defense des Droits et la Paix (RFDA/RFDDP), 2005; Thomas, 2007;). Kasangye et al. (2014) stated that survivors of violent sexual rape were brutalized by the insertion of foreign objects, including wood sticks, bottles, riffle barrels, hard bananas, and often covered in chili pepper. Several researchers provided description of foreign object insertion rape, which was characterized by forcing broken bottles, unpolished wood sticks and rifle barrels into a woman's vagina (Amnesty International, 2004; Bartels et al., 2010; Doctors Without Borders, 2007). Foreign object insertion type of rape also consisted of using knives, machetes, bottle glass, or razor blades to cut off women's genitals, or simply blowing a woman's genitals apart by rifle blast to kill her painfully after rape (Amnesty International, 2004; Bartels et al., 2010; Carlsen, 2009;

Doctors Without Borders, 2007). This type of rape was also acknowledged by Bosman, 2007) who described the sexual rape in DRC as characterized by unspeakable cruelty, including beating, stabbing, cutting, and severe genital mutilation by sticks, glass, knives, and guns. The findings in the above studies are a clear description of survivors' painful memories and experience of traumatizing events because of torturous burning, genital mutilation, and forcibly witnessing others being blown up in their genitals by riffle blasts after rape. Violent sexual rape survivors in eastern DRC continue to experience various types of traumas with serious short- and long-term physical health consequences.

Recent studies have documented a number of medical signs of physical damages in most survivors of sexual violence, including severe fistulas in the rectum and vagina; prolonged bladder incontinence; dysfunctional legs and hips; severe wound infections; vaginal and anal tears and scars; scars on the body; infection with numerous STDs and HIV/AIDS; and unwanted pregnancies (Autesserre, 2012; Baaz & Stern, 2010; Barker, Levtov & Slegh, 2014; Kasangye et al., 2014; Schnurr & Swatuk, 2010). To elucidate the types of brutal rape-related physical damages, Kasangye et al. (2014) classified them into three categories: rape-related rectal and vaginal fistulas, rape-related sexually transmitted diseases, and rape-related pregnancies and rape-conceived/born children.

Rape-related anal and vaginal fistulas are common physical damages that lead to impairment of the victims' physical, mental, and social functionality (Bartels et al., 2010; Kasangye et al., 2014). About 95% of fistulas treated in DRC originated from trauma (Kasangye et al., 2014). About 68% of the surgical interventions performed in Goma in 2004 were to repair traumatic fistulas; and 5,987 fistulas were repaired in 2012

(Kasangye et al., 2014). Severe rape-related and disabling damages were characterized by evident anal and vaginal fistulas; tears in the vagina and anus; severe pelvic, lumbar, and abdominal pain; genital wounds because of genital mutilation; broken pelvic bones; urinary or fetal incontinence; reproductive abnormality; internal and external bleeding. Such physical trauma is usually accompanied with prolonged severe pains, depression and stress (Amnesty International, 2004; Baaz & Stern, 2011; Bartels et al., 2010; Brown, 2012; Kasangye et al., 2014).

Sexual rape in DRC puts the victims at high risk of acquiring sexually transmitted diseases and HIV/AIDS (Mukwege & Nangini, 2009). Findings in many studies that focused on violent sexual rape in eastern DRC indicated that traumas resulting from forced sexual rape and unprotected sexual violence might be associated with elevated biological risk of the spread of STDs and HIV/AIDS (Bworn, 2012; Duroch et al., 2011; Kasangye et al., 2014; Mukwege & Nangini, 2009). In another study, Culbert et al. (2007) found that the rate of HIV prevalence in the eastern city of Bukavu, DRC was about 4%-5% prior to the conflicts, but between 2002 and 2006, that rate jumped to 19% of positive HIV cases. Brown (2012) stated that about 60% of rape perpetrators in Congo had HIV, and this put the women at a 60% rick of acquiring HIV for every sexual rape event. These results confirmed Amnesty International (2004) early report that many women survivors who participated in their study had HIV and other types of STDs.

Like in normal consensual intercourse, sexual rape during war and intimate partner sexual rape may result in unplanned pregnancy and rape-born children as a direct consequence. A 1996 cross-sectional study involving 4,008 adolescent women victims of

rape in the US indicated that 12 to 45.5% of rapes resulted in pregnancy (Begley, Heavey, 2012). Malecha, McFarlance, Watson, Gist, Batten, Hall,…et al., (2005) studied 148 victims of sexual rapes by intimate partners in the UK and reported that 20% of sexual rape resulted in pregnancy. Bartels et al. (2010) also found that of 1,021 violent rape survivors who received care at a health center in Eastern DRC, 6% had rape related pregnancy, but the chance for a sexual rape to result into unwanted pregnancy was 37% higher among those who experienced sexual slavery.

Women survivors of violence experience lifelong painful trauma when they carry sexual-rape related children. RFDA/RFDDP (2005) states that ostracism and stigmatization of women survivors in DRC is worsened when rape results in unwanted pregnancy, which reflects a tangible mark of possible HIV and other STDs infection and the most permanent consequence of sexual rape. Further, the birth and presence of rape-born child causes long-lasting psychological damage, loss of self-esteem, and loss of confidence among women survivors of sexual rape; and constitutes a lifelong symbol of bad memories, shame, stigmatization, and rejection (Kasangye et al., 2014; RFDA/RFDDP, 2005).

The body of literature provides compelling evidence that physical injuries and pain resulting from violent sexual rape add to the list of health implications possibly targeted for use as a strategic weapon of war. While in most studies researchers acknowledge the violent sexual rape against women as war strategy aimed at creating chaos and the humiliation local men and the whole community, reports on the effects of sexual violence on men was limited. In this analysis, I intended to extend knowledge

about relationship between physical health variables and chronic pain and depression experienced by violent sexual rape victims in eastern DRC.

Mental Health Effects Variables

Being a victim of violent sexual rape may be associated with prolonged traumatizing memories as well as disturbed mental status, shame, and feeling worthless. Schalinski et al., (2011) investigated the mental health effects of violent sexual rapes and the female dissociative response to such brutality in a prolonged crisis setting in eastern DRC. Measures included the number of those who experienced depression, PTSD, level of dysfunctional dissociation, and disturbing painful events (Schalinski et al., 2011). The study showed that over 96% of the subjects experienced sexual assault, 73.6% experienced physical assaults, 60.4% experienced abduction, 69.8% witnessed cruel events of armed assaults, and 62.3% witnessed homicides (Schalinski et al., 2011). Those who met the depression criteria as defined by the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* included 67% of all respondents, and 32% showed no sign of PTSD (Schalinski et al., 2011). In the study findings, the authors showed that accumulated exposures to violent sexual rape events through self- experience as victims or by watching traumatizing sexual rape events were associated with the increased severity of PTSD. After conducting simultaneous regression analyses, the authors also found that shutdown or dysfunctional dissociation could have value in forecasting the level PTSD (adjusted $R^2 = 42$, $n = 52$ $p < .05$ for Model I; adjusted $R^2 = 43$, $n = 50$ $p < .001$ for Model II respectively) that further could facilitate the correlation between dissociation and depression (Schalinski et al., 2011).

In a few other studies including Campbell et al. (2008); Chen et al. (2010); Leibling & Slegh (2011); Lawry et al. (2011); and Kelly (2010), victims who experienced violent sexual rapes were more likely to experience increased risk of psychological disorders (anxiety, PTSD, and stigma, rejection, and mental health consequences. These findings were supported by Bartels et al. (2013), Lawry et al. (2011), and Meger (2010) who demonstrated that the violent sexual rapes were practiced as a strategic weapon in DRC armed conflict to weaken the society by degrading the men and women in the community, disrupting families, imposing fear, and inflicting serious mental and physical health effects on the victims. The majority of women victims of violent sexual rape (90%) were found deeply traumatized, with multiple serious mental and social consequences, including anxiety, insomnia, nightmares, self-loathing, aggression, memory loss, fear, withdrawal, and abandonment (Bartels et al., 2013). Wood & Richardson (2013) found that the health status of violent rape victims in eastern DRC was worsened by the impunity enjoyed by violent rape perpetrators, severe human rights abuse, dysfunctional health care systems and healthcare infrastructures, and poorly integrated health services including HIV and TB care services.

According to Brown (2012), physical symptoms are concerning because of their psychological impacts. In a 14-month study that assessed the psychosomatic support for 178 women victims of sexual rapes in the armed conflict in Congo, Brazzavilee, 54.1% of them were found with anxiety disorders and 24.6% had acute stress disorders (Baubet, Gansou, Hustache, Mbemba, Moro, Roptin, …& Souza, 2009). When the Global Assessment of Functioning Scale (GAF) was used, 89.3% of victims were found with

extreme or medium impairment prior to care, but this improved significantly to 28.6% after psychological care was provided (Hustache et al., 2009). The findings indicated a strong relationship between conflict-related sexual rape and the development of mental illness symptoms, which would otherwise be lessened if the victim had psychological health care and social support (Hustache et al., 2009).

Violent sexual rape may have serious mental affects not only on the victims, but also on the perpetrators. A study by Bourke (2012) highlighted an old view that bad events, especially those involving violence, often cause simultaneous effects on both victims and perpetrators. However, the study focused more on violent sexual rapes, bodily pain and trauma, and used psychiatric, psychological, forensic, and laws to understand the victims of sexual assaults in the United Kingdom and US from the 19th century to present (Bourke, 2012). The author argued that since the1860s, psychological suffering was not acknowledged as affecting victims of sexual rape (Bourke, 2012). Rather, victims of sexual rape were known to experience physical pain (Bourke, 2012). It was only after the 1970's that rape victims were legally acknowledged to experience both physical pain and mental suffering (Bourke, 2012). The author's conclusion reflected and agreement with the feminists' viewpoint that forced sexual rape deeply wounds the victims' feelings, honor, and happiness, creates psychic damages, and cause permanent effects of sexual identity, stigmatization, and PTSD (Bourke, 2012). This study served as the starting point of the trend toward acknowledging sexual rape as a potential cause of disabling physical pain and long-term mental suffering experienced by the victim.

Sexual rape by familiar perpetrators can cause mental problems that may affect the victims' immediate family members, including children, spouse, neighbors, friends, and community. Kalisya et al. (2014) explored sexual exploitation of children and youths and their vulnerability to brutality in eastern DRC by analyzing 440 children aged 10-17 years, and 54 adult cases of violent sexual rape. The study findings showed that the majority of cases (74%) resulted from sexual rape by a perpetrator who was familiar to the family, compared to 13% of cases caused by attacks from military personnel (Kalisya et al. Many children and youth (53%) experienced a longer delay in seeking care within 72 hours; most survivors (84%) were found with physical injuries, including hymeneal tears, anal cuts, and cuts of the posterior fourchette (Kalisya et al., 2014). Findings also indicated that 21% of adolescents and 7.7% of adults had positive pregnancy tests, and 2.9% of children and 5.3% of adults tested HIV positive (Kalisya et al.). While this study addressed the damages experienced by the majority of youth survivors (75%), it did not provide elaborated analysis of the psychological suffering experienced as a result of chronic physical pain, shame, and damages to the reproductive health.

In most of the studies described above, researchers demonstrated the potential psychological effects experienced by victims of violent sexual rapes, mainly due to negative memories, self-blame, stigma, and feeling worthless. The connection between physical pain and psychological problems was only acknowledged in a few studies. This is an indication that the relationship between physical injury and mental effects as impacts of violent sexual rape among victims DRC may still be misunderstood. In this analysis, I intend to expand knowledge on the correlation between mental health

variables (PTSD and feelings of worthlessness) and chronic pain and depression for victims in eastern DRC.

Social Health Effects Variables

Survivors of violent sexual rape may suffer from social health damage when they experience shame, stigma, abandonment/rejection, and exclusion. Violent sexual rapes can demoralize the community (Brown, 2013; Menna, 2010). Several researchers have stated the existing belief that during armed conflict in DRC, violent sexual rape served as a control instrument for intimidation and exertion of power to cause fear; and to enslave and to control the victims, with the desire to bring pain, humiliation and punishment to the community (Hanlon, 2008; Mukwege & Nangini, 2009; Trenholm et al., 2011). The authors also added that violent sexual rape has been used as an effective weapon for the destruction of communities and society (Hanlon, 2008; Mukwege & Nangini, 2009; Trenholm et al., 2011). Both Melber (2011) and Card (2007) stated that war-related rape was a cruelty with a political motivation aimed at causing social death through hostile dominance, degradation and possession.

Terrorizing women was used to threaten all community members. Card (2007) explained social death as a form of atrocity aimed at putting the whole society into chaos. The author emphasized that the genocidal cruelty against women in eastern DRC systematically caused social death of the community, especially when violent sexual rapes were used to spread HIV and other infectious diseases and to force impregnation (Card, 2008). Further, Card maintained that women in the community were left with

severe physical/reproductive and mental damages in order to shame or stigmatize them and annihilate the community.

Regardless of where violent sexual rape takes place, survivors may often have difficulty adjusting to social norms in the community because of the resulting devastating marks of shame, humiliation, and stigma. Hall et al. (2014) conducted a randomized study of the effects of cognitive therapy in which they argued that the probability of experiencing PTSD, depression, anxiety, and social maladjustment is ultimately high among victims of sexual violence. During a 6-month period, the authors compared group-based cognitive processing therapy with individual support available to violent sexual rape survivors (Hall et al., 2014). The study results showed that 88% of those recruited for the study had previous or recent violent sexual rape experience and endured increased levels of distress and functional impairment symptoms (Hall et al., 2014). The authors reported that victims of violent sexual rape are usually disallowed by their families, including their parents, husbands, siblings and sometimes their children and they are abandoned and excluded from the social life of their community (Hall et al., 2014). This study demonstrated that sexual rape victims are more likely to experience severe and permanent interpersonal traumas, increased social health and mental health problems when they lose their social wealth following the episode of sexual violence and have no one else to turn to.

In a study of the many interrelated health causes for social rejection of rape survivors in eastern DRC, Kohli et al. (2013) analyzed data from 27 in-depth interviews with sexual violence survivors, their spouses and family members. The study findings

showed a likelihood of physical and mental health problems among the survivors (Kohli et al., 2013). The findings also showed survivors' strong belief that they were psychologically and physically different due to ongoing pain emanating from violent sexual rape (Kohli et al., 2013). The authors argued that a constant feeling of shame in front of their own children and family members often increased the development of mental health symptoms, such as pressure headaches, mental disturbance, shame-faced and madwoman looking, and the feeling of complete loneliness and isolation. When rape survivors constantly experience the above described mental and physical health symptoms, they may experience a decreased interest in social interaction, reduced appetite, limited physical functionality and inability to compete. Additionally, victims may make be unable to gain back the feeling of a normal sense of their life, and such a condition may result in suicidal thoughts.

In their case study, Kohli et al. (2012) focused on the programs established by Foundation Rama Lavina (FORAL), a local non government organization in eastern DRC), including the mobile clinic services, clinical evaluation and monitoring, and support to treat PTSD, anxiety, and depression. Of the 772 women treated within 12 months, 85% were found to be survivors of violent sexual rape; most survivors (83.6%) showed STI symptoms and each of the survivors showed at least two symptoms of mental illness (Kohli et al., 2012). Depression symptoms were more common, with 43% who had sadness, 22.8% who spoke slowly, and 20.8% who sought to justify the assault (Kohli et al., 2012). When the PTSD symptoms were analyzed, 34.4% felt shameful, 22.5% were embarrassed, and 17.5% had trouble sleeping (nightmares and insomnia). In

terms of anxiety symptoms analysis, 29.8% were shown to have troubled state of mind or anxiety, and 20.6% acted with panic (Kohli et al., 2012). Results also showed that the majority of women (72.4%) completed treatment, while only less than half of male partners (40.8%) completed the treatment.

The strength of the study was the ability to bring the healthcare services within reach of the community of those who needed it most. The number of male survivors and partners who adhered and completed the treatment program was very low compared to the number of women survivors who received the same treatment. This FORAL program accomplished a social change in the lives of many victims who could have otherwise developed severe and disabling illness from these symptoms. The troubled state of mind may be unhealthy for the survivor population because of total disconnection with self, family, and society, in combination with daily thoughts of guilt and feelings of worthlessness, lack of resources and support. Both, social support and emotional support are important factors to aid in the prevention of prolonged physical pain and mental suffering.

In the studies discussed above, the authors connect social health variables of shame, stigma, abandonment/rejection, and exclusion to the experience of violent sexual rape. There is no previous study on these social health variables that could facilitate a comparison of pre-war social health conditions of individuals to post war social conditions. As discussed in the background section, DRC is a country that had been autocratically governed by authorities who had been focused on stealing the national wealth at the expenses of their own people. Therefore, it may be difficult to argue that the

recent war events were the only source of social health conditions. In this study, I intended to expand knowledge on the correlation between social health variables (social rejection and support from family/friends) and chronic pain and depression among violent sexual rape survivors in eastern DRC.

Review and Synthesis of Studies Related to Research Questions

In this study, the associations between the impacts of violent sexual rape and chronic pain and depression experience among female victims in Eastern DRC were investigated. Emphasis will be put on a number of ecological variables. The analysis also focused on assessing the health variables including: physical health effects, mental health effects, and social health effects. Fistula and Chronic Pain, injuries and illness experience were assessed using the DHS7-Module-Fistula Questionnaires developed by DHS & USAID (2016) and LSMS developed by Bruck et al. (2013). PTSD and Depression influencing factors were measured based on factors identified in the PANAS-X as developed by Watson et al., (1988). Social Rejection and Social Support by Family/Friends were evaluated using the MOS Social Support Survey developed by the Rand Corporation (Sherbourne & Stewards, 1991). The review and synthesis of studies related to the research questions included the follow:

Physical Health Effects and Chronic Pain and Depression

Research questions one (RQ1): Is there an association between physical health effects (including fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, and the PANAS-X? Research question two (RQ2): Is there an

association between physical health effects (including other violent rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X?

Analyses of recent and previous armed conflicts in Afghanistan, DRC, Kosovo, Liberia, Rwanda, Soudan, Sri-Lanka have led researchers to agree that, in our time, war-related violent sexual rape is systematically planned as a war-winning strategic weapon that was used to conquer and destroy communities by inflicting death, injury, pain, terror, humiliation, and destruction of women (Akinsulure-Smith, 2014; Christianson et al., 2012; Duroch et al., 2011; Liebling et al., 2011; Roka et al., 2014; Virginie et al., 2010). In their retrospective descriptive cohort study, Roka et al. (2014) looked at the sexual violence programs during and after conflict in Eastern DRC and stated that violent sexual rape is detrimental to survivors' medical and physiological wellbeing. Whereas the population in eastern DRC largely experienced social destabilization as a result of conflict-related displacement and traumatic experiences influenced by abusive behaviors of the armed perpetrators, women were particularly targeted for systematic sexual rape and destruction as means for male's humiliation, dominance, and resources control (Roka et al., 2014). Akinsulure-Smith (2014) stated that violent sexual rape had far-reaching consequences on women survivors since it did more than destroy their sense of identity by also producing their continuous experience of physical and mental impacts following the brutal acts against them. In each of these studies, the authors highlight the devastating nature of war-related violent sexual rape and its physical health, psychological health,

and social health implications among rape survivors. In countries or regions with active armed conflicts, sexual rape actions are often brutal, and mostly perpetrated by armed men (Roka et al., 2014).

HIV infection as a result of violent sexual rape is a real physical health implication of mass rape, especially in sub-Saharan Africa (Virginie et al., 2010). Mass rape during war in eastern DRC appears to have increased the incidence of HIV infection among the survivors (Virginie et al., 2010). However, other authors acknowledged the lack of adequate data to support this argument because most rape victims and perpetrators had not been tested prior to the violent sexual rape event (Virginie et al., 2010).

In this study, the intent was to clarify the association between the physical health effects variables including fistulas and the chronic pain and depression, and other sexual rape-related injuries and chronic pain and depression. The result of this investigation could expand the knowledge of the association between physical health effects variables (fistulas and other sexual rape-related injuries) and chronic pain and depression among the victims of violent sexual rape in eastern DRC.

Mental Health Effects and Chronic Pain and Depression

Research questions three (RQ3): Is there an association between mental health effects variables (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, DHS7-Module-Fistula Questionnaire, the MOS Social Support Survey, and the PANAS-X scale? Research question four (RQ4): Is there an association between mental health effects variables (including feelings of worthlessness) and the chronic pain and

depression experience among women victims of violent sexual rape in eastern DRC as measured by the MOS Social Support Survey, and the PANAS-X scale?

Most researchers conclude that the physical health consequences resulting from sexual rape were the goals of using rape as a strategic weapon to win over the enemy during war. The majority of studies report that victims of violent rapes experience psychological health damages that were believed to be the result of shame, horrifying memories, and self-blame. A limited number of papers suggest a possible relationship between physical health effect (injuries) and mental health problems.

In eastern DRC, the preparation of severe physical and mental damage against women has been successfully used to destroy and demoralize families, and undermine cultural and political solidarity (Broekaert et al., 2014). Undoing the devastating damages of violent sexual rape requires addressing the issue of gender-based violence. Gender-based violence has been identified as chief challenge to peace and healing in eastern DRC (Baaz & Stern, 2013; Lander, 2014). War-related rape in eastern DRC can be referred to as a sexed story because it has been a result of men's sexual desire (Lander, 2014; Mertens, 2013; Price, 2013). Both authors also showed that in eastern DRC, the war empowered armed men who uncontrollably exposed their sexual tendencies. As a gendered story, these tendencies became a display of militarized ideals of masculinity through which perpetrators targeted women as means to humiliate and feminize the male enemy, his community, and his nation (Lander, 2014; Baaz & Stern, 2013; Mertens, 2013; Price, 2013).

The rampant violent sexual rape in eastern DRC, however, targeted both women and men. Several empirical studies show that sexual violence during war in eastern DRC affected thousands of men and women, both young and adults since 1996 (Bartels et al., 2013; Johnson et al., 2010; Lawry et al., 2011; Meger, 2010). However, female experience of violent sexual rape may differ from that of males, in terms of physical, mental and social health consequences. In his study of sex differences in trauma and posttraumatic stress disorder, Tolin (2006) analyzed data from previous research works and he suggested that women were at a greater risk of developing PTSD than men and boys. The author also stated that one main reason why women are more likely than men to be at a higher risk of developing PTSD is that they are more likely to be victims of potentially traumatic events (PTEs) (Tolin, 2006).

Autesserre (2012) stated that the sexual rape and torture of women and girls has been taking place more than any other form of violence. On the one hand, the author said that both men and women victims bore the consequences with serious physical and emotional impacts characterized by inflicted bodily injury, horrific torture, stigma, and rejection (Autesserre, 2012). On the other hand, the author argued that looking at the violent sexual rape in the DRC as an issue only affecting women and girls was counterproductive (Autesserre, 2012). Not acknowledging the men victims of violent sexual rape would hinder the advocacy efforts for the cause of thousands of affected men and boy survivors of brutal sexual rape (4% to 10%) and prevent the possibility of engaging other men constructively into the process of breaking the cycle of rape-related sexual violence (Autesserre, 2012).

In a study of 998 households, Johnson et al. (2010) examined the occurrence of sexual violence and human rights violations in eastern DRC. With a 98.9% response rate, women reported experiencing more sexual violence 39.7% (95% confidence interval [*CI*], 32.2%-47.2%; n=224/586) than men 23.6% (95% *CI*, 17.3%-29.9%; n=107/399) (Johnson et al., 2010). The authors also examined the relationship between these atrocities and physical and mental health among the resident populations in eastern DRC. The measures included sexual violence prevalence and characteristics, symptoms of MDD and PTSD, human rights abuses, and physical and mental healthcare needs among Congolese adults in specific territories of eastern DRC (Johnson et al. 2010). The authors stated that the majority of households (67%) reported human rights incidents related to the armed conflict, and 41% of all adult populations met the criteria for MDD wile over 50% met the criteria for PTSD.

Although the specific impacts and characteristics of violent sexual rapes in DRC may differ from one affected region to another, Duroch et al. (2011) affirmed many researchers' views that the practice of violent rapes was a strategic war mechanism, which had devastating effects on the victims' health in Eastern DRC. The authors maintained that the magnitude of physical, psychological, and social suffering experienced by the victims signaled a pivotal role of the war commanders who strategically ordered soldiers to physically, morally, and socially harm civilians, especially women in order to destroy or wound the community. In this study, I intended to assess the association between the psychological health effect variables (PTSD and feelings of worthlessness) experienced by violent sexual rape survivors and the chronic

pain and depression experience. The results of this inquiry could provide insightful information that might feel the gap in the literature.

Social health effects and chronic pain and depression experience

Research questions five (RQ5): Is there an association between social health effect variable (including social rejection and family/friend support) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the MOS Social Support Survey and PANAS-X scale; Research question six (RQ6): Is there an association between social health effect variable (including support from family/friends) and chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the MOS Social Support Survey and PANAS-X scale?

Sponsoring harm against civilians during war promotes terror, impunity, social disturbance, and perpetuation of conflicts (Duroch et al., 2011). Liebling et al. (2011) described the devastating stigma, social rejection, abandonment, injustice, victimization, lack of resources, fear and shame that may be associated not only with being a victim of rape, but also with the knowledge and fear of being infected with HIV or AIDS. Such attitude may become a traumatic social effect of systematic violent sexual rape that hampers the need to seek medical care. Since there are no pre-war data reported studying, the social health effects and chronic pain and depression correlation, current information for the war and post war period could not be compared. In this study, I investigated the relationship between social health consequences (social rejection and support from family/friends) and the chronic pain and depression experienced by violent sexual rape

victims in eastern DRC. The results of this analysis could fill the gap of knowledge on relationships between social health effects variables and chronic pain and depression among the target population.

Summary and Conclusion

The literature review included major themes such as consequences of violent sexual rape; relationship between violent sexual rape and chronic pain and depression; relationship between physical health effects, psychological health effects, and social health effects and chronic pain and depression experience. Numerous studies revealed evidence of physical health, mental health, and social health suffering among the majority of survivors of violent sexual rapes (Babalola, 2014; Benyard, 2011; Dossa et al., 2014). Demographically, females in eastern DRC are more likely to experience violent sexual rape and all related health implications than males and females in other regions throughout the county (Brown, 2011; Cannon, 2012). All women are subject to sexual violence but women aged between 14 to over 50 are twice or more likely than other females to be gang-raped, sexually enslaved, and experience major physical health, mental health, and social health consequences (Cannon, 2012; Kasangye et al., 2014). It has been argued that prolonged and disabling physical, mental, and social health consequences might increase the severity of chronic pains, depression and stress (Autesserre, 2012; Kasangye et al., 2014; Slegh, Barker & Levtov, 2014). Women, girls and men victims of violent sexual rape in eastern DRC experience severe physical health effects, mental health effects, and social health damages linked to exposure to brutal killings, sexual torture, sexual brutality, and forced labor (Autesserre, 2012; Kasangye et

al., 2014). Gang-raped victims also experience health consequences resulting from brutal rapes characterized by genital mutilation by using razor blades, and machetes or knife, and the insertion of hard, burning, sharp, and pepper coated objects, including broken bottles wood sticks, green bananas, riffle barrels (Autesserre, 2012; Baaz & Stern, 2011; Kasangye et al., 2014).

Violent rape-related physical health impacts are characterized by disabling damages such as severe vaginal and anal fistulas, chronic pain of the pelvic, lumbar, and abdomen; broken pelvic; urinary and fetal incontinence; reproductive damages; and internal and external bleeding (Autesserre, 2012; Schnurr & Swatuk, 2010; Slegh et al., 2014). Survivors of violent sexual rape in eastern DRC are more likely to be exposed to STDs and HIV, and rape-related pregnancy; to experience stigmatization, humiliation, rejection and isolation by family or community, (Brown, 2012; Kasangye et al., 2014),

The significance of investigating chronic pain and depression among the victims of violent rapes in DRC, especially in the eastern part of the country, was supported by the absence of literature that focuses on the relationships between physical health damages, mental health damages, and social health damages and chronic pain and depression experience among the rape survivors in DRC (Casey et al., 2011; Hall et al., 2014). In this investigation, I tested the associations between sexual rape-related physical health effects, mental health effects, and social health effects and chronic pain and depression experience among the women victims of violent rapes in eastern DRC. The findings could extend knowledge about the relationships between violent sexual rape-related chronic pain and depression experience and physical health damages (fistulas and

other sexual rape-related injuries), chronic pain and depression and mental damages (PTSD and feelings of worthlessness), and chronic pain and depression and social health damages (social rejection and support from family/friends).

Upon the study completion, the knowledge of the correlations between chronic pain and depression among sexual rape survivors and the physical health effects, mental health effects, and social health effects could serve as knowledge-base for health care services providers, researchers, and health educators for better reframing strategies for protecting and improving physical, psychological, and social health of the victims. This study results could also help those involved in humanitarian activities, such as medical and public health programs, aid organizations, peace keeping missions, government and non-governmental organizations, and health policy experts in identifying top public health priority issues and the strategies useful for the reduction of the occurrence of violent sexual rapes during and after armed conflicts. Due to the distinct nature and magnitude of the violent sexual rapes in eastern DRC, this study could provide insights about the need for improved access to basic and mental health care services as priority in addressing the matter of basic human rights protection and suffering of vulnerable populations in armed conflict zones. This chapter established that the existence of a gap in literature about the relationships between ecological variables (physical health effects, mental health effects, and social health effects) and chronic pain and depression among women the victims of violent sexual rape in eastern DRC. In the next chapter, the research methods were discussed, including the introduction, documenting the various components of quantitative method identified for this study.

Chapter 3: Research Method

Introduction

The purpose of this chapter was to measure the health consequences of violent rapes among women victims in eastern DRC. In this chapter, I will document the quantitative method that I used to investigate the relationship between the physical health effects variables (including fistulas and other sexual rape-related injuries), mental health effects variables (PTSD and feelings of worthlessness), and social health effects variables (including rejection and support from family/friends) and chronic pain and depression experienced by women victims of violent sexual rape in eastern DRC. The chapter will also include a discussion of the population and sampling plan that were used in this study, including the recruitment procedures and inclusion and exclusion criteria. The chapter will conclude with a discussion of data collection and analysis, including information on instrumentation and materials and protection of human participants.

Research Design and Rationale

I used the quantitative approach to investigate the consequences of violent sexual rape and its relationship with the chronic pain and depression experience of women victims in eastern DRC. The independent variables in the study were the physical health effects (comprising of fistula and other sexual rape-related injuries), mental health effects (comprising of PTSD and feelings of worthlessness), and social health effects (comprising of social rejection and support from family/friends), while the dependent variables were chronic pain and depression. I collected data by using questionnaire instrument and one-on-one interview techniques, which is an accepted data collection

method in quantitative research (Bowling, 2014; Nyklicek, 2016). This type of technique is also considered to be an effective instrument for data collection because it is economical offers the respondents the opportunity for structured self-report (Polit & Beck, 2012). The quantitative design was appropriate for this study because it allowed me to examine and measure the information to increase knowledge about the relationship between the health consequences of violent sexual rape (i.e., the independent variables) and the chronic pain and depression experience of the victims (i.e., the dependent variables). Because of the objectivity of reporting numerical data, quantitative designs offer the opportunity to compare and summarize data, which could be generalizable or representative (Polit & Beck, 2012).

Considering the specific characteristics of the target population and area of study, the data collection process required me to make one or more trips to the eastern DRC. The success of this study was heavily dependent upon appropriate levels of access to the area and the sexual rape victims (target population) and the trust and commitment of selected study participants. Steps I took to overcome possible access challenges included a strong collaboration with local organizations and communities. Several meetings took place between November 18th and December 1st, 2017, in which heads of local non-governmental organizations offered strong support for this study and assured to facilitate the access of the target population.

Population of Study

The target population for this study consisted of females 18–80 years of age, who survived violent rapes that occurred between 2010 and 2014 in eastern DRC. This age

cohort allowed me to address the gap in research by looking into this specific population group. On the other hand, women victims of violent sexual rape younger than 18 years of age are considered minors and were therefore excluded from the study. Also, women who were raped before 2010, who did not live in eastern DRC during 2010 to 2014, those who are 81 years of age or older, or who are mentally unstable were excluded from the study to eliminate confounding and recall biases. Figure 7 represents the areas in the country that were most affected by violent sexual rape as the occupation by combat factions continued to expand in 2001.

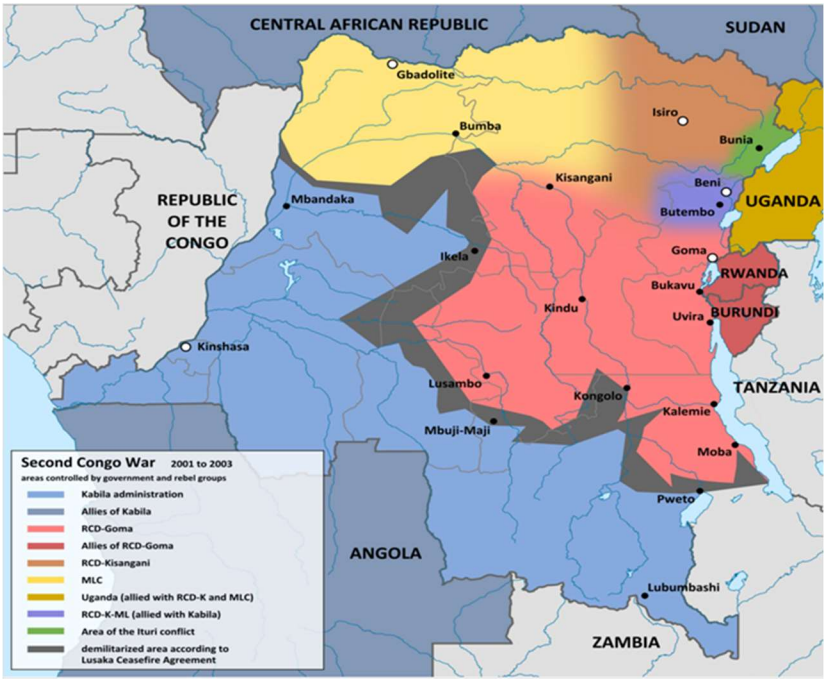

Figure 7. Map of second Congo war, 2001-2003 that reflects the DRC territories held by armed factions since 2001 with overwhelming burden of human rights violation against civilians and widespread violent sexual rape following the Lusaka Ceasefire Agreement 1999 (Stearns, 2011).

I selected the years between 2010 and 2014 as the study period because that was part of the critical period of active armed conflicts and extreme violence against civilians,

during which most documented atrocities and widespread sexual violence occurred in eastern DRC (Peterman et at., 2011). The timeframe of 2010–2014 was appropriate because the targeted participants who survived rape during that time could still be easily traced and identified. On the contrary, many of those who were victims of violent sexual rape prior to 2010 may have died or moved from the area to survive, and women who survived violent sexual rape after 2014 could still be under treatment or experiencing continuous emotional and psychological memories and traumas as result of the violent attacks (Hall et al., 2014; Kohli et al., 2012; Peterman et al., 2011).

Although human catastrophe involving mass killing and widespread violent rapes were prevalent in most countries province, some areas (cities or towns) were more affected than others (Laudati, 2013). I selected the eastern province of South Kivu because it was the eastern DRC province that was most severely affected by deadly violence and brutal rape (Laudati, 2013; Steiner et al., 2009). These severely-affected provinces and cities in the country included the Noth Katanga province (cities of Kalemie, Kongolo and Moba); the Maniema province (city of Kindu); the North Kivu province (cities of Beni, Butembo, Masisis, and Walikale); the Orientale province (cities of Kisangani, Isiro, Bunia); and the South Kivu province (cities of Bukavu, Kabare, Kalehe, Mwenga, Sange, Shabunda, Uvira, and Walungu; Laudati, 2013; Steiner et al., 2009).

Women and girls in these eastern regions, particularly in North Kivu and South Kivu provinces, were severely affected by violence through brutal rape and were left with several health consequences (Bartels et al., 2010; Coleman, 2014; Davis, 2010). In

studying the violent sexual rape in eastern DRC, Bartels et al. (2010) also reported the International Rescue Committee count of 40,000 cases in 2003, a record of 20,517 cases by Malteser International between 2005 and 2007, and 27,000 cases recorded by the United Nation in 2006. Kelly et al. (2011) stated that more than 15,000 violent rapes took place in 2009. The overall number of female victims of violent sexual rape in eastern DRC from retrospective studies was estimated between 1.69 and 1.80 million (Petrman & Palermo, 2011).

Sampling and Sampling Procedures

Due to the unique time, space, and people characteristics being evaluated and the resources available in relation to the target populations in this study, I used nonprobability, purposive, convenient sampling. Convenient sampling allowed me to uniquely focus on assessing the association between the independent variables and the victims' chronic pain and depression experience, while paying attention to possible confounding variables (see Bruck et al., 2013; Trochim, 2006). Convenient sampling is a recognized sampling option in quantitative research when the larger target population cannot be reached (Bruck et al., 2013; Polit & Beck, 2012).

I estimated the sample size for this inquiry by using the statistical sample size calculation for multiple regression analysis. According to Green (1991), two important reasons why multiple regression analyses may be conducted include (a) the interest in the multiple R value for statistical significance and (b) assessing the beta (β) weight for the statistical significance. Because I was more interested in understanding the predictors that lead to statistical significance or statistical power in this study, my focus was more on

testing the beta (β) weight. In this case, Green's recommended formula was $N \geq 104 + k$ (k equals the number of independent variables). The total number of independent variables identified in this study was six. Therefore, the sample size calculation equation $N \geq 104 + 6$, $N \geq 110$ was used. Using the G* Power 3.1.9.2 sample size calculation formula with a total number of independent variable effect size $F^2 = 0.35$ and $\alpha = 0.01$, this computation resulted in a total of 158 samples, with a power ($1 - \beta$ *error* = 0.9999). Considering both results 110 and 158 valid, I elected to use 150 as sample size for this study. This number met Green's rule for a multiple regression analysis when focusing on the statistical significance rather that the *R* effect.

I focused the process on sampling only those who were available. Because convenient samples are nonprobability samples that are used to evaluate the cause-effect relationship, this procedure still works well even when the specific probability and information about the population being selected is not available (Bruck et al., 2013; Polit & Beck, 2012). I recruited a sample of 150 women survivors of violent sexual rape to participate in this study. The recruitment of participants and process were facilitated by a local nonprofit organization that serves the cause of women and children victims of violence and sexual rape in eastern DRC. The organization had preexisting groups of women survivors of sexual violence whom they serve within the target area that was useful for sample recruitment process.

Procedure for Recruitment, Participation, and Data Collection

I recruited all participants for this study from the towns in the targeted areas in eastern DRC. The recruitment of study participants was based upon meeting the

established eligibility criteria, which included being a female, aged 18 to 80 years old, and a victim or survivor of violent sexual rape in the eastern DRC between 2010 and 2014. All victim participants had to have resided in eastern DRC during the period of the occurrence of sexual assault.

The recruitment and participation in the study were voluntary. Participants were registered through a not-for profit, non-governmental organization in South Kivu province in eastern DRC, which is devoted to empowering women and educating children in Congo to motivate and support young people to go back to school and provide vocational skills and training to ensure socioeconomic reinsertion for efficient community empowerment. Collaborating with this organization was critical because it strives for eliminating hunger through farming using organic, integrated approaches to feed war-affected children and help them get reenrolled in schools. The organization also has a research component and a trained team of local researchers in qualitative and quantitative interviews and data collection. This local organization has collaborated with the Johns Hopkins University Mental and Public Health Teams for almost 10 years in the area involving research.

In a feasibility meeting on in November 2017, a permission was requested to have access to the women victims of violent sexual rape in the targeted villages or towns. The leader of the local organization granted the permission to access the target population and offered a strong support for this study. Three days prior to meeting with participants, a notification about the study was distributed and communicated in the villages of the target population. The notification was an invitation that target population interested in

participating in the study. After 3 days of the invitation information distribution, an information session was held with the target population in the local community church facilities. This session allowed me to meet with volunteers interested in participating in the study. During the event, I interested screened volunteers for eligibility based on the established eligibility criteria, and consequently, I selected potential volunteer participants. In that information session, the selected participants received the informed consent and information about study requirements.

Additionally, the participants were given the opportunity to ask any questions before their definite decision to participate in the study. To participate in the study, eligible volunteers were required to provide written or oral informed consent, acknowledging that they understood the study participation requirements and their qualifications, and that they agree voluntarily to participate. Due to the sensitivity of the issue that was being investigated, the vulnerable status of the participants, and to protect their privacy, I offered the eligible volunteers the option to provide oral consent if they did not wish their names recorded. The oral consent was documented in writing using an assigned participant's identifier.

Right after securing the informed consent from participants, I started the survey of participants. This step involved the utilization of questionnaires that focused on the following selected variables: independent variables will include (a) physical health effects (fistula and other sexual rape-related injuries), (b) mental health effects (PTSD and feelings of worthlessness), and (d) social health effects variables (social rejection and family/friend support). On average, 13 surveys were conducted per day. Paper

questionnaires were utilized to collect data and a storage device was used to store the collected data electronically during the data collection process.

To ensure privacy of the participants, data collection was held in a closed environment setting in the local community church facilities. Each respondent was assigned a personal identifier or code for use in recording the responses in lieu of her name in order to ensure privacy. The number/code identifier started with CSR101 for the first respondent, CSR102 for the 2nd respondent, CSR103 for the 3rd respondent and this continued until all the participants were coded in totality. CSR stood for *Congo Study Respondent*, and the last 2 digits of the code signified the order number of respondent.

During the data collection process, I kept paper surveys, storage device, and laptop computer with collected data in a secure locked metal case. After the interviews for data collection were completed, I secured the paper surveys and electronic devices in a protected location where they will be kept for at least 5 years as required by the university or as long as possible, until there will be no reasonable possibility that I will need them. A locked safe location was allocated to store all paper surveys and devices containing collected data.

For the future disposal of collected data, paper records will be shredded and recycled at a proper time, instead of carelessly tossing them in the garbage. The disposal of data stored on USB drives will require a physical destruction of the storage device. Any records stored on a computer hard drive will be erased using commercial software applications designed to remove all data from the storage device.

The collection of data to evaluate independent and dependent variables involved the use of questionnaires instruments, including: (a) the LSMS developed by Bruck et al. (2013), (b) the DHS7-Module-Fistula Questionnaire developed by DHS & USAID (2016), (c) the MOS - Social Support Survey developed by Sherbourne & Stewards at the Rand Corporation (1991), and the PANAS-X) developed by Watson et al., (1988). To accommodate the participants in the data collection process and to protect their privacy, an arrangement for private settings was made with local church leaders at the time of recruitment. To collect data for each study variable, sets of structured questionnaires were presented in English and French (two of the official languages of DRC). For eligible participants with French language limitation, an interpretation was provided in Swahili by the researcher. In addition to the informed consent, data collection instruments included:

- The LSMS is a survey instrument designed to collect data on a variety of variables among conflict exposures and violence-affected populations (Bruck et al. 2012). In this study, I utilized the LSMS consisting of conflict- and violence-related questionnaires to address Harm and Health consequences or physical and social health variables. The LSMS questionnaires was appropriate for this study because they are often used to capture data about individual's physical health effects experience and link that experience to psychological distress resulting conflict-related fear, family separation, low connectedness, death, and abduction (Bruke et al., 2013).
- The DHS7-Module-Fistula Questionnaire is one of the four standard model questionnaires that are often used by the DHS program to collect comparable

health data across countries. These model questionnaires include the household questionnaire, women's questionnaire, man's questionnaire, and the biomarker questionnaire used. I selected to use the DHS7-Module-Fistula Questionnaire, an 11-item instrument, to evaluate participants' experience of fistula resulting from violent sexual rape by assessing the descriptors characteristics. In this study, the use of the DHS7-Module-Fistula Questionnaire instrument was critical for the evaluation of fistula experience among sexual rape survivors of eastern DRC.

- The MOS - Social Support Surveys (SSS) is a 20-item multidimensional instrument that was designed as a comprehensive tool for assessing the social support (Sherbourne & Stewart, 1991). The SSS was appropriate for this study because it helped in capturing the social support and support from family/friends characteristics that may predict vulnerability to mental health conditions among the victims of violent sexual rape.
- The PANAS-X is a 60-item instrument designed to evaluate the extent to which respondents experienced positive or negative affects to depict signs or descriptors of PTSD, Feelings of worthlessness, Depression and other psychological effects, which are important characteristics in the life of violent sexual rape survivors (Watson et al., 1988). Understanding the psychological health factors among sexual rape victims provided revealing information of potential history of PTSD and depression experience which might have

resulted from the victims' traumatic sexual assault events (Charles, Piazza, Mogle, Sliwinski & Almeida, 2013; Shalev, Liberzon, & Marmar, 2017).

Instrumentation

In this study, the following instruments were utilized: The DHS7-Module-Fistula Questionnaire developed by DHS & USAID, (2016), the LSMS developed by Bruck et al. (2013), the MOS Social Support Survey developed by the Rand Corporation (Sherbourne & Stewards, 1991), and the PANAS-X developed by Watson et al., (1988) to evaluate the PTSD and depression symptoms.

DHS7-Module-Fistula Questionnaire

The DHS7-Module-Fistula questionnaire is one of many health survey instruments that were developed by the DHS/USAID (2016). DHS surveys are divided into four types of model questionnaires addressing different health areas, including those focusing on household questionnaire topics, the woman's questionnaires topics, man's questionnaire topics, and the biomarker questionnaire topics (DHS/USAID, 2014; Mallick, 2015). DHS surveys also include the optional questionnaire modules, which have been incorporated as main parts of the core questionnaire for collecting data on a variety of topics, including domestic violence, female genital mutilation, maternal mortality, fistula, and out-of-pocket health expenditures (Mallick, 2015).

Reliability of the DHS7-Module-Fistula questionnaire is known to be high because the surveys are recognized as nationally-representative that provide health data for a wide range of indicators and facilitates monitoring and evaluation of health indices in population, health, and nutrition areas, including fistula (Mallick, 2015; DHS/USAID,

2014). DHS7-Module-Fistula questionnaire focuses on descriptive designs as primary and useful level of analysis for evaluating the health and demographic conditions, identifying underserved population groups, and for tracking the impacts of program interventions in a selected population (DHS/USAID, 2014). With generally large sample sizes from 5,000 to 30,000 households at the national, regional (states), and residential (urban/rural) levels, DHS conduct quantitative methods every 5 years (Mallick, 2015). By applying the standard DHS Surveys and drawing samples based on a stratified cluster design, DHS methods are largely trusted with increased validity for providing strong comparable health data overtime (Mallick, 2015).

LSMS

The LSMS focuses mainly on conflict-related area since its introduction by Bruck et al., in 2010. It was then revised in 2013 and was approved by the World Bank as an integrated surveys mechanism for Living Standard Measurement Study adapted to measuring conflict exposure variables. The LSMS consists of a variety of questionnaire components that focus on understanding the causes and impacts of war at the individual and household levels (Bruck et al., 2013). In this study, I utilized section C of the LSMS comprising structured questions, which focused on harm and health consequences. Twelve (12) item questions of the LSMS instrument were administrated in a total 18 minutes. Permission to use the LSMS instrument was sought and granted by the Stockholm International Peace Research Institute.

The reliability of LSMS survey has been extensively studied. Published empirical studies of LSMS surveys in conflict and post conflict countries and local areas have

indicated consistency (Dabalen, Kebebe, & Saumik, 2012; Debalen & Saumik, 2012, Minoiu & Shemyakina, 2014; Rohner, Thoening & Zilibotti, 2012). When measuring the impact of conflict exposure module in micro-level and concentrated on individual and household, LSMS surveys allow effective collection of information that helps in understanding the cultural, social, economic, and political processes of violent conflict (Bruck, 2013). Justino, Leone, and Slardi (2011) used LSMS in conflict affected Timore-Leste to evaluate the impacts of war on education access and found significant decline in human capital, especially among the youths. The LSMS was also used in Nepal, to study the post conflict variables. Due to self-selection and endogeneity of the variables studied, the results showed biases in assessing the impacts of the war (Pivovarova & Swee, 2011, 2012). However, great disadvantages have been found when the surveys are conducted at micro-level. The main reason for such criticism has been that LSMS at micro-level often fail to identify causal relationships, linkages, and transmission mechanisms which are the important endogenous dynamics of violent conflicts (Bruck et al., 2013).

MOS SSS

The SSS was first introduced by the MOS program of the Rand Corporation in 1991 as an instrument that could facilitate the understanding of social support as a critical factor that affects functioning and well-being (Sherbourne & Stewart, 1991). Designed for a comprehensive quantitative assessment of the multiple dimensions of social support, this multi-trait tool was intended for measuring the functional components of social support based on the theory that social support is important only when it is perceived with functional support value, which is reflected in its effect on individual's functioning

and well-being (Sherbourne & Stewart, 1991). One approach by which social support serves particular function in interpersonal relationships is through the dimensionality of support scaling functions, which include the emotional/informational (involving caring, love, empathy, or affectionate support), instrumental support or tangible support, informational support or guidance support to find, and positive social interaction (Sherbourne & Stewart, 1991). The SSS was also designed to support the structure of a global functional social support index. Several investigations have been conducted to test, this instrument has been validated with a high reliability measure, evaluated as fairly stable (all $\alpha > 0.91$), reflecting thus, a strong internal consistency reliability (Sherbourne & Stewart, 1991. When the construct validity hypotheses and factorial validity were assessed, the overall result showed reflected high reliability of validity as all items measured correlated highly, exceeding the convergent validity criterion (greater than r=0.30, with correlations ranging from 0.72 -0.90), $P < 0.01$. (1991).

Positive Affect and Negative Affect Schedule – Expanded Form (PANAS-X)

PANAS-X as developed by Watson et al., (1988) first emerged in recent studies as a dominant measurement for the emotional dimensions experience. Built on two general dimensions, the original PANAS scale offers most of a self-rated affect of common mood terms which are presented in a hierarchical order (Watson & Tellegen, 1985). Since the creation of the initial PANAS, the authors have then created an expanded version of the PANAS, the PANAS-X, a 60-item designed to focus on specific emotional states in 11 various categories at two different dimensions, including negative dimension (fear, sadness, guilt, hostility, shyness, fatigue), and positive dimension

(surprise, joviality, self-assurance, attentiveness, and serenity; Watson & Clark, 1992). The PANAS-X instrument comprises a 60-item schedule that takes 10 or less minutes to administer, and based on the authors-provided protocol, the higher level indicates the prevalence of the symptoms (Watson & Clark, 1994).

Initial reliability and validity assessments of the PANAS-X instrument has been confirmed by various studies which have maintained its fit as a diagnostic measure, especially because depression tends to manifest as an affectively complex combination of high negative affect and low positive affect (Watson & Clark, 1984; Watson et al., 1988). Similarly, the PANAS-X has been shown to be strongly correlated with other measures of mood and symptomatology, including the Beck Depression Inventory (BDI) by Beck, Ward, Mendelson, Mock, & Erbaugh (1961), the Hopkins Symptom Checklist (HSCL) Depression scale (Derogatis et al. 1974), the Center for Epidemiological Studies Depression Scale (CES-D) by Radloff (1977), and Watson & Clark (1994). Further, the PANAS-X instrument has shown evidence of meaningful discriminant validity, as well as has presented correlations with other commonly applied measures of state affect and psychiatric symptomatology (Watson et al., 1988; Watson & Clark, 1994).

Operationalization

To evaluate the physical health effect variable – fistula, the DHS7-Module-Fistula Questionnaire instrument was used. This instrument of 11 questions was administered in 8 minutes. The respondents' answers were recorded using the codes provided in the surveys. Based on the answer types, all Yes answers represented affirmative statement of the issues being evaluated, and all No responses represented respondents' negative

statements on the issues being evaluated. For questions requiring different types of answer coding and scoring, I utilized the coding and scoring that was provided in the survey for each question measured.

The physical health effects variable – other sexual rape-related injuries were evaluated in micro-level based on the scoring criteria provided in the LSMS (Bruck et al., 2013). Section D of the LSMS instrument was used to assess participants' characteristics including harm and health consequences (Burke et al., 2013; Burk et al., 2010; Justino, 2010; Minoiu & Shemyakina, 2014). In collecting data using Section D of the LSMS instrument, the year characteristic represented that the time *year* during which the study participants experience the violent sexual rape. All answers from the respondents were properly recorded using the codes provided in the surveys. All *yes* answers were based on the participants' answer types that represented positive statement toward the issues that was being investigated. All *no* responses reflected participants' adverse statements toward the issues that was evaluated. Coding and scoring was utilized for any other questions requiring different types of answer, as provided in the survey instructions.

To evaluate variables PTSD and feelings of worthlessness, data collection process employed PANAS-X instrument. All 60 items in the PANAS-X were used to collect participants' responses on their positive and negative emotional scales process as means to evaluate their PTSD and depression experience. Information collected using the PANAS-X was appropriate because it included characteristics shared between PTSD and depression among individuals with history of traumatic events (Almeida, Charles, Mogle, Piazza & Sliwinski, 2013; Shalev, Liberzon, & Marmar, 2017).

I utilized the MOS SSS multidimensional instrument to evaluate the social rejection and support from family/friends variables. This 20-item SSS questionnaire was appropriate for this study because it helped in capturing the social characteristics that may predict vulnerability to mental health conditions and chronic pain and depression experience among the victims of violent sexual rape (Sherbourne & Stewart, 1991).

Data Analysis Plan

Data for this study were collected on paper questionnaires. Information collected from respondents was entered in Excel files. The data entered in Excel files were later imported into SPSS Statistics 23 for data analysis. Data collected included physical health effects; mental health effects, and social health effects characteristics and associated chronic pain and depression experience. To avoid any possibility of data entry error, collected data were entered in two different Excel files for easy verification of discrepancy. Original copies were kept for reference and to facilitate the verification in the process of addressing any error found in the Excel files.

Respondents' physical health effects, including fistula and other sexual rape-related injuries and association with the chronic pain and depression experience were evaluated using the DHS7-Module-Fistula Questionnaire by DHS /USAID (2016) and the LSMS questionnaire that were developed by Bruck et al. (2013). The mental or psychological health effects (symptoms or characteristics of PTSD and feelings of worthlessness) and the association with chronic pain and depression were evaluated using the PANAS-X scale (Watson et al., 1994). I analyzed the social health effects in form of social rejection and support from family and friends using the SSS by the MOS program

of the Rand Corporation (Sherbourne & Stewart, 1991). The data collection and analysis focused on the following research questions and hypotheses:

RQ1: Is there an association between physical health effects (including fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X?

$H_0$1: There is no association between physical health effects (fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

$H_1$1: There is an association between physical health effects (fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

RQ2: Is there an association between physical health effects (including other violent rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X?

$H_0$2: There is no association between physical health effects (other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

$H_1$2: There is an association between physical health effects (other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

RQ3: Is there an association between mental health effect (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X?

$H_0$3: There is no association between mental health effect (PTSD) and chronic the pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

$H_1$3: There is an association between mental health effect (PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

Q4: Is there an association between mental health effects (including feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X?

$H_0$4: There is no association between mental health effect (feelings of worthlessness) and the chronic pain and depression experience among women victims of

violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

$H_1$4: There is an association between mental health effect (feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS and the PANAS-X.

RQ5: Is there an association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X?

$H_0$5: There is no association between social health effect (social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X.

$H_1$5: There is an association between social health effect (social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X.

RQ6: Is there an association between social health effects (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X?

$H_0$6: There is no association between social health effect (support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X.

$H_1$6: There is an association between social health effect (support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS Social Support Survey, and the PANAS-X.

Statistical examination for this study started with descriptive statistics analysis to quantitatively define or summarize the physiognomies of the study sample to include mean, median, frequencies, and standard deviation. The experience of chronic pain and depression among survivors of violent sexual rape might be influenced by physical, mental, and social health characteristics. That association were evaluated using multinomial logistic regression statistical analysis. Multinomial logistic analysis was appropriate because the data being analyzed (independent and dependent variables) include nominal or have multiple levels or categories. Multinomial regression analysis helped in understanding how the physical health damage variables, mental health damage variables, and social health damage variables might be associated with the dependent variables (chronic pain and depression). In addition, some of the collected data were ordinal in nature. Therefore, ordinal regression analysis was appropriate for analyzing the ordinal type of data toward understanding the association between independent and dependent variables. The strength of relationship between variables determined by the

significance of the study results. The more significant the result was, the stronger the relationship.

Threats to Validity

Several methodical challenges and limitations could threaten the validity of this study. There often more challenges in relation with conducting a study in a conflict-affected area, especially when the conflict situation and conflict area are defined improperly, or when dealing with time variations (Bruck et al., 2013, Steiner et al., 2009). In most quantitative studies, the major threats to validity include the threats to internal validity and the threats to external validity (Aschengrau & Seage, 2008).

Threats to Internal Validity

Context or History. Each country or area of conflict context is unique to its environment, culture, politics, and populations (Kalyvas, 2007). An assessment approach that works for one country's conflict situation may not work for another conflict assessment in another country, and conflict characteristics frequently change over time, place, and context that can only be explained at the individual level (Bruck et al., 2013; Kalyvas & Kocher, 2009). In conflict-affected areas, a succession of external events (e.g. epidemic, renewed civil or political conflicts) may occur during the period of the study and that may cause ambiguity among the participants, distort the history of the events being evaluated, or the death of one or more study participants may occur and affect the maturation (Polit & Beck, 2012).

Timing of Surveys or Maturation. The timing of surveys has been found to be critically decisive in defining the quality of information collected in conflict-affected area

to affect war related studies (Bruck et al. 2013). Collected information tends to diminish in quality when the surveys are conducted a long time after the violent conflict experience (Bruck et al., 2013; Verqimp, 2000). However, because it is difficult to conduct surveys when the conflict is ongoing, researchers have managed to include questions that allow survivors to assess the time before and after conflict.

Using LSMS for collecting information on impacts of violence in conflict-related areas poses serious bias challenges (Bruck, 2013). During conflicts, some conflict-affected areas are difficult to access, which makes it hard to gain access to conflict-affected individuals with most valuable information. Such condition may leave no choice to the researcher than relying on ex-post facto surveys. Further, instances of renewed hostilities may create unfavorable condition for respondents to recall necessary information, leading thus to self-reporting bias.

When the political environment is insecure, respondents may use self-censoring for fear of retribution from political officials. This study was conducted in a conflict-related area. It was critical to pay attention to potential biases, including the information, recall, and selection biases, and distrust, which were discussed in the following paragraphs.

Selection Bias. This type of bias may occur when the outcome of a study is influenced by the difference between the groups of participants being measured or compared (Krishna et al. 2010). In a conflict-affected area, conducting a survey may pose serious selection bias. The risk of insecurity, political constraints, and sensitivities of the issue may require the exclusion of a planned survey location and populations, causing

thus a Selection bias by location (Arkona & Kalvas, 2008; Kalvas & Kocher, 2009; Restrepo, Spagat, & Vargas, 2004). In conflict-affected areas, it is also possible to run the risk of selection bias by group, when certain groups are excluded in the sample population based on ethnic, religious, or cultural characteristics, or when the target population or population of interest is displace/killed prior to the survey (Beegle et al., 2011; Bundervoet et al., 2009; Samii, 2010). To control selection bias in this study of a target population with a unique characteristic of war-affected, time and location specific, and a in conflict area, convenient sampling was used in order to allow all available violent rape victims to be included in the study.

Recall-bias or Recall error. This type of bias often becomes another important issue that affects ex-post facto surveys. Recall bias has been previously noted as potential challenge in surveys administered to assess demographic, socioeconomic, and epidemiologic data in post-conflict areas and populations (Deaton, 2001). Bruck et al. (2013) stated that traumatic events, duration after the violent events and forgetfulness may have considerable impacts on respondents' memories and seriously affect their answers to survey questions. To overcome the recall bias, validated methods were used to aid the respondents in reducing the recall bias. Those included the utilization of event timelines about well-known events that took place. Those will also include survey questionnaires related to past events, which were used more consistently to generate quality information long after the conflict events took place (Humphrey & Weinstein, 2004; 2008).

Poor survey choice or Instrumentation. Making a poor survey selection and approach can seriously impact the outcome of the study. When LSMS is administered in macro-level (country level), government officials may provide data that satisfy their political agenda, may limit the ability to collect quality data at the individual and household level (micro level; Kalyvas & Kocher, 2009). To overcome the instrumentation threat of validity, validated instruments were used for data collection.

Distrust and misleading answers. Misleading answers are also recognized as serious problems that may affect the quality of answers when respondents lack trust or suspect the survey sponsor. In a conflict-affected area, impacted populations tend to lose trust in the government or occupying entity that failed to provide security during conflict. When that kind of distrust or suspicion arises, respondents usually regard conflict-focused surveys as government- or rebel-sponsored data collection effort, and thus provide misleading answers or simply boycott they survey (Bruck et al., 2013). Participants may also not be truthful in their answers due to embarrassment or they may provide the answers that the researcher expects to hear. To overcome this issue, the recruitment and data collection process required establishing strong and credible relationships with the respondents. In addition, the data collection process avoided questions that directly or indirectly associated the investigator or the respondents to the government or rebel organizations.

Confounding variables. In convenient sampling, the internal threats to internal validity would also include the existence of confounding variables, which comprise variables that are not being studied. In this study, confounding variables might include

previously experienced chronic pain or depression prior to any event of violent sexual rape, or before the victims' eligible age, and time of the study (Polit & Beck, 2012). Because the existence of confounding variables often leads to confounding biases and threaten the internal or external validity of the study, the approach required focusing on assessing the causal-effect relationship between dependent and independent variables and using a timeline in describing the time of event occurrence to avoid 'history' bias (Haneuse, Rivera-Rodriguez & Spiengelman, 2016).

Threats to External Validity

This study targeted the population group of females who survived violent rape in eastern DRC. Several studies have been published regarding the violent sexual rape experience among women of the conflict-affected country of DRC (Bernard, Nikolova, & Williamson, 2014). In the eastern DRC environment, the major threat to external validity could be the possibility to generalize the results. With the intent to select a group of women survivors of violent sexual rape in this location, it was not possible to assure that the study sample would be representative of the true affected population. Also, due to the specific characteristics of the study population, the selection of a non-probability convenient sample that includes women survivors of violent rape, the specific context of war, and the selected location could not make the study results generalizable to the entire women population of DRC.

In this study, the threats to external validity may include the issue of interaction between relationships and people, time, and condition (Polit & Beck, 2012). This type of threat to external validity may occur when, due to the sample section process, some

people may be selected over others, or some may be excluded when they are deemed not beneficial to the study due to their criteria at the time of selection, (Polit & Beck, 2012). Similarly, since there was no control group in this study, other factors could include causal effects capable of impacting the constancy of a relationships among variables (Polit & Beck, 2012). To establish validity, both interaction and causal effects were dealt with by providing description of the characteristics of target population that were included (who could be reached) and those who were not included (who cannot be reached) in the study, just to give to the reader an idea of how those groups compared, in terms of differences and similarities.

Threats to Statistical Validity. Scientific research is designed to fulfill the goal of yielding necessary evidence or boosting knowledge that may be dependable in making applicable decisions (Garcia-Perez, 2012). Reaching valid conclusions or statistical conclusion in research may be threatened by unintended circumstances, including the use of inappropriate statistical techniques, the use of statistical test with insufficient or low statistical power, and misstating the assumptions of the statistical test, lacking appropriate support for the hypothesis. To avoid the threats to statistical validity, the critical approach necessitated the use of adequate data analysis or statistical methods, select selection of accurate sample size, and a careful selection of the best supporting arguments for the research hypothesis (Garcia-Perez, 2012).

Ethical Procedures

Prior to the data collection stage for this study, I submitted a proposal requesting for approval to the Walden University Institutional Board (IRB). The request for IRB

approval was granted with IRB Approval Number 10-04-17-0112484. Upon IRB approval, I proceeded with the data collection process. Study participants were notified three days before the data collection start day. An information session was held with participants, during which, the informed consent was presented and explained and issues or questions regarding confidentiality and participation procedures were addressed. Study participants were informed about the voluntary participation, the purpose, the data collection procedures, and any issues that could affect their confidentiality. Potential recruits were given the information they needed to decide to enter or not or not to enter the study. Each person was given the respect, time, and opportunity necessary to freely decide whether to participate in the study. A consent form was presented and agreement to participate was sought. Participation was voluntary and there was no unrealistic inducements to participate. During the information session, study participants were informed about the sensitivity of the subject matter. They were also reminded of their right to not participate in the study, to refuse to answer any study question if not comfortable, and to decline participation in the study at any point of time of their choosing.

Once informed consent was obtained, I proceeded with data collection using the questionnaire instruments. Data collection interviews were conducted within a closed environment setting to ensure the privacy and confidentiality of the participants. At the end of each data collection using the survey questionnaire instruments, a debriefing was held, involving a discussion concerning any possible issues and process experience during the interview. Forms containing the collected data were kept in a protected

location with a lock and each respondent was assigned a personal identifier or code in lieu of her name, to ensure privacy and confidentiality. Because of the limitation of technology and computer access among the general population, online questionnaire resources were not available.

This study was not expected to pose any cost burdens or risk to the safety or wellbeing of participants. Although, there was a probability that this type of study could involve some minimal risks of minor discomforts, such as those often experienced in daily life of the general population, including becoming upset, fatigue, or stress. Therefore, I was aware of the possibility of minimal psychological trauma due to reliving the rape experiences which may be remembered by reading and responding to the questions on events covered in the questionnaires. This type of study could also involve a risk of breach of confidentiality. In addressing this issue, the study design involved the application of appropriate safeguards, including appropriate data safety monitoring plan and confidentiality protection procedures and the use of trained personnel. Because every data collected may be unique to each participant's violent rape experience, the investigator needed to be mindful of the sensitivity of issues surrounding the participants' experience. Therefore, the use of ethical judgment was critical to this study. Further, the local non-governmental organization is known to work directly with psychosocial care providers to traumatized victims in the South Kivu province. It was, therefore appropriate collaborate with that during data collection because the organization helped had available psychosocial services for counseling/therapy or referral for patients, in case they experienced mood change or were upset by the research. In terms of benefits, participants

received no direct benefits associated with their participation in this study. However, the larger community could benefit from probable increased knowledge that may guide future studies, or from improved community health care because of this study.

Summary

The intent of this investigation was to analyze whether the consequences of violent sexual rape may be associated with chronic pain and depression experience among violent sexual rape women victims in the eastern DRC. This was a quantitative study design in which I used questionnaires to collect data from study participants. The population of study included females 18-80 years old of age who survived violent rapes in eastern DRC between 2010 and 2014. The sample size of this study comprised 156 volunteer participants.

The instruments for this inquiry included the DHS7-Module-Fistula Questionnaire with 11 item questions to evaluate the fistula experience, the LSMS, Section D, which provided a total of 8 questions to cover the physical health effects variable of other sexual rape-related injuries (Bruck et al., 2013). The data collection process also included the PANAS-X, a 6-item instrument designed to collect data for assessing any mental health symptoms that could identify known signs of PTSD or depression. In addition, this process involved the use of the MOS SSS, an instrument with 20-item questions that focuses on assessing all aspects of social supports. This instrument was valuable for collecting data related to social health effects variables of social rejection, social support from family and friends and the association with chronic pain experience (Sherbourne &

Stewart, 1991). The data analysis procedures, the threats to validity, and the ethical procedures were presented.

The next chapter presents the data analysis that I conducted focusing on the six independent variables to address the key research questions of the study. The chapter discusses the results of the data analyses that I conducted, including the descriptive statistics, the multinomial logistic regression analyses, and the ordinal logistic regression analyses. The analysis helped me in uncovering the relationships between the independent and dependent variables.

Chapter 4: Results

Introduction

The purpose of this quantitative study was to investigate the relationships between physical health effects (including fistula and other injuries resulting from violent sexual rapes and chronic pain and depression), psychological health effects (including PTSD and feelings of worthlessness) social health effects (including social rejection and support from family and friends) and the chronic pain and depression experience of female survivors of violent sexual rape in eastern DRC. In this part of the DRC, individual support services programs revealed a larger number of sexual rape victims living with functional impairment and a combination of depression, anxiety, and PTSD (Murray et al., 2018). I expected the results of this study would assist health professionals, academics, and care providers in formulating response strategies for addressing the health needs of afflicted violent sexual rape survivors in conflict areas and identifying public health priorities and strategies for reducing the occurrence of sexual violence during war, as well as provide insights for reducing chronic pain and depression among violent sexual rape survivors.

In this chapter, I will briefly introduce the purpose of the study and address the data collection, results, and summary. In the data collection section, I will describe the period for data collection and the recruitment of study participants. This section will also include a description of the response rate and details of the data collection process from the strategy that I previously discussed in Chapter 3. Further, I will present the sample demographic characteristics and a descriptive report in this section. In the results section,

I will detail the emphasis of statistical analysis, including the descriptive statistics to summarize the physiognomies or characteristics of the study sample to include mean, median, frequencies, and standard deviation. The results section will also include details of the test of suitability of statistical assumptions and a report on the statistical analysis findings arranged by research question and hypothesis. The results section will also contain figures and tables that illustrate the study findings. I will conclude this chapter with a summary review of the findings, answers to the research questions, and a transition to Chapter 5.

Data Collection

The target sample size for this study at recruitment was 150. To determine the required sample size, I used two different steps. Step 1 consisted of Green's (1991) sample size calculation for multiple regression analysis, according to which $N \geq 104 + k$ (k equals the number of independent variables). Because there were six independent variables in this study, the sample size calculation equation was $N \geq 104 + 6$, $N \geq 110$. According to Green's sample size calculation, the required sample size for this study was 110. Step 2 consisted of determining the sample size using G*Power 3.1.9.2 sample size calculation formula with a total number of independent variable effect size $F^2 = 0.35$ and $\alpha = 0.01$. This equation yielded a total required sample of 158, with a power ($1 - \beta$ *error* = 0.9999). Considering both results valid, I elected to use 150 as sample size for this study. However, due to an overwhelming response to the invitation of volunteers to participate in the study, a total of 156 participants were recruited, which became a more desirable sample size closer to the 158 required by the G*Power calculation. For the purpose of

multiple regression analysis in this study, I determined 156 was an appropriate sample size.

The target population for this study was 18 to 80 years old female survivors of violent sexual rape who resided in eastern DRC between 2010 and 2014. The recruitment of participants was conducted through a local nongovernmental organization. I collected data for this study through face-to-face interviews. Each participant was interviewed in a private setting. During the interview process, each participant responded to questionnaires from four different instruments. First, I used the DHS7-Module-Fistula Questionnaire (DHA/USAID, 2016) to collect data regarding violent sexual rape-related fistula and the chronic nature of these injuries. The LSMS (Brock et al. 2013) was used to gather data on violent rape-related injuries, the chronic nature of these injuries, and the effects of that experience of their victims' physical and psychological health. Using the MOS-SSS (Sherbourne & Stewart, 1991) allowed me to collect data on social health factors that affect the victims' functioning and well-being. Lastly, I used the PANAS-X (Watson & Clark, 1994) to collect data on positive or negative feeling and emotions (i.e., depression factors) among the violent sexual rape victims.

I entered the collected raw data into Excel spreadsheets by research instrument and broke out information by sections or by questions. The data were then exported to the Statistical Package for Social Sciences (SPSS), Version 24 and were decoded for statistical analysis. Based on participants' preference and the consideration established by IRB for this study, I did not use questions by which participants could potentially be identified and did not collect information that could reveal the respondents' identity.

Results

I conducted descriptive statistical analyses to quantitatively define the characteristics of the study sample by each variable set, to include mean, median, frequencies, and standard deviation. Multinomial logistic regression analyses were performed to evaluate the relationships between the independent and dependent variables of nominal, multiple levels or categorical characteristics. Ordinal regression analyses were conducted to test the relationships between the independent and dependent variables with ordinal characteristics. I employed multinomial regression analyses to determine how the physical, mental, and social health damage variables might be associated with chronic pain and depression. I also used ordinal regression analyses to evaluate the degree of association between mental health damage variables with chronic pain and depression and the degree of association between social health damage variables and chronic pain and depression. The strength of relationship between variables helped to determine the significance of the study results.

Descriptive Statistics

I recruited a total of 173 eligible participants from the targeted rural localities in eastern DRC. Of the 173 recruited, three underage participants and four no cases were eliminated, leaving 156 possible participants to be considered for the study. At recruitment, each volunteer participant received in private, a copy of the consent form translated into the French language. The majority of the participants preferred the consent form to be read to them. To provide their agreement to participate in the study, some

chose to sign the consent form and others chose to offer an oral agreement through voice acceptance and head nodding.

I conducted this study with only women participants who were violent sexual assault survivors ($N = 156$). The majority of the participants were from the targeted residential locality north of Bukavu, eastern DRC. The frequencies of participants by residential locality are shown in table 1.

Descriptive statistics of fistula experience. I performed descriptive statistics (see Table 1) for the independent variable of fistula and all its sub variables. Of all participants 62.2% ($f = 97$) experienced fistula, $M = 1.39$, $SD = 0.487$. More than half of the study participants experienced fistula after cruel sexual assault 58.3% ($f = 91$), $M = 0.79$, $SD = 1.142$. Out of those who experienced fistula, 53.2% ($f = 83$) sought care from a care provider (doctor or nurse), $M = 0.69$, $SD = 0.610$, and 18.6% ($f = 29$) received surgery, ($M = 1.01$, $SD = 0.905$). Among those who were treated by a caregiver or who received surgery, 35% ($f = 54$) were cured with complete stop of the leakage, $M = 1.05$, $SD = 1.057$, and 17.3% ($f = 27$) where cured temporarily or with a reduction in leakage.

Table 1

Descriptive Statistics of Participants' Fistula Experience

	N									
	Valid	Missing	*M*	*SD*	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Range	Sum
Experienced fistula	156	0	1.38	.487	.507	.194	-1.766	.386	1	215
Heard about it before	156	0	1.05	.907	-.102	.194	-1.788	.386	2	164
Signs after delivery or miscarriage	156	0	1.59	1.386	-.100	.194	-1.859	.386	3	248
Signs after normal Delivery or labor	156	0	.26	.644	2.194	.194	3.094	.386	2	41
Suspected cause	156	0	.79	1.142	4.009	.194	19.360	.386	8	123
# Days of signs after cause	156	0	25.28	31.119	1.136	.194	-.040	.386	90	3944
Did you seek Care	156	0	.69	.610	.292	.194	-.627	.386	2	107
If No, Reason why	156	0	.31	1.585	7.020	.194	52.936	.386	13	48
Treated by doctor/ Health Care Provider	156	0	1.12	1.339	1.893	.194	4.544	.386	6	174
Received surgery	156	0	1.01	.905	-.013	.194	-1.790	.386	2	157
Cured with treatment	156	0	1.05	1.106	1.057	.194	.590	.386	4	164

Descriptive statistics analysis – LSMS section D (Harm and Injury).

Violent sexual assault motivation. I performed descriptive statistics analysis for the independent variable of other violent sexual rape-related injuries experienced by sexual rape survivors. Data were collected using Section D of LSMS instrument that focused on physical health and harm. Table 2 reflects the participants' responses regarding the nature of violent sexual rape. Most respondents believed that the nature of the violence they experienced was a sexual assault 98.7% (*f* = 154) *M* = 3.95, *SD* = 0.451, while 87% (*f = 136), M* = 0.87, *SD* = 0.335 thought the aggression was to cause physical harm. Still a large majority of respondents 78.8% (*f* = 123), *M* = 2.37, *SD* = 1.229 considered the attack as psychological assault, and 59% (*f* = 92), *M* = 1.18, *SD* = 0.987 thought the attack against them was verbal.

Table 2

Descriptive Statistics of Violent Sexual Assault Types (LSMS-Question 1)

	N					Std. Error of		Std. Error		Su
	Valid	Missing	*M*	*SD*	Skewness	Skewness	Kurtosis	of Kurtosis	Range	m
Physical	156	0	.87	.335	-2.246	.194	3.083	.386	1	136
Verbal	156	0	1.18	.987	-.368	.194	-1.889	.386	2	184
Psychological	156	0	2.37	1.229	-1.426	.194	.035	.386	3	369
Sexual	156	0	3.95	.451	-8.745	.194	75.448	.386	4	616
Unknown	156	0	1.90	13.640	7.070	.194	48.602	.386	99	297

Types of assaults experienced. My descriptive statistical analysis of violent assault (see Table 3) showed the range of verbal aggression preceding sexual rape against participants was 78.2% (F = 122) M = 1.56, SD = 0.828. About 80% (f = 124) of participants were attacked using a weapon, M = 3.18, SD = 1.620. All the respondents 100% were forced to have sex, M = 10.00, SD = 0.00, and 89% (f = 139) were forced to perform sexual acts, M = 9.87, SD = 0.268.

Table 3

Descriptive Statistics of Violent Sexual Assault (LSMS Question 2)

	N					Std. Error of		Std. Error of	
	Valid	Missing	*M*	*SD*	Skewness	Skewness	Kurtosis	Kurtosis	Range
Verbal Assault	156	0	1.56	.828	-1.380	.194	-.098	.386	2
Insult not Assault	156	0	.52	1.139	1.745	.194	1.059	.386	3
Attack - Knife/Weapon	156	0	3.18	1.620	-1.475	.194	.177	.386	4
Attack - Knife/Gun/Other	156	0	3.65	2.225	-1.051	.194	-.908	.386	5
Attacked/Beaten/Expelled	156	0	2.19	2.899	.565	.194	-1.703	.386	6
Strangled or Burned	156	0	1.08	2.534	1.937	.194	1.776	.386	7
Injured or Killed	156	0	2.05	3.504	1.127	.194	-.740	.386	8
Injured - Mine/Explosion	156	0	.46	1.992	4.108	.194	15.071	.386	9
Forced to Have Sex	156	0	10.00	.000		.194		.386	0
Forced to do Sexual Acts	156	0	9.87	3.348	-2.645	.194	5.063	.386	11
Lost Body Parts	156	0	2.15	4.620	1.687	.194	.856	.386	12
Forced to Labor	156	0	2.75	5.326	1.426	.194	.035	.386	13
Robbed	156	0	5.56	6.873	.423	.194	-1.845	.386	14
Kidnapped	156	0	3.94	6.624	1.088	.194	-.827	.386	15
Extorted/Looted	156	0	3.59	6.696	1.334	.194	-.222	.386	16
Do not know	156	0	3.46	15.992	4.440	.194	17.941	.386	77
Other	156	0	16.50	37.014	1.806	.194	1.279	.386	99

Person assaulted, related illness, and place and time of assault. Descriptive statistics analysis (see Table 4) was conducted for the data collected using LSMS tool Section D, focusing of QD3 (the person assaulted), QD4 (prolonged or chronic physical/internal illness experience), QD5 (year of violent rape event) and QD6 (place of assault) to understand the persons assaulted, related illness, place and time of assault. The frequency of survivors who were assaulted and at the same time saw their family members assaulted was $f = 89$, (57.1%), $M = 1.00$, $SD = 0.000$. Almost all survivors of violent sexual rape experienced rape-related chronic illness that lasted 6 months or more (physical, internal, or psychological) $f = 152$, 97.4%.

Table 4

Descriptive Statistics Analysis of LSMS-Questions 3, 4, 5, and 6

	N	Range	Min	Max	*Mean*	*Std. Dev*	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
Assaulted	156	0	1	1	1.00	.000	.	.386	.	.
Family Members	156	99	0	99	56.48	49.163	-.288	.194	-1.942	.386
Long/Chronic Illness	156	2	0	2	1.00	.161	.000	.194	37.221	.386
Year of Event	156	1003	1011	2014	1999.62	112.978	-8.743	.194	75.422	.386
Assault in the Field	156	1	0	1	.07	.257	3.388	.194	9.601	.386
Assault at Home	156	2	0	2	1.31	.955	-.653	.194	-1.594	.386
Assault in Ref Camp	156	3	0	3	.27	.860	2.899	.194	6.486	.386
Assault in Village	156	4	0	4	.41	1.217	2.645	.194	5.063	.386
Assault at Work	156	5	0	5	.38	1.337	3.206	.194	8.388	.386
Assault on Travel	156	6	0	6	.23	1.158	4.847	.194	21.770	.386
Assault Elsewhere	156	7	0	7	.63	2.007	2.899	.194	6.486	.386
Do not Know	156	77	0	77	.99	8.690	8.745	.194	75.448	.386
Refuse to Answer	156	0	0	0	.00	.000	.	.	.	.
Valid N (listwise)	156									

In Table 5, the large number of participants were sexually assaulted in 2014 (34.6%, *F* = 54), followed by those who were assaulted in 2013 (18.6%, *F* = 29) and 2012 (17.3%, *F* = 27). On the other hand, the lowest number of sexual assault victims among the study participants occurred in 2011 (12.8%. *F* = 20), with a 3% decrease from the 2010 occurrence (15.4%, *F* = 24). These results reflected a trend of increased rates of violent sexual rapes between 2010 and 2014.

Table 5

Year of Sexual Assault event

		Frequency	*Percent*	Valid Percent	Cumulative Percent
Valid	2010	24	15.4	15.4	16.7
	2011	21	13.5	13.5	30.1
	2012	28	17.9	17.9	48.1
	2013	29	18.6	18.6	65.4
	2014	54	34.6	34.6	100.0
	Total	156	100.0	100.0	

Participants' physical or psychological illness experience. A descriptive statistics analysis in Table 6 was also run for Question 8 of the LSMS for the frequencies of participants' physical or mental illness experience. The results showed the average survivors participants who suffered psychological distress as (*M* = .86*, SD* = .349) for a period of 6 months or more following the violent sexual rape. A total of 134 participants (85.9%) experienced prolonged physical or mental illness for 6 months or more as result of violent sexual rape (*M* = 3.79*, SD* = 0.885). One hundred seventeen (117) had physical injuries (75%), and less than half (23.7%) became handicapped or disabled due to physical injuries (physical injuries *M* = 1.50, *SD* = .869; handicapped (*M* = .71, *SD*=1.280). Four and half (4.5%) of victims watched their family members being raped and killed during the attack (*M* = 5, *SD*=.51).

Table 6

Descriptive Statistics for LSMS Injury and illness experience

							Skewness		Kurtosis	
	N	Range	Min	Max	Mean	Std. Dev	Statistic	Std. Error	Statistic	Std. Error
Illness 6+ Months	156	1	0	1	.86	.349	-2.083	.194	2.369	.386
Injured in Sexual Viol	156	2	0	2	1.50	.869	-1.166	.194	-.649	.386
Disabled in Sex Viol	156	3	0	3	.71	1.280	1.248	.194	-.449	.386
Psychological Distress	156	4	0	4	3.79	.885	-4.108	.194	15.071	.386
Death During Attack	156	5	0	5	.51	1.522	2.645	.194	5.063	.386
Death in Hospital	156	6	0	6	.27	1.246	4.440	.194	17.941	.386
Death after Hospital	156	0	0	0	.00	.000	.	.	.	.
Suffered Other effects	156	8	0	8	.51	1.966	3.594	.194	11.058	.386
Did Not Suffer	156	9	0	9	.23	1.427	6.061	.194	35.182	.386
Don't Know	156	77	0	77	1.48	10.609	7.070	.194	48.602	.386
Refused to Answer	156	0	0	0	.00	.000	.	.	.	.
Valid N (listwise)	156									

Participants' physical injuries related to sexual assaults. Focusing on sexual assault-related injuries and consequent prolonged illness experience, a descriptive statistics analysis of LSMS on participants' injuries and dysfunctional state was conducted (Table 7). The results of frequencies distribution of participants experienced of physical dysfunction following violent rape event indicated a highest number of survivors who experienced prolonged or chronic suffering because of violent sexual rape. The results matched those presented in descriptive analysis for LSMS-Question 8, showing the prolonged internal injuries (including vaginal bleeding, fistula, injury of the pelvic, back pain, vaginal wounds) as the most experienced among the victims (97.4%, $F = 152$, $M = 0.97$, $SD = 0.159$), followed by prolonged psychological effects (94.9%, $F = 148$, $M = 3.79$, $SD = 0.885$) and prolonged or chronic illness (85.9%, $F = 134$, $M = 0.86$, $SD = 0.349$).

Table 7

Descriptive Statistics Analysis of Prolonged/Chronic Internal Injuries

Prolonged/Chronic Illness	*N*	Range	Min	Max	*Mean*	*Std. Dev.*	Skewness		Kurtosis	
							Statistic	Std. Error	Statistic	Std. Error
Long Internal Injuries	156	1	0	1	.97	.159	-6.061	.194	35.182	.386
Long-term/Chronic Illness	156	1	0	1	.86	.349	-2.083	.194	2.369	.386
Long-term Physic Injuries	156	2	0	2	1.50	.869	-1.166	.194	-.649	.386
Lost Body Part	156	12	0	12	2.15	4.620	1.687	.194	.856	.386
Physical Dysfunction	156	3	0	3	.71	1.280	1.248	.194	-.449	.386
Long Psych Illness	156	4	0	4	3.79	.885	-4.108	.194	15.071	.386
Permanent Dysfunction /Death	156	5	0	5	.51	1.522	2.645	.194	5.063	.386
Chronic Disability/Death	156	0	0	0	.00	.000	.	.	.	.
Valid N (listwise)	156									

Descriptive Statistics Analysis of PANAS-X

Descriptive statistics analysis of the Positive Affect Scale. Descriptive statistics analysis was conducted on the positive dimension scales (Table 9). Data was collected using the PANAS-X by Watson & Clark (1994). The frequency of general positive dimension was first conducted, focusing on survivors' positive affect experience after being the violent sexual rape event, including feeling attentive, feeling strong, feeling inspired, feeling alert, feeling active, feeling excited, feeling proud, feeling enthusiastic, feeling determined, and feeling interested. Then the frequency of general negative dimension was conducted focusing on survivors' negative affect experience, including feeling irritable, living with fear, feeling upset, feeling of guilt, feeling nervous, feeling unfriendly, unable to relax, feeling ashamed, feeling scared, feeling distressed, being afraid at all time, and feeling unsafe. The measure choices included the following 5-points Likert values, very slightly, a little, moderately, quite a bit, and extremely.

The table 8 provided the results of the positive dimension scales. Almost all the survivors of violent sexual rape experienced very low or diminished positive emotion experience. Among the answer choices for 'daring' ranging from 'very slightly or not at all, a little, moderately, quite a bit, and extremely', most respondents appeared to have no daring feeling at all 81% (F = 136), M = 1.21, SD = 0.468; not at all fearless (full of fear), 97% (F = 142), M = 1.13, SD = 0.470; not at all proud, 95.5% (F = 149), M = 1.08, SD = 0.402; not at all confident, 86% (F = 134), M = 1.19, SD = 0.506; not at all cheerful, 92% (F = 143), M = 1.09, SD = 0.308; not at all delighted, 94.2% (F = 147), M = 1.06, SD = 0.271; not at all excited, 95% (F = 148), M = 1.04, SD = 0.224 ; not at all

lively, 95% (*F* = 148), *M* = 1.09, *SD* = 0.431; not at all energetic, 92.3% (*F* = 144) *M* = 1.11, *SD* = 0.403; not at all enthusiastic, 51% (*F* = 79), *M* = 1.73, *SD* = 0.925; not at all attentive, 74% (*F* = 115), *M* = 1.37, *SD* = 0.692; not at all able to concentrate, 90% (*F* = 140), *M* = 1.14, *SD* = 0.474; not at all relaxed, 88% (*F* = 137), *M* = 1.16, *SD* = 0.475; not at all at ease, 87.2% (*F* = 136), *M* = 1.19, *SD* = 0.542; not at all active, 88.5% (*F* = 138), *M* = 1.16, *SD* = 0.514; and not at all interested, 85.5% (*F* = 138), *M* = 1.15, *SD* = 0.452.

In the contrary, scores for feeling 'strong' were widely distributed but still a large number of respondents 33.3% (*M* = 2.29, *SD* = 1.316) said that they felt less strong at some point, and 25% felt a little strong, 22% felt moderately strong, and 18% felt quite a bit strong. Similarly, scores for feeling 'bold' were also widely distributed but still most respondents 46% (*M* = 2.03, *SD* = 1.118) were not bold at all bod, 21% a little were bold, 21% were moderately bold, 12% were quite a bit bold, 1.3% extremely bold. Further, for the score about feeling determined, 25% were quite a bit determined: 35.3% were a little determined, 25% were moderately determined. Other affect positive affect factors that scored with widely distributed responses included 'feeling bashful' with only 5% not at all bashful, 42% moderately bashful, 40% quite a bit bashful, and 3.2% extremely bashful; 'feeling sluggish' with 26.3% not at all sluggish, 17% a little, 37% moderately, 18% quite a bit, and 3% extremely sluggish; 'feeling sheepish with 5.1% not at all, 26% moderately, 61% quite a bit, and 4% extremely.

Overall, the score of all positive emotion scales was very low, with more than 20 out of 36 (56%) scales scoring each less than 100-199 points, two scales scoring between 200-299 points, six scales that scored between 300-399, one scale scored in 400s, and

three scales scored in 500s. The low score in the positive affect scale was a clear indication that the majority of survivors did not have positive life experience after their violent sexual rape.

Table 8

Descriptive Statistics of General Positive Dimension Scales

	N									
	Valid	Missing	*Mean*	*Std. Deviation*	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis	Range	Sum
Daring	156	0	1.21	.468	2.538	.194	8.324	.386	3	189
Strong	156	0	2.29	1.147	.349	.194	-1.120	.386	4	357
Fearless	156	0	1.13	.470	3.840	.194	15.220	.386	3	177
Bold	156	0	2.03	1.118	.678	.194	-.752	.386	4	316
Proud	156	0	1.08	.402	6.040	.194	38.600	.386	3	168
Confident	156	0	1.19	.506	3.031	.194	9.681	.386	3	185
Cheerful	156	0	1.09	.308	3.546	.194	12.924	.386	2	170
Delighted	156	0	1.06	.271	4.538	.194	22.147	.386	2	166
Happy	156	0	1.16	.502	3.709	.194	15.059	.386	3	181
Joyful	155	1	1.17	.467	3.244	.195	12.000	.387	3	181
Excited	156	0	1.04	.224	6.461	.194	45.585	.386	2	162
Lively	156	0	1.09	.431	5.414	.194	30.650	.386	3	170
Enthusiastic	156	0	1.73	.925	1.256	.194	.761	.386	3	270
Energetic	156	0	1.11	.403	3.858	.194	14.360	.386	2	173
Attentive	156	0	1.37	.692	2.094	.194	4.958	.386	4	213
Alert	156	0	1.22	.678	3.349	.194	11.395	.386	4	191
Determined	156	0	2.68	1.047	.094	.194	-.957	.386	4	418
Concentrating	156	0	1.14	.474	4.086	.194	18.650	.386	3	178
Bashful	156	0	3.26	.866	-.659	.194	.411	.386	4	509
Sluggish	156	0	2.54	1.138	-.003	.194	-1.024	.386	4	396
Surprising	156	0	1.10	.362	3.785	.194	14.584	.386	2	172
Relaxed	156	0	1.16	.475	3.383	.194	12.454	.386	3	181
Calm	156	0	2.18	1.038	.475	.194	-.509	.386	4	340
Tired	156	0	1.92	1.122	.959	.194	-.109	.386	4	300
Amazed	156	0	1.28	.767	3.049	.194	8.744	.386	4	199
Timid	156	0	1.64	.908	1.456	.194	1.533	.386	4	256
Shy	156	0	3.29	1.187	-.849	.194	-.300	.386	4	514
Sleepy	156	0	1.76	.873	.895	.194	-.095	.386	3	275
At Ease	156	0	1.19	.542	3.299	.194	11.305	.386	3	185
Drowsy	156	0	1.97	1.050	.675	.194	-.711	.386	4	307
Sheepish	156	0	3.54	.853	-1.417	.194	2.091	.386	4	552
Astonished	156	0	1.13	.405	3.332	.194	10.904	.386	2	176
Active	156	0	1.16	.514	3.971	.194	17.420	.386	3	181
Interested	156	0	1.15	.452	3.585	.194	14.520	.386	3	179

Descriptive statistics analysis of the Negative Affect Scale. On the other hand, the descriptive statistics analysis of the experience of negative emotion showed the survivors' tendency of higher negative experience as result of violent sexual rape. In Table 9, a large majority of survivor participants reported high score on emotional experience: being 'afraid' (M = 3.92, SD = 0.596): moderately 16%, quite a bit 70%, extremely 12.2%, a little 2% but 0% not at all afraid. For 'scared' (M = 4.10, SD = 0.777), moderately 6.4%, quite a bit 65%, extremely 26% but only 3.2 not at all scared; 'frightened': moderately 8%, quite a bit 63%, extremely 29% but only 0.6% not at all frightened; 'nervous' (M = 4.03, SD = 0.757): moderately 15.4%, quite a bit 58.3%, and extremely 24.4% with only 1.9% not at all nervous. The large majority of participants (92%) felt quite a bit jittery (or very disturbed) (M = 3.79, SD = 0.709).

High emotional scores were also found for *irritable* (M = 3.78, SD = 0.747), moderately 20%, quite a bit 65%, extremely 10.3% and only 1.9% not at all feeling irritable; *hostile* (M = 3.66, SD = 1.127) with a little 5.1%, moderately 21%, quite a bit 44.2%, extremely 22%; 'angry' (M = 4.24, SD = 0.654) moderately 6.4%, quite a bit 59%, extremely 33.3% with only 0.6% not at all angry; *disgusted* (M = 3.94, SD = 0.712) moderately 17%, quite a bit 62.2%, extremely 18% while 0.6% were not at all disgusted. Most of responses showed elevated negative feeling about *loathing* or feeling of intense dislike (M = 3.74, SD = 0.763, only 2.6% not at all feeling of loathing, 2.6% a little, 22.4% moderately, 64% quite a bit, and 9% extremely. All respondents had negative experience of *sadness* (M = 4.28, SD = 0.563) with 6% moderately, 61% quite a bit, and 33.3% extremely. Most respondents also said they felt irritable (M = 3.78, SD = 0.747)

with 20% moderately, 65% quite a bit, 10.3% extremely; and the majority also said the felt *scornful* at 18% moderately, 68% quite a bit, and 4.5% extremely. Negative feeling of *alone* (*M* = 3.90, *SD* = 0.599), 14% moderately, 76% quite a bit, and 9% extremely, with only 1.3% not feeling alone. For *blue* (*M* = 3.93, *SD* = 0.719), 8.3% moderately, 73.1% quite a bit, and 14% extremely, with only 2% not at all feeling blue. Most respondents also felt *lonely* (*M* = 3.92, *SD* = 0.638) 78.2% quite a bit; 'downhearted' 69.2% quite a bit; *upset* (*M* = 4.22, *SD* = .615) 63% quite a bit and 30.1% extremely; *guilty* (*M* = 4.00, *SD* = .653)14% moderately, 68% quite a bit, and 17.3% extremely; *ashamed* (*M* = 4.12, *SD* = 0.601) 73.1% quite a bit and 21% extremely.

Feeling *distressed* was also prevalent (*M* = 4.26, *SD* = 0.522), with 4% moderately, 66% quite a bit, and 30.1% extremely and 0% distressed; *disgusted with self* (*M* = 4.06, *SD* = 0.608) with 11.5% moderately, 68% quite a bit, and 20% extremely and only 0.6 not at all disgusted with self ; *angry with self* (*M* = 4.25, *SD = 0.629*) with 5% moderately, 62% quite a bit, and 33% extremely, but only 0.6 not at all angry at self. Other overwhelming scores included for *blameworthy* (*M* = 4.14, *SD* = 0.515) with 7.1% moderately, 71.2 quite a bit, and 21.2% extremely, but 0% not at all blameworthy and *dissatisfied with self* (*M* = 4.28, *SD* = 0.630) at 6% moderately, 58% quite a bit, 36% extremely, but only 0.6% not at all dissatisfied with self.

Table 9

Descriptive Statistics Analysis of General Negative Dimension Scales

	N			*Std.*		Std. Error of		Std. Error		
	Valid	Missing	*Mean*	*Deviation*	Skewness	Skewness	Kurtosis	of Kurtosis	Range	Sum
Afraid	156	0	3.92	.596	-.531	.194	1.442	.386	3	612
Scared	156	0	4.10	.777	-1.841	.194	6.156	.386	4	639
Frightened	156	0	4.19	.623	-.806	.194	3.487	.386	4	654
Nervous	156	0	4.03	.757	-1.138	.194	3.354	.386	4	629
Jittery	156	0	3.79	.709	-1.647	.194	4.871	.386	4	591
Shaky	156	0	3.16	1.133	-.833	.194	-.459	.386	4	493
Angry	156	0	4.24	.654	-.988	.194	3.414	.386	4	661
Hostile	156	0	3.66	1.127	-.940	.194	.380	.386	4	571
Irritable	156	0	3.78	.747	-1.217	.194	2.897	.386	4	590
Scornful	156	0	3.59	.929	-1.734	.194	2.630	.386	4	560
Disgusted	156	0	3.94	.712	-.787	.194	1.844	.386	4	615
Loathing	156	0	3.74	.763	-1.281	.194	3.025	.386	4	583
Sad	156	0	4.28	.563	-.033	.194	-.478	.386	2	667
Alone	156	0	3.90	.599	-1.609	.194	6.837	.386	4	609
Blue	156	0	3.93	.719	-1.684	.194	5.141	.386	4	613
Lonely	156	0	3.92	.638	-2.049	.194	8.147	.386	4	612
Downhearted	156	0	3.85	.599	-.849	.194	3.153	.386	4	601
Irritable	156	0	3.78	.747	-1.217	.194	2.897	.386	4	590
Upset	156	0	4.22	.615	-.841	.194	3.842	.386	4	658
Guilty	156	0	4.00	.653	-1.129	.194	4.708	.386	4	624
Ashamed	156	0	4.12	.601	-1.496	.194	8.295	.386	4	642
Distressed	156	0	4.26	.522	.224	.194	-.381	.386	2	665
Disgusted with self	156	0	4.06	.608	-.728	.194	3.553	.386	4	634
Angry with self	156	0	4.25	.629	-1.036	.194	4.276	.386	4	663
Blameworthy	155	1	4.14	.515	.200	.195	.452	.387	2	642
Dissatisfied with self	156	0	4.28	.630	-.929	.194	3.558	.386	4	668

Descriptive Statistics Analysis of the MOS-SSS

In Table 10, the descriptive analysis was conducted for the emotional/information support, tangible support, affectionate support, and positive social support data that were collected using the MOS-SSS by Sherbourne & Stewart (1991). The MOS-SSS used a 5-point Likert Scale with values including none of the time, a little of the time, some of the time, most of the time, and all of the time. Frequency distributions were conducted on all four sections of the SSS-MOS instrument.

The analysis results showed that participants' responses were widely distributed for each survey item, with more participants indicating that they needed someone to support them especially in the emotional/informational support and tangible support

sections. For instance, highest scores were recorded for those who responded that they did not need *someone who help them when confine* 23.1% (*F* = 36), *M* = 2.91, *SD* = 1.461, and 29.5% (*F* = 46), *M* = 2.57, *SD* = 1.359 for those who said they did not need 'someone who assists in illness'.

Table 10

Descriptive Statistics Analysis of the Social Support Survey – (MOS)

	N									
	Valid	Missing	*Mean*	*Std. Dev*	Skewness	Std. Err of Skewness	Kurtosis	Std. Err of Kurtosis	Range	Sum
Emotional/Informational Support										
Someone you can count on	156	0	3.40	1.168	-.244	.194	-.719	.386	4	531
Someone to give you information	156	0	3.45	1.091	-.124	.194	-.757	.386	4	538
Someone to give you good advice	156	0	3.33	1.114	.004	.194	-.817	.386	4	519
Someone to confide in about self	156	0	3.20	1.220	-.107	.194	-.877	.386	4	499
Someone whose advice is needed	156	0	3.08	1.223	.032	.194	-.925	.386	4	481
Someone to share private worries	156	0	3.31	1.227	-.099	.194	-.985	.386	4	516
Someone to turn to	156	0	3.30	1.166	-.387	.194	-.645	.386	4	515
Someone who understands	156	0	3.35	1.206	-.352	.194	-.731	.386	4	523
Tangible Support										
Someone who Helps when confined	156	0	2.91	1.461	.120	.194	-1.344	.386	4	454
Someone who Takes me to the Dr.	156	0	3.32	1.280	-.210	.194	-1.005	.386	4	518
Someone who prepares a meal for me	156	0	3.21	1.404	-.145	.194	-1.282	.386	4	500
Someone who provides daily help	156	0	3.10	1.390	.001	.194	-1.256	.386	4	483
Affectionate Support										
Someone who shows love/affection	156	0	3.03	1.379	.061	.194	-1.276	.386	4	473
Someone to love	156	0	2.90	1.367	.145	.194	-1.197	.386	4	453
Someone who assists in illness	156	0	2.57	1.359	.381	.194	-1.069	.386	4	401
Positive Social Interaction Support										
Someone to have Good Time	156	0	3.01	1.223	.232	.194	-.866	.386	4	470
Someone with whom to Relax	156	0	2.94	1.154	.037	.194	-.788	.386	4	459
Someone to do enjoyable things	156	0	2.87	1.335	.283	.194	-1.098	.386	4	447
Someone for Getting Things Off Mind	156	0	3.01	1.161	-.013	.194	-.694	.386	4	469

Statistical Analysis

Research Question 1: Fistula Association with Chronic Pain and Depression

RQ1: Is there an association between physical health effects (including fistulas) and chronic pain and the depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the MOS Social Support Survey and the PANAS-X scale?

$H_0$1: There is no association between physical health effects (fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the MOS Social Support Survey and the PANAS-X scale.

$H_1$1: There is an association between physical health effects (fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the MOS Social Support Survey and the PANAS-X scale.

Fistula and chronic pain (Chronic Illness Over 6 months). A multinomial logistic regression analysis was selected as appropriate statistical analysis for testing the relationship between the predictor variable – rectovaginal fistula (including experienced fistula, sought care, seen by provider, had surgery, and was cured) and outcome variable - chronic pain experience (prolonged internal suffering from rape, prolonged illness from rape, prolonged injuries from rape, and disability due to rape). Multinomial logistic regression was also selected because it is the statistical type of analysis appropriate when

dealing with categorical or nominal data, and when the outcome variable has more than two levels.

Table 11 provides the results of a multinomial logistic analysis to test the association between fistula and chronic pain prolonged illness over 6 months among survivors of violent sexual rape. The results show the modal class used by the null model Yes (Chronic illness over 6 months), with 85.9% of prediction accuracy (F = 134), with only 14.1% without chronic illnesses connected to violent sexual rape. A multinomial regression test was conducted to test the relationship between the predictor variables fistula experience (including experienced fistula, sought care, seen by provider, had surgery, and was cured) and chronic internal illness experience (outcome) among the women survivors of violent sexual rape in eastern DR Congo. The traditional 0.05 criterion of statistical significance was utilized.

Table 11

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Case Processing Summary

		N	Marginal Percentage
Prolonged illness over 6 months	No	22	14.1%
	Yes	134	85.9%
Experienced fistula	Yes	97	62.2%
	No	59	37.8%
Received surgery	n/a	63	40.4%
	Yes	29	18.6%
	No	64	41.0%
Cured	n/a	59	37.8%
	Yes, Completely	54	34.6%
	Not Stopped but Reduced	27	17.3%
	Not Stopped at all	8	5.1%
	Did Not Receive Treatment	8	5.1%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		11[a]	

a. The dependent variable has only one value observed in 5 (45.5%) subpopulations.

The result in the model fitting information in Table 12 showed the *chi*-square of 19.722, *p*-value = 0.003 less than the significance level of 0.05. The *p*-value of 0.003 was

an indication that the full model fit predicted significantly better than any model without predictors. The results supported assumption that there may exist a relationship between fistula experience and chronic pain (prolonged internal illness) among the violent sexual rape victims.

Table 12

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Model Fitting Information

	Model Fitting Criteria		Likelihood Ratio Tests			
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	37.034	40.084	35.034			
Final	29.312	50.661	15.312	19.722	6	.003

The goodness-of-fit in Table 14 provides clarity that fistula experience supported the evidence of good fit for the model with adequate predictions compared to the intercept (null model). The null model used the modal class (Yes, for those women who experienced prolonged illness over 6 months) as the model's prediction accuracy – 86%. With the final model $p = 0.003$ (<0.05) in Table 12 indicated that the model provided better accuracies for the reference outcome and outperformed the null compared to the null model.

The Pearson *Chi*-square statistics in Table 13 confirmed that the model was an adequate fit for the data $X^2 = .921$ and a Pearson statistic *p*-value=.922, $p > \alpha$ (0.05). There was no warning message and there were no subpopulations cells with zero frequencies. Therefore, because the goodness-of-fit table 13 showed a *p*-value of .922 $p > \alpha$ (0.05), there is a good indication that the model was better fit for the data.

Table 13

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	.921	4	.922
Deviance	1.115	4	.892

The correction measures analysis in Table 14 reflected the estimates of the strength of the relationship between fistula including (experienced fistula, causes of fistula, sought care, seen by provider, had surgery, and was cured) and chronic pain (prolonged internal illness). The highest pseudo *r*-square value shows the Nagelkerke result of 0.213 (21%), indicating the proportion of variation that is explained the model, which suggests medium level of relationship strength between predictor and outcome variables.

Table 14

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Correlation Measures

Cox and Snell	.119
Nagelkerke	.213
McFadden	.155

To evaluate the effect significance of the predictor variables over the outcome variable, the likelihood ratio tests in Table 15 compared all the model elements to the full model to determine how each predictor variables meaningfully contributes to the outcome, considering the full model. Based on their significance levels > 05, none of the

tested fistula subscales appeared to be a significant predictor of chronic pain among the victims.

Table 15

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Likelihood Ratio Test

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	29.312	50.661	15.312[a]	.000	0	.
Experienced fistula	29.312	50.661	15.312[a]	.000	0	.
Received surgery	30.830	46.079	20.830	5.517	2	.063
Cured	28.573	40.772	20.573	5.260	3	.154

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Table 16 had the outcome Yes prolonged illness over 6 months. The results in this parameter estimation tables showed that survivors of violent sexual rapes who developed fistula were more likely than those who did not to experience prolonged illness condition for over 6 months, *Odds Ratio* (*OR*) = 85712899.7 (95% *CI* 7932623.051 to 1179103672.00), $p = 0.000$. However, respondents who had fistula and surgery intervention compared to those who did not have surgery were less likely to experience prolonged illness that lasted for over 6 moths, *OR* = 0.135, (95% *CI* 0.020 to 0.903), $p = 0.039$. Lastly, respondents who had fistula and who were fully cured as compared to those who were not fully cured or who were not cured at all, were less likely to experience prolonged illness that lasted for over 6 months, *OR* = 2.539E-9, (95% *CI* 4.444$-9 to 5.798E-9), $p = 0.000$.

Table 16

Fistula and Chronic Pain (Prolonged Illness over 6 Months): Parameter estimates

Prolonged Illness over 6 Months[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Yes	Intercept	3.143	1.442	4.747	1	.029			
	[Experienced fistula=1]	18.387	1.276	207.675	1	.000	96712899.700	7932623.051	1179103672.000
	[Experienced fistula=2]	0[b]	.	.	0	.	.	.	.
	[Received surgery=0]	-2.066	1.411	2.144	1	.143	.127	.008	2.012
	[Received surgery=1]	-2.001	.969	4.263	1	.039	.135	.020	.903
	[Received surgery=2]	0[b]	.	.	0	.	.	.	.
	[Cured=0]	0[b]	.	.	0	.	.	.	.
	[Cured=1]	-17.489	.889	386.819	1	.000	2.539E-8	4.444E-9	1.451E-7
	[Cured=2]	-18.966	.000	.	1	.	5.798E-9	5.798E-9	5.798E-9
	[Cured=3]	.811	.000	.	1	.	2.250	2.250	2.250
	[Cured=4]	0[b]	.	.	0	.	.	.	.

a. The reference category is: No.

b. This parameter is set to zero because it is redundant.

The final model of the model fitting information showed a likelihood ratio test with $p = 0.003$. This was an indication of strong significance of the result. Therefore, there was evidence of significant association between physical health effects (fistulas) and chronic illness condition of 6 months and beyond among women survivors of violent sexual rape in eastern DR Congo.

Fistula and Depression (Upset all the time). The multinomial logistic regression was also conducted to test the association between fistula (including experienced fistula, causes of fistula, sought care, seen by provider, had surgery, and was cured) and depression outcome variable (including sadness, anxiety, feeling hopeless, feeling of guilt, worthlessness, loss of interest, decreased energy, irritability, lack of concentration, sleeplessness). The assumption was that violence rape victims with fistula are more likely to experience depression. Depression is described as the presence of serious disorder that

involves individual body, mind, and mood, including feeling of guilt, loss of pleasure, pessimism, sadness, self-dislike, and suicidal thoughts, which affects the normal well-being and functions of the body (mental, behavioral, and physical) (APA, 2013; Greenberget al., 2015). A few depression factors from the PANAS-X were considered as outcome variables in this multinomial regression analysis. Table 17 above provides the results of a multinomial logistic analysis to assess how fistula might be associated with depression symptom *upset* (upset all the time). The case processing summary shows the modal class used by the null model *quite a bit* (upset all the time), with 62.8% of prediction accuracy, 30.1% *extremely upset*, and only 0.6% for not upset at all.

Table 17

Fistula and Depression (Upset all the time): Case Processing Summary

		N	Marginal Percentage
Upset all the Time	Very Slightly	1	0.6%
	Moderately	10	6.4%
	Quite a Bit	98	62.8%
	Extremely	47	30.1%
Experienced fistula	Yes	97	62.2%
	No	59	37.8%
Treated by Doctor/HC Provider	n/a	62	39.7%
	Saw a Doctor	47	30.1%
	Saw a Nurse/Midwife	32	20.5%
	Community Health Worker	9	5.8%
	Other	6	3.8%
Received surgery	n/a	63	40.4%
	Yes	29	18.6%
	No	64	41.0%
Cured, Not Cured	n/a	59	37.8%
	Yes, Completely	54	34.6%
	Not Stopped but Reduced	27	17.3%
	Not Stopped at all	8	5.1%
	Did Not Receive Treatment	8	5.1%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		27[a]	

a. The dependent variable has only one value observed in 16 (59.3%) subpopulations.

The model fitting information in Table 18 was computed for multiple indices to test the null model as well as the final model, including all related predictors and intercepts. Grounded on the *chi*-square $X^2 = 45.761$, *p*-value = 0.033 < α (0.05), there was no warning message or subpopulations cells with zero frequencies. The results provided evidence that the full model was a good fit because it predicted significantly better and more accurately than the null model.

Table 18

Fistula and Depression (Upset all the time): Model Fitting Information

	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	114.409	123.559	108.409			
Final	128.648	229.294	62.648	45.761	30	.033

The goodness-of-fit Table 19 is designed to provided supporting evidence of better fit for the model. Both, the Pearson statistics and deviance statistics were computed based on the *chi*-square. Their inflation depended with the sample size. The significance level $p = 0.999 > \alpha$ (0.05) was a strong indication that model was a good fit for the data.

Table 19

Fistula and Depression (Upset all the time): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	23.514	48	.999
Deviance	28.220	48	.990

The above Table 20 reflected the estimates of the strength of the relationship between fistula including and depression (sadness - upset all the time). The highest pseudo *r*-square value showed the Nagelkerke result of 0.309 (31%), indicating the proportion of variation explaining the model, and therefore suggesting medium level of relationship strength between predictor and outcome variables.

Table 20

Fistula and Depression (Upset all the time): Correlation measures

Cox and Snell	.254
Nagelkerke	.309
McFadden	.170

The likelihood ratio tests in Table 21 evaluated the effect significance of the predictor variables over the outcome variable. It also compared all the model elements to the full model to determine how each predictor variables meaningfully contributed to the outcome. Based on their significance levels > 05, none of the tested fistula subscales

appeared to be a significant predictor of depression (being upset all the time) among the victims.

Table 21

Fistula and Depression (Upset all the time): Likelihood Ratio Tests

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	128.648	229.294	62.648[a]	.000	0	.
Experienced fistula	128.648	229.294	62.648[a]	.000	0	.
Treated by Doctor/HC Provider	120.888	184.935	78.888[b]	16.240	12	.181
Received surgery	128.435	210.781	74.435[b]	11.786	6	.067
Cured, Not Cured	124.058	197.254	76.058[b]	13.409	9	.145

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

b. Unexpected singularities in the Hessian matrix are encountered. This indicates that either some predictor variables should be excluded or some categories should be merged.

In Table 22, the parameter estimates of the predictor variables, including experienced fistula, causes of fistula, sought care, seen by provider, had surgery, and was cured, were compared. Only treated by a doctor/health care providers, as compared to all other predictors, was found to significantly impact the chronic pain outcome, *OR* = 2.573, (95%, *CI* 5.791 to 0.001), *p* = 0.000.

Table 22

Fistula and Depression (Upset all the time): Parameter Estimates

								95% Confidence Interval for Exp(B)	
Upset all the Time[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	Lower Bound	Upper Bound
Moderately	Intercept	21.288	816.281	.001	1	.979			
	[Experienced fistula=1]	-19.175	1746.545	.000	1	.991	4.703E-9	.000	.[b]
	[Experienced fistula=2]	0[c]	.	.	0	.	.	.	.
	[Treated by Doctor/HC Provider=0]	-15.614	630.885	.001	1	.980	1.655E-7	.000	.[b]

	[Treated by Doctor/HC Provider=1]	8.855	1405.947	.000	1	.995	7006.920	.000	.[b]
	[Treated by Doctor/HC Provider=2]	20.741	1484.360	.000	1	.989	1017507303.000	.000	.[b]
	[Treated by Doctor/HC Provider=3]	8.384	1658.800	.000	1	.996	4377.589	.000	.[b]
	[Treated by Doctor/HC Provider=6]	0[c]	.	.	0	.	.	.	.
	[Received surgery=0]	6.827	2.267	9.069	1	.003	922.036	10.845	78391.045
	[Received surgery=1]	-10.670	431.720	.001	1	.980	2.323E-5	.000	.[b]
	[Received surgery=2]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=0]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=1]	-1.426	1054.407	.000	1	.999	.240	.000	.[b]
	[Cured, Not Cured=2]	12.252	1174.271	.000	1	.992	209343.905	.000	.[b]
	[Cured, Not Cured=3]	12.431	1440.689	.000	1	.993	250353.252	.000	.[b]
	[Cured, Not Cured=4]	0[c]	.	.	0	.	.	.	.
Quite a Bit	Intercept	25.301	517.984	.002	1	.961			
	[Experienced fistula=1]	.531	1648.909	.000	1	1.000	1.701	.000	.[b]
	[Experienced fistula=2]	0[c]	.	.	0	.	.	.	.
	[Treated by Doctor/HC Provider=0]	-10.568	1.920	30.289	1	.000	2.573E-5	5.971E-7	.001
	[Treated by Doctor/HC Provider=1]	-.636	1330.239	.000	1	1.000	.529	.000	.[b]
	[Treated by Doctor/HC Provider=2]	9.770	1412.860	.000	1	.994	17502.604	.000	.[b]
	[Treated by Doctor/HC Provider=3]	10.119	1546.515	.000	1	.995	24807.271	.000	.[b]
	[Treated by Doctor/HC Provider=6]	0[c]	.	.	0	.	.	.	.
	[Received surgery=0]	1.263	1.641	.593	1	.441	3.536	.142	88.100
	[Received surgery=1]	-12.052	431.719	.001	1	.978	5.832E-6	.000	.[b]
	[Received surgery=2]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=0]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=1]	-10.716	985.450	.000	1	.991	2.220E-5	.000	.[b]
	[Cured, Not Cured=2]	.299	1112.767	.000	1	1.000	1.349	.000	.[b]
	[Cured, Not Cured=3]	.951	1391.015	.000	1	.999	2.588	.000	.[b]
	[Cured, Not Cured=4]	0[c]	.	.	0	.	.	.	.
Extremely	Intercept	21.714	517.980	.002	1	.967			
	[Experienced fistula=1]	2.812	1648.908	.000	1	.999	16.639	.000	.[b]
	[Experienced fistula=2]	0[c]	.	.	0	.	.	.	.
	[Treated by Doctor/HC Provider=0]	-7.477	.000	.	1	.	.001	.001	.001
	[Treated by Doctor/HC Provider=1]	1.257	1330.239	.000	1	.999	3.516	.000	.[b]
	[Treated by Doctor/HC Provider=2]	10.405	1412.861	.000	1	.994	33027.454	.000	.[b]
	[Treated by Doctor/HC Provider=3]	11.468	1546.516	.000	1	.994	95584.139	.000	.[b]
	[Treated by Doctor/HC Provider=6]	0[c]	.	.	0	.	.	.	.
	[Received surgery=0]	1.482	.000	.	1	.	4.401	4.401	4.401
	[Received surgery=1]	-12.678	431.719	.001	1	.977	3.117E-6	.000	.[b]
	[Received surgery=2]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=0]	0[c]	.	.	0	.	.	.	.
	[Cured, Not Cured=1]	-11.901	985.450	.000	1	.990	6.787E-6	.000	.[b]
	[Cured, Not Cured=2]	-1.303	1112.767	.000	1	.999	.272	.000	.[b]
	[Cured, Not Cured=3]	.920	1391.015	.000	1	.999	2.508	.000	.[b]
	[Cured, Not Cured=4]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Very Slightly.

b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

c. This parameter is set to zero because it is redundant.

Fistula and Depression (Feeling Blue or Depressive Mood). A multinomial regression analysis was also conducted to test if experience of fistula could predict the depression outcome (feeling blue or depressive mood/feeling depressed) among violent sexual rape victims. In Table 23, the case processing summary of a multinomial logistic analysis of how fistula is associated with depressive mood or feeling blue among the victims of sexual rape. The results show the modal class used by the null model *quite a bit* (depressive mood or feeling blue) with 60.9% of prediction accuracy, 33.3% extremely nervous or feeling depressed, and only 5.8% without the depressive mood connected to violent sexual rape.

Table 23

Fistula and Depression (Feeling Blue or Depressive Mood): Case Processing Summary

		N	Marginal Percentage
Blue/Depressive mood/Nervous	Moderately	9	5.8%
	Quite a Bit	95	60.9%
	Extremely	52	33.3%
Experienced fistula	Yes	97	62.2%
	No	59	37.8%
Did you seek Care	n/a	61	39.1%
	Yes	83	53.2%
	No	12	7.7%
Treated by Doct/HC Provider	n/a	62	39.7%
	Saw a Doctor	47	30.1%
	Saw a Nurse/Midwife	32	20.5%
	Community Health Worker	9	5.8%
	Other	6	3.8%
Received Surgery	n/a	63	40.4%
	Yes	29	18.6%
	No	64	41.0%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		16[a]	

a. The dependent variable has only one value observed in 6 (37.5%) subpopulations.

The results of the multinomial regression analysis in tables 23 through 28 are described in Table 24. The likelihood ration *Chi*-Square of 26.930 with a $p = 0.042 < 0.05$ indicated that the final model fitted significantly well than any other model without predictors. The results of this test provided evidence of existing significant association between fistula and depression among the survivors.

Table 24

Fistula and Depression (Feeling Blue or Depressive Mood): Model Fitting Information

	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	74.818	80.917	70.818			
Final	79.888	134.785	43.888	26.930	16	.042

The goodness-of-fit results in Table 25 showed that the model was a better fit for the data. Both, the Pearson statistics and deviance statistics showed the significance level $p = .929$ and $p = 0.815$ respectively, $p > \alpha$ (0.05). The higher *p*-value in the Table 26 confirmed that the model was a better fit for the data.

Table 25

Fistula and Depression (Feeling Blue or Depressive Mood): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	7.141	14	.929
Deviance	9.246	14	.815

Table 26 shows the estimates of the strength of the relationship between fistula including and depression (depressive mood). The highest pseudo *r*-square value shows the Nagelkerke result of 0.196 (20%) is the proportion of variation that explains the

model, suggesting thus, a medium level of strength of association between fistula and depression.

Table 26

Fistula and Depression (Feeling Blue or Depressive Mood): Correlation Measures

Cox and Snell	.159
Nagelkerke	.196
McFadden	.104

The effect significance of the predictor variables over the outcome variable was evaluated in the likelihood ratio tests (Table 27). The test compared all the model elements to the full model to determine how each predictor variables meaningfully contributes to the outcome. The results indicated that Fistula experience subscales *did you seek care* appeared to significantly predict depression *blue* (depressive mood) at a significance level $p = 0.009$, respectively, p-value < α (0.05). However, experienced fistula, treated by doctor/healthcare provider, and received surgery did not.

Table 27

Fistula and Depression (Feeling Blue or Depressive Mood): Likelihood Ratio Tests

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	79.888	134.785	43.888[a]	.000	0	.
Experienced fistula	75.888	124.686	43.888	.000	2	1.000
Did you seek Care	85.454	128.151	57.454	13.565	4	.009
Treated by doctor/HC Provider	78.768	109.267	58.768	14.880	8	.062
Received Surgery	77.013	125.811	45.013	1.125	2	.570

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

The parameter estimates in the next Table 28 had the fistula subscale predictors (including experience fistula; did you seek care; treated by doctor/HC provider or by other), and received surgery), compared to depression feeling blue (feeling depressed). Among those who felt blue at a moderate scale, a one-point decrease in treated by the doctor/healthcare provider=1 and any one-point decrease in treated by the nurse=2, compared to all other predictors, had a significant negative impact on the survivors' depression experience of feeling blue, *OR* = 0.007, (95% *CI* 9.955E-5 to 0.474), *p* = 0.021 and *OR* = 0.031, (95% *CI* 0.008 to 9.470E-5), *p* = 0.031 respectively. The results also showed that for those who experienced depression blue at quite a bit scale, a one-point increase in did you seek care=1, compared to all other predictors, had a significant positive impact on the survivors' depressive mood experience blue, *OR* = 7.624, (95% *CI* 1.045 to 55.609), *p* = 0.045.

Table 28

Fistula and Depression (Feeling Blue or Depressive Mood): Perimeter Estimates

								95% Confidence Interval for Exp(B)	
Depressive mood/Nervousness[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	Lower Bound	Upper Bound
Moderately	Intercept	-40.646	914.474	.002	1	.965			
	[Experienced fistula=1]	15.921	890.690	.000	1	.986	8211254.056	.000	.[b]
	[Experienced fistula=2]	0[c]	.	.	0	.	.	.	.
	[Did you seek Care=0]	28.384	.000	.	1	.	2123092582000.000	212309258 2000.000	212309258200 0.000
	[Did you seek Care=1]	27.949	1265.098	.000	1	.982	1374718283000.000	.000	.[b]
	[Did you seek Care=2]	0[c]	.	.	0	.	.	.	.
	[Treated by doctor/HC Provider=0]	10.431	914.474	.000	1	.991	33880.027	.000	.[b]
	[Treated by doctor/HC Provider=1]	-4.980	2.161	5.313	1	.021	.007	9.955E-5	.474
	[Treated by doctor/HC Provider=2]	-4.856	2.250	4.659	1	.031	.008	9.470E-5	.640
	[Treated by doctor/HC Provider=3]	-3.160	2.277	1.926	1	.165	.042	.000	3.679

	[Treated by doctor/HC Provider=6]	0[c]	.	.	0	.	.	.	.
	[Received Surgery=0]	1.319	1163.260	.000	1	.999	3.740	.000	.[b]
	[Received Surgery=1]	10.485	3160.294	.000	1	.999	.044	.000	.[b]
	[Received Surgery=2]	0[c]	.	.	0	.	.	.	.
Quite a Bit	Intercept	.401	2410.388	.000	1	1.000			
	[Experienced fistula=1]	.751	2410.389	.000	1	1.000	2.119	.000	.[b]
	[Experienced fistula=2]	0[c]	.	.	0	.	.	.	.
	[Did you seek Care=0]	17.823	2410.388	.000	1	.994	54983876.300	.000	.[b]
	[Did you seek Care=1]	2.031	1.014	4.015	1	.045	7.624	1.045	55.609
	[Did you seek Care=2]	0[c]	.	.	0	.	.	.	.
	[Treated by doctor/HC Provider=0]	-17.823	.000	.	1	.	1.818E-8	1.818E-8	1.818E-8
	[Treated by doctor/HC Provider=1]	-2.367	1.535	2.379	1	.123	.094	.005	1.898
	[Treated by doctor/HC Provider=2]	-1.812	1.483	1.493	1	.222	.163	.009	2.988
	[Treated by doctor/HC Provider=3]	-1.718	1.511	1.293	1	.256	.179	.009	3.468
	[Received Surgery=0]	16.817	.000	.	1	.	20116280.38	.000	.[b]
	[Received Surgery=1]	12.686	442.193	.001	1	.997	323255.920	.000	.[b]
	[Received Surgery=2]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Extremely.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

In both multinomial analyses of the association between fistula and chronic pain and of the association between fistula and depression, the results established clear evidence that fistula significantly predicted chronic pain and the depression among survivors of violent sexual rape. The hypothesis that there is an association between physical health effects (fistulas) and chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the MOS SSS and the PANAS-X scale was found to be true and therefore maintained. Based on the above results, I rejected the null hypothesis that there is no association between fistula experience and chronic pain and depression among women survivors of violent sexual rape in eastern DRC.

Research Question 2: Other Injuries Association with Chronic Pain and Depression

RQ2: Is there an association between physical health effects (including other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

$H_0$2: There is no association between physical health effects (other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and PANAS-X scale.

$H_1$2: There is an association between physical health effects (other sexual rape-related injuries) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Other Sexual Rape-related Injuries and Chronic Pain. A multinomial logistic regression analysis was also conducted to test how the other injuries from violent sexual rape predicted the outcome of chronic pain among survivors of violent sexual rape in eastern DRC. The multinomial regression analysis was based on the following assumption: violent sexual rape injuries may predict chronic pain experience among survivors. The multinomial logistic regression tested whether other injuries due to violent sexual rape, (including fistula, real disability or immediate death of survivors' family member, attack by knife or weapon, physical damage with handicap, chronic disability,

and injuries during sexual violence) predicted the experience of chronic pain (chronic illness due to violent sexual rape).

Table 29 is a case processing summary of a multinomial logistic analysis of the association between violent rape-related injuries and chronic pain 'chronic illness related to violent sexual rape. The results show the modal class used by the null model for yes, experienced chronic illness due to sexual violence. This accuracy was explained by a total prediction of 85.9%, with only 14.1% of whose did not experience chronic illnesses related to violent sexual rape.

Table 29

Other Rape-Related Injuries and Chronic Illness: Case Processing Summary

		N	Marginal Percentage
Chronic Illness due to Viol	No	22	14.1%
	Yes	134	85.9%
Attack by Knife or Weapon	No	31	19.9%
	Yes	125	80.1%
Injured During Sex Viol	No	39	25.0%
	Yes	117	75.0%
Experienced fistula	Yes	97	62.2%
	No	59	37.8%
Physical Damage Handicap	No	119	76.3%
	Yes	37	23.7%
Real Disability/Immediate Death	No	140	89.7%
	Yes	16	10.3%
Chronic Disability or Death1	No	156	100.0%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		24[a]	

a. The dependent variable has only one value observed in 16 (66.7%) subpopulations.

The results in the model fitting information Table 30 showed the likelihood ration *Chi*-Square of 21.535 with a $p = 0.001 < 0.05$. The assumption was that other violent

sexual rape-related injuries may impact the chronic pain experience among rape victims. The results with a *p*-value of 0.001indicated that the full model fit was a significantly better fit of the final model than any other model without predictors, confirming thus, a significant relationship between other violent rape-related injuries.

Table 30

Other Rape-Related Injuries and Chronic Illness: Model fitting information

	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	60.626	63.676	58.626			
Final	49.246	67.545	37.246	21.380	5	.001

The results in the goodness-of-fit in Table 31 showed the Pearson statistics with significance level $p = 0.351 > 0.05$ and deviance statistics with significance level $p = 0.445 > 0.05$. Both *p*-values in this test (0.351 and 0.442) were greater than α (0.05), which indicated the proportion of the difference that was explained by the model. The larger *p*-values yielded a strong indication that the model was a better fit for the data.

Table 31

Other Rape-Related Injuries and Chronic Illness: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	19.684	18	.351
Deviance	18.182	18	.444

The results in the correlation measures Table 32 showed the strength of the relationship between predictors and the intercept variables. The highest pseudo *r*-square value showed the Nagelkerke result of 0.230. The higher R^2-value of 0.230 (23%)

explained the model and suggested a strong level of association between injuries from violent sexual rape and chronic pain.

Table 32

Other Rape-Related Injuries and Chronic Illness: Correlation Measures

Cox and Snell	.128
Nagelkerke	.230
McFadden	.168

To test the effect significance of the predictor variables over the outcome variable in the Likelihood Ratio Tests (Table 33), the model elements were compared to the full model to determine how each predictor variables meaningfully contributes to the chronic pain outcome. The results indicated that among other predictors, fistula experience that resulted from sexual violence wounds, $p = 0.011$ and injuries from attack by knife or weapon, $p = 0.008$ significantly predicted the chronic pain outcome among survivors of violent sexual rape, p-value < α (0.05).

Table 33

Other Rape-Related Injuries and Chronic Illness: Likelihood Ratio Tests

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	49.246	67.545	37.246[a]	.000	0	.
Attack by Knife or Weapon	56.810	72.059	46.810	9.564	1	.002
Injured During Sex Viol	47.711	62.961	37.711	.465	1	.495
Experienced fistula	53.886	69.136	43.886	6.640	1	.010
Physical Damage Handicap	48.435	63.684	38.435	1.189	1	.276
Real Disability/Immediate Death	47.845	63.094	37.845	.599	1	.439
Chronic Disability or Death1	49.246	67.545	37.246[a]	.000	0	.

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 34, the parameter estimates of the predictor variable, other injuries due to violent sexual rape, were compared to chronic illness among the survivors. The results indicated that rapes survivors who also sustained fistula injuries as a result of violent sexual rape compared to did not experience fistula injuries, had an increased probability of experiencing chronic pain (chronic illness due to violence), *OR* = 3.679, (95%, *CI* 1.327 to 10.203), *p*=.012. However, sexual rape survivors who also sustained injuries from knife or other weapon attack, as compared to all other who did not experience knife or other weapon attack, were less likely to experience chronic illness due to sexual violence, *OR* = 0.194, (95%, *CI* 0.69 to 0.545), *p* = 0.002.

Table 34

Other Rape-Related Injuries and Chronic Illness: Parameter Estimate

								95% Confidence Interval for Exp(B)	
Chronic Illness due to Viol[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	Lower Bound	Upper Bound
Yes	Intercept	2.005	1.148	3.051	1	.081			
	[Attack by Knife or Weapon=0]	-1.639	.527	9.687	1	.002	.194	.069	.545
	[Attack by Knife or Weapon=4]	0[b]	.	.	0	.	.	.	.
	[Injured During Sex Viol=0]	-.383	.557	.474	1	.491	.682	.229	2.030
	[Injured During Sex Viol=2]	0[b]	.	.	0	.	.	.	.
	[Experienced fistula=1]	1.303	.520	6.265	1	.012	3.679	1.327	10.203
	[Experienced fistula=2]	0[b]	.	.	0	.	.	.	.
	[Physical Damage Handicap = 0]	.663	.598	1.228	1	.268	1.940	.601	6.266
	[Physical Damage Handicap=3]	0[b]	.	.	0	.	.	.	.
	[Real Disability/Immediate Death=0]	-.779	1.097	.504	1	.478	.459	.053	3.943
	[Real Disability/Immediate Death=5]	0[b]	.	.	0	.	.	.	.
	[Chronic Disability or Death1=0]	0[b]	.	.	0	.	.	.	.

a. The reference category is: 0.
b. This parameter is set to zero because it is redundant.

The results presented in the model fitting information Table 34 provided the key information of this multinomial regression test. The final model showed the likelihood ratio test with a significance level $p = 0.001$, which was supported by the correlation measures (see Table 32), with Nagelkerke results of 0.230. Based on this analysis, I concluded that that there was an established evidence of significant relationship between other injuries due to violent sexual rape and chronic pain (chronic illness due to violent sexual rape) among survivors of violent sexual rape.

Other sexual rape-related injuries and depression 'feeling irritable'. A multinomial logistic regression analysis was conducted to assess how other injuries from violent sexual rape predict the depression experience among the survivors of violent sexual rapes in eastern DRC. The assumption was: Injuries resulting from violent sexual rape injuries may predict depression experience among the victim survivors. The multinomial logistic regression tested if other injuries due to violent sexual rape, (chronic illness due to violent rapes, prolonged illnesses, physically forced to perform sexual acts, and physically forced to have sex) predicted the experience of depression (feeling irritated). Table 35 is the case processing summary of a multinomial logistic analysis that tested the association between other violent sexual rape-related injuries and depression symptom of feeling irritable. The results showed the modal class used by the null model (quite a bit, feeling irritable) with 64.7% of prediction accuracy,19.9% moderately feeling irritable, 10.3% extremely feeling and only 1.9% of not at all feeling irritable.

Table 35

Other Rape-Related Injuries and Feeling Irritable: Case Processing Summary

		N	Marginal Percentage
Feeling Irritable	Very Slightly	3	1.9%
	A Little	5	3.2%
	Moderately	31	19.9%
	Quite a Bit	101	64.7%
	Extremely	16	10.3%
Chronic Illness due to Viol	No	22	14.1%
	Yes	134	85.9%
Prolonged Illness	No	4	2.6%
	Yes	152	97.4%
Physically Forced to Perform Sexual Acts	No	16	10.3%
	Yes	140	89.7%
Physically Forced to Have Sex	Yes	156	100.0%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		5	

The results of the multinomial regression analysis described in Table 36. The likelihood ration *Chi*-Square of $X^2 = 26.930$, $p = 0.004 < 0.05$ indicated that the final model fitted significantly well than any other model without predictors. The results of this test also provided information of significant association between other sexual rape-related injuries and depression among the survivors.

Table 36

Other Rape-Related Injuries and Feeling Irritable: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	67.621			
Final	38.833	28.788	12	.004

In Table 37, the goodness-of-fit results provided the Pearson statistics with $p = 0.277 > \alpha$ (0.05) and deviance statistics with significance level $p = 0.300 > \alpha$ (0.05). Both Pearson and deviance statistics values provide information that explained the model. The

high significance levels of p =.277 and p = .300 indicated that the model was a good fit for the data.

Table 37

Other Rape-Related Injuries and Feeling Irritable: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	5.103	4	.277
Deviance	4.883	4	.300

Table 38 also provided the results of the correlation measures. The result of the Nagelkerke statistics of 0.194 (19%) was the highest pseudo *r*-square value proportion of variation which explained the model. These values suggested a moderate level of relationship between other injuries from violent sexual rape and depression (Feeling irritated all the time).

Table 38

Other Rape-Related Injuries and Feeling Irritable: Correlation Measures

Cox and Snell	.169
Nagelkerke	.194
McFadden	.090

To determine how meaningful was the contribution of each predictor variable in predicting the chronic pain outcome, the effect significance of the predictor variables over the outcome variable was tested in the Likelihood Ratio Tests (Table 39) by comparing the model elements to the full model. The results indicated that among other predictors, chronic illness due to violent sexual rape, significantly predicted the

depression experience (feeling irritated all the time) outcome among the violent sexual rape survivors, $p = 0.001$, p-value < α (0.05).

Table 39

Other Rape-Related Injuries and Feeling Irritable: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	38.833[a]	.000	0	.
Chronic Illness due to Viol	58.315	19.482	4	.001
Prolonged Illness	39.892	1.060	4	.901
Physically Forced to Perform Sexual Acts	46.241	7.408	4	.116
Physically Forced to Have Sex	38.833[a]	.000	0	.

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 40, the predictors variables were compared to one another. The parameter estimates data showed that none of the predictor variables had significant relationship to the depression outcome as compared to the others. However, where $B = 0.476 > 0$, there was an indication that chronic illness due to violent sexual rape was more likely to predict moderate feeling of depression, $OR = 1.609$, (95%, CI 0.358 to 7.243). Whereas, the predictor 'chronic illness due to violent sexual rape' with $B = -1.008 < 0$ suggested that chronic illness due to violent sexual rape compared to other predictor, was less likely to increase quite a bit of depression experience (feeling irritated all the time) among the survivors of violent sexual rape, $OR = 0.365$, (95%, CI 0.082 to 1.623). In other words, as the chronic illness due to violent sexual rape variation increase by one unit as compared to other injuries due to rapes, the odds of experiencing depression

(feeling irritated all the time) decrease by 9.8% among the survivors of violent sexual rape, 1- 0.082 = 0.918 (9.8%).

Table 40

Other Rape-Related Injuries and Feeling Irritable: Parameter Estimates

Feeling Irritable[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confce Interval for Exp(B) Lower Bound	Upper Bound
Very Slightly	Intercept	-17.936	2356.538	.000	1	.994			
	[Chronic Illness due to Viol=0]	18.260	2356.538	.000	1	.994	85194300.220	.000	.[b]
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Prolonged Illness=0]	16.262	.000	.	1	.	11550249.110	11550249.110	11550249.110
	[Prolonged Illness=1]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Perform Sexual Acts=0]	-16.798	4143.762	.000	1	.997	5.069E-8	.000	.[b]
	[Physically Forced to Perform Sexual Acts=11]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
A Little	Intercept	-1.455	.674	4.665	1	.031			
	[Chronic Illness due to Viol=0]	-.068	1.309	.003	1	.959	.934	.072	12.161
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Prolonged Illness=0]	.292	.000	.	1	.	1.339	1.339	1.339
	[Prolonged Illness=1]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Perform Sexual Acts=0]	1.068	1.124	.903	1	.342	2.910	.321	26.347
	[Physically Forced to Perform Sexual Acts=11]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
Moderately	Intercept	.557	.373	2.236	1	.135			
	[Chronic Illness due to Viol=0]	.476	.767	.384	1	.535	1.609	.358	7.243
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Prolonged Illness=0]	16.911	5079.630	.000	1	.997	22097370.510	.000	.[b]
	[Prolonged Illness=1]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Perform Sexual Acts=0]	-.202	.815	.062	1	.804	.817	.166	4.032
	[Physically Forced to Perform Sexual Acts=11]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
Quite a Bit	Intercept	2.069	.317	42.534	1	.000			
	[Chronic Illness due to Viol=0]	-1.008	.762	1.753	1	.185	.365	.082	1.623
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.

[Prolonged Illness=0]	16.498	5079.630	.000	1	.997	14618842.860	.000	.[b]
[Prolonged Illness=1]	0[c]	.	.	0	.	.	.	.
[Physically Forced to Perform Sexual Acts=0]	-1.182	.775	2.324	1	.127	.307	.067	1.402
[Physically Forced to Perform Sexual Acts=11]	0[c]	.	.	0	.	.	.	.
[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Extremely.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

Other Sexual Rape-related Injuries and Depression (active). A multinomial logistic regression analysis was also performed, to test the relationship between other injuries from violent sexual rape, (including injuries during sexual violence, chronic damage injuries, physical damage - handicap, physically forced to have sex, chronic illness due to violence and family members died during attack) and depression active (inability to engage in any activity). The assumption was that other injuries due to violent sexual have serious impact on depression experience among violent sexual rape survivors in DR Congo. Table 41 shows the modal class used by the null model, active (unable to engage in any activity), with 89% of prediction accuracy in very little or no activity at all, and only 9% for a little, 0.6% for moderately, and 1.6% for quite a bit.

Table 41.

Other Rape-Related Injuries and Active: Case Processing Summary

		N	Marginal Percentage
Active (inability to engage in any Activity)	Very Slightly	138	88.5%
	A Little	14	9.0%
	Moderately	1	0.6%
	Quite a Bit	3	1.9%
Injured During Sex Viol	No	39	25.0%
	Yes	117	75.0%
Chronic Damage Injuries	No	39	25.0%
	Yes	117	75.0%
Physical Damage Handicap	No	119	76.3%
	Yes	37	23.7%
Physically Forced to Have Sex	Yes	156	100.0%
Chronic Illness due to Viol	No	22	14.1%
	Yes	134	85.9%
Family Member Died During Attack	No	123	78.8%
	Yes	33	21.2%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		12[a]	

a. The dependent variable has only one value observed in 5 (41.7%) subpopulations.

The results from the model fitting information (Table 42) indicated that the final model significantly fitted better than any other model without predictors and outperformed the null model considering a final probability ratio test *chi*-square X^2 (12, N = 156), 22.092, $p = 0.037 < 0.05$. The results provided clear indication that 'other injuries due to violent sexual rape' were significantly associated with depression outcome 'active' (inability to engage in any activity) among the women survivors of violent sexual rape, an outcome that supported out assumption.

Table 42.

Other Rape-Related Injuries and Active: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	50.682			
Final	28.590	22.092	12	.037

The analysis of the goodness-of-fit in Table 43 had a Pearson *chi*-square statistics $p = 0.277 > 0.05$, and a deviance with $p = 0.300 > 0.05$. Both the Pearson test and deviance *p*-value were large. The larger *p*-values in the goodness of fit table provide a strong suggestion that the model was a better fit for the data.

Table 43

Other Rape-Related Injuries and Active: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	7.642	21	.996
Deviance	8.980	21	.989

In the correlation measures Table 44, the Pseudo *R*-square analysis provided the results that affirmed the strength of the relationship between the independent (predictor) and dependent (intercept) variables. The highest pseudo r-square in the Nagelkerke statistics of 0.228 was the highest level of association between the predictor and intercept variables, with nearly 23% value proportion that explained the model.

Table 44

Other Rape-Related Injuries and Active: Correlation measures

Cox and Snell	.132
Nagelkerke	.228
McFadden	.163

To evaluate the significance of each predictor variable's contribution in predicting the depression outcome, active (inability to engage in activity), and to understand the effect significance of the predictor variables over the intercept variables, the Likelihood Ratio Tests was used (Table 45). The results showed that of all predictor variables, family member died during attack, significantly weighted on participants' activity experience (inability to engage in any activity) outcome, $p = 0.042 < 0.05$.

Table 45

Other Rape-Related Injuries and Active: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	28.590[a]	.000	0	.
Injured During Sex Viol	28.590[a]	.000	0	.
Chronic Damage Injuries	28.590[a]	.000	0	.
Physical Damage Handicap	35.683	7.093	3	.069
Physically Forced to Have Sex	28.590[a]	.000	0	.
Chronic Illness due to Viol	29.627	1.037	3	.792
Family Member Died During Attack	36.769	8.179	3	.042

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

To analyze the parameter estimates (Table 46), I compared the predictor variables to one another. The results showed that, comparing all the predictor variables, none had a significant relationship to the depression outcome active (unable to engage in any activity). For each predictor, the *p*-value was greater than 0.05.

Table 46

Other Rape-Related Injuries and Active: Parameter Estimates

Active (inability to engage in activity)[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Very Slightly	Intercept	2.452	1.143	4.604	1	.032			
	[Injured During Sex Viol=1]	17.265	7177.506	.000	1	.998	31473424.690	.000	.[b]
	[Injured During Sex Viol=2]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=1]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=2]	0[c]	.	.	0	.	.	.	.
	[Physical Damage Handicap=1]	1.532	1.255	1.489	1	.222	4.626	.395	54.136
	[Physical Damage Handicap=3]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
	[Chronic Illness due to Viol=1]	-1.441	1.382	1.088	1	.297	.237	.016	3.549
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Family Member Died During Attack=1]	.836	1.364	.376	1	.540	2.307	.159	33.405
	[Family Member Died During Attack=5]	0[c]	.	.	0	.	.	.	.
A Little	Intercept	-17.543	1.201	213.357	1	.000			
	[Injured During Sex Viol=1]	17.869	7177.506	.000	1	.998	57574156.130	.000	.[b]
	[Injured During Sex Viol=2]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=1]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=2]	0[c]	.	.	0	.	.	.	.
	[Physical Damage Handicap=1]	1.347	1.427	.891	1	.345	3.846	.235	63.005
	[Physical Damage Handicap=3]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
	[Chronic Illness due to Viol=1]	-1.209	1.521	.632	1	.427	.298	.015	5.882
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Family Member Died During Attack=1]	18.731	.000	.	1	.	136357593.800	136357593.800	136357593.800
	[Family Member Died During Attack=5]	0[c]	.	.	0	.	.	.	.
Moderately	Intercept	-35.012	7927.923	.000	1	.996			
	[Injured During Sex Viol=1]	37.134	8403.616	.000	1	.996	1340228561000000000.000	.000	.[b]
	[Injured During Sex Viol=2]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=1]	0[c]	.	.	0	.	.	.	.
	[Chronic Damage Injuries=2]	0[c]	.	.	0	.	.	.	.
	[Physical Damage Handicap=1]	-18.427	4466.215	.000	1	.997	9.934E-9	.000	.[b]
	[Physical Damage Handicap=3]	0[c]	.	.	0	.	.	.	.
	[Physically Forced to Have Sex=10]	0[c]	.	.	0	.	.	.	.
	[Chronic Illness due to Viol=2]	-2.995	.000	.	1	.	.050	.050	.050
	[Chronic Illness due to Viol=1]	0[c]	.	.	0	.	.	.	.
	[Family Member Died During Attack=1]	18.632	6614.212	.000	1	.998	123540624.700	.000	.[b]
	[Family Member Died During Attack=5]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Quite a Bit.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

In addressing Research Question 2, the results of three multinomial logistic regression analyses provided strong evidence of significant association. The first multinomial logistic regression analysis provided meaningful evidence that other injuries due to violent sexual rape were strongly associated with chronic pain (including chronic illnesses from sexual violence), $p = 0.001$. The results of a second multinomial logistic regression test showed evidence of strong relationship between other injuries related to violent sexual rape and depression (irritable or feeling irritable) with a final model $p = 0.004$. Further, the last multinomial test also yielded significant evidence showing that other injuries due to violent sexual rape was strongly associated with depression (i.e., active or unable to engage in any activity), with a final model $p = 0.037$. Because all the tests revealed a strong association between the predictor and outcome variables, the hypothesis was confirmed. Therefore, the null hypothesis that "there is no relationship between "other injuries due to violent sexual rape and depression was rejected.

Research Question 3. PTSD Association with Chronic Pain and Depression

RQ3: Is there an association between mental health effect (including PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

$H_0$3: There is no association between mental health effect (PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

$H_1$3: There is an association between mental health effect (PTSD) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

PTSD and Chronic Pain (Chronic Illness due to Sexual Violence). A multinomial logistic regression analysis was performed to test whether PTSD factors resulting from violent sexual rape survivors predicted chronic pain experience. PTSD is defined as a disorder that is developed by some individuals because of serious life threatening and life altering events (Stein & Lang, 2013). Often manifested in episodes of re-experiencing, avoidance, arousal, and cognition or mood symptoms, PTSD is commonly experienced after shocking traumatic events of war, physical assault, sexual assaults, terror attacks, abuses, disaster, or other serious events (2013). Some indications or symptoms of PTSD may include the irritability, distorted self-blame, persistent anger, fear, or shame, diminished interest, and feeling detached, difficulty concentrating, irritable, hostile or aggressive behavior, and sleeplessness (National Institute of Mental Health - NIMH; 2018). Table 47 provides the results of a case processing summary of a multinomial logistic analysis of how PTSD affected chronic pain among survivors of violent sexual rape in eastern DRC. The results show the modal class used by the Null model 'Yes' (chronic illness due to sexual violence), with 85.9% of prediction accuracy, with only 14.1% without chronic illnesses connected to violent sexual rape.

Table 47

PTSD Symptoms and Chronic Illness due to Sexual Violence: Case Processing Summary

		N	Marginal Percentage
Chronic Illness due to Viol	No	22	14.1%
	Yes	134	85.9%
Feeling Irritable	Very Slightly	3	1.9%
	A Little	5	3.2%
	Moderately	31	19.9%
	Quite a Bit	101	64.7%
	Extremely	16	10.3%
Living with Fear	A Little	3	1.9%
	Moderately	25	16.0%
	Quite a Bit	109	69.9%
	Extremely	19	12.2%
Upset all the Time	Very Slightly	1	0.6%
	Moderately	10	6.4%
	Quite a Bit	98	62.8%
	Extremely	47	30.1%
Feeling of Guilty	Very Slightly	2	1.3%
	Moderately	21	13.5%
	Quite a Bit	106	67.9%
	Extremely	27	17.3%
Experiencing Nervousness or Anxiety	Very Slightly	3	1.9%
	Moderately	24	15.4%
	Quite a Bit	91	58.3%
	Extremely	38	24.4%
Feeling of Unfriendliness	Very Slightly	13	8.3%
	A Little	8	5.1%
	Moderately	32	20.5%
	Quite a Bit	69	44.2%
	Extremely	34	21.8%
Dep Unable to Relax	Very Slightly	4	2.6%
	A Little	2	1.3%
	Moderately	29	18.6%
	Quite a Bit	109	69.9%
	Extremely	12	7.7%
Dep Feeling of Shame	Very Slightly	2	1.3%
	Moderately	8	5.1%
	Quite a Bit	114	73.1%
	Extremely	32	20.5%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		125[a]	

a. The dependent variable has only one value observed in 120 (96.0%) subpopulations.

The result in the model fitting information Table 48 yielded results suggesting that symptoms of PTSD (including feeling irritable, living with fear, upset all the time, feeling of guilt, nervousness or anxiety, unfriendliness - hostile or aggressive behavior, unable to relax, and feeling of shame) significantly affected chronic pain. With a *chi*-square of 51.965, *p*-value = 0.004, less than alpha α (0.05), the results were an indication that the full model fitting significantly predicted better than any model without predictors. The assumption that PTSD could affect the chronic pain outcome among victims was supported.

Table 48

PTSD Symptoms and Chronic Illness due to Sexual Violence: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	114.631			
Final	62.666	51.965	28	.004

The goodness-of-fit in Table 49 provided results that showed supporting evidence of good fit for the model with adequate predictions compared to the Intercept (null model). The null model used the modal class (yes for those women who experienced chronic illnesses because of violent sexual rape) as the model's prediction accuracy of 86%. With the final model $p = 0.004$ (<0.05) in Table 48 indicated that the model provided better accuracies for the reference outcome (Yes) and outperformed the null compared to the null model. Table 49 also confirmed that the model was an adequate fit for the data because the Pearson *chi*-square statistics of 70.417, $p = 0.977 > 0.05$ and deviance *chi*-square statistics of 54.729, $p = 1.000 > 0.05$. There was no warning message and there were no subpopulations cells with zero frequencies. Therefore,

because the goodness-of-fit table showed a large *p*-value, $p = 0.977 > \alpha\ (0.05)$, there was a strong indication that the model was a better fit for the data.

Table 49

PTSD Symptoms and Chronic Illness due to Sexual Violence: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	70.417	96	.977
Deviance	54.729	96	1.000

The Pseudo *R*-square Table 50 reflected the estimates of the strength of the relationship between PTSD (including feeling irritable, living with fear, upset all the time, feeling of guilt, nervousness or anxiety, hostile [i.e., feeling unfriendly], unable to relax, and feeling of shame) and chronic pain (i.e., chronic illnesses due to violent sexual rape). The highest pseudo *r*-square value shows the Nagelkerke result of 0.509 (51%), indicating the proportion of variation that is explained by the model, and which suggests high relationship strength between the predictor and outcome variables.

Table 50

PTSD Symptoms and Chronic Illness due to Sexual Violence: Correlation Measures

Cox and Snell	.283
Nagelkerke	.509
McFadden	.409

To evaluate the effect significance of the predictor variables over the outcome variable, the Likelihood Ratio Tests in Table 51 compared all the predictors variable (feeling irritable, living with fear, upset all the time, feeling of guilt, nervousness or anxiety, hostile [i.e., feeling unfriendly], unable to relax, and feeling of shame) to the full

model to determine how each predictor variable meaningfully contributes to the chronic pain (i.e., chronic illnesses due to violent sexual rape) outcome. The results showed that experiencing nervousness or anxiety compared to all other predictors, significantly predicted chronic illnesses due to violent sexual rape among the victims, $p = 0.011$, followed by feeling irritable, $p = 0.016$.

Table 51

PTSD Symptoms and Chronic Illness due to Sexual Violence: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	62.666[a]	.000	0	.
Feeling Irritable	74.881	12.214	4	.016
Living with Fear	65.863	3.197	3	.362
Upset all the Time	63.329	.663	3	.882
Feeling of Guilty	70.383	7.717	4	.102
Nervousness or Anxiety	73.873	11.207	3	.011
Hostile/Feeling Unfriendly	71.496	8.829	4	.066
Unable to Relax	63.220	.554	4	.968
Feeling of Shame	63.020	.354	3	.950

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Table 52 had the outcomes of "No" experience of chronic illness due to violent sexual rape compared to "Yes" had experience of chronic illness due to violent sexual rape. Survivors' experience of feeling irritable all the time was more likely to have chronic illness due to violent sexual rape, *OR* = 0.061, (95% *CI* 0.005 to 0.756), p=.029, compared to not feeling irritable. Other experience, including living with fear, being upset, feeling guilty, anxiousness, hostile mood, or unable to relax did not show significant effect on effect on chronic illness due to violent rape outcome.

Table 52

PTSD Symptoms and Chronic Illness due to Sexual Violence: Parameter Estimates

SV Chronic Illness due to Viol[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
No	Intercept	-2.622	1.943	1.821	1	.177			
	[Feeling Irritable=1]	31.906	.000	.	1	.	71871039840000.000	71871039840000.000	7187103984 0000.000
	[Feeling Irritable=2]	-10.884	1396.080	.000	1	.994	1.876E-5	.000	.[b]
	[Feeling Irritable=3]	-.801	1.398	.329	1	.566	.449	.029	6.944
	[Feeling Irritable=4]	-2.792	1.282	4.744	1	.029	.061	.005	.756
	[Feeling Irritable=5]	0[c]	.	.	0	.	.	.	.
	[Living with Fear=2]	-15.312	4568.945	.000	1	.997	2.239E-7	.000	.[b]
	[Living with Fear=3]	2.223	1.596	1.941	1	.164	9.235	.405	210.672
	[Living with Fear=4]	1.532	1.277	1.439	1	.230	4.626	.379	56.478
	[Living with Fear=5]	0[c]	.	.	0	.	.	.	.
	[Upset all the Time=1]	-16.145	8309.687	.000	1	.998	9.733E-8	.000	.[b]
	[Upset all the Time=3]	-1.105	1.698	.424	1	.515	.331	.012	9.225
	[Upset all the Time=4]	-.295	.948	.097	1	.756	.745	.116	4.777
	[Upset all the Time=5]	0[c]	.	.	0	.	.	.	.
	[Feeling of Guilty=1]	-14.864	8327.877	.000	1	.999	3.503E-7	.000	.[b]
	[Feeling of Guilty=3]	-17.475	1485.675	.000	1	.991	2.575E-8	.000	.[b]
	[Feeling of Guilty=4]	-.576	1.126	.262	1	.609	.562	.062	5.109
	[Feeling of Guilty=5]	-1.462	.000	.	1	.	.232	.232	.232
	[Feeling of Guilty=41]	0[c]	.	.	0	.	.	.	.
	[Nervousness/Anxiety =1]	25.533	2041.034	.000	1	.990	122734715100.000	.000	.[b]
	[Nervousness/Anxiety =3]	2.086	1.520	1.882	1	.170	8.050	.409	158.493
	[Nervousness/Anxiety=4]	1.717	1.321	1.692	1	.193	5.570	.419	74.116
	[Nervousness/Anxiety=5]	0[c]	.	.	0	.	.	.	.
	[Hostile/Unfriendly=1]	-34.361	2703.221	.000	1	.990	1.194E-15	.000	.[b]
	[Hostile/Unfriendly =2]	-14.479	2315.519	.000	1	.995	5.150E-7	.000	.[b]
	[Hostile/Unfriendly =3]	1.366	1.086	1.581	1	.209	3.919	.466	32.954
	[Hostile/Unfriendly =4]	.949	.985	.927	1	.336	2.582	.374	17.814
	[Hostile/Unfriendly =5]	0[c]	.	.	0	.	.	.	.
	[Unable to Relax=1]	-15.550	5814.059	.000	1	.998	1.764E-7	.000	.[b]
	[Unable to Relax=2]	1.383	6313.946	.000	1	1.000	3.986	.000	.[b]
	[Unable to Relax=3]	.260	1.408	.034	1	.854	1.297	.082	20.465
	[Unable to Relax=4]	.421	1.244	.114	1	.735	1.523	.133	17.449
	[Unable to Relax=5]	0[c]	.	.	0	.	.	.	.
	[Feeling of Shame=1]	49.227	13292.547	.000	1	.997	2393892565000000000000.000	.000	.[b]
	[Feeling of Shame=3]	-.989	1.756	.317	1	.573	.372	.012	11.611
	[Feeling of Shame=4]	-.534	1.091	.240	1	.625	.586	.069	4.972
	[Feeling of Shame=5]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Yes.

b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

c. This parameter is set to zero because it is redundant.

Based on the overall results described above that established the evidence that PTSD (feeling irritable, living with fear, upset all the time, feeling of guilt, nervousness or anxiety, hostile [i.e., feeling unfriendly], unable to relax, and feeling of shame) significantly predicted the chronic pain outcome (chronic illness due to viol), the null hypothesis that there is no association between PTSD and chronic pain and depression experience among women survivors of violent sexual rape in Eastern DRC was, therefore, rejected.

PTSD and Depression (Sadness). An ordinal regression analysis was performed to evaluate whether PTSD factors predicted depression among violent sexual rape survivors. While PTSD is described as a disorder that is developed following of serious life threatening and life altering events (Stein & Lang, 2013), it's not uncommon that individuals who meet the PTSD criteria also meet the criteria for persistent depression which is characterized by depressive mood for a period of two years and beyond (APA, 2013). The most common signs of major depression often manifested include the inability to sleep, eat properly, engage in normal daily activities, sadness, emptiness of mind, anxiety, helplessness, worthlessness, guilty feeling, irritability, disinterest, inability to concentrate, aches and pains, and tiredness (APA, 2013; NIMH, 2018).

An ordinal regression analysis was conducted based on the ordinal nature of the predictor and outcome variables. The assumption for this analysis was that PTSD has significant effect on the depression experience outcomes among survivors of violent sexual rape. The PTSD predictors variables including living with fear, experiencing

nervousness or anxiety, upset all the time, feeling guilty, and alone [i.e., avoidance or withdrawal], and depression outcome variable sad [i.e., sadness] were used. The above Table 53 shows the results of the ordinal regression analysis of relationship between PTSD and depression among survivors of violent sexual rape in Eastern DRC. The case processing summary results showed the modal class used by the null model, sad, with 70% of prediction accuracy for most of the time, 5.8% of moderately sad, and and 33.3% of extremely sad.

Table 53

PTSD Symptoms and Depression (Sadness): Case Processing Summary

		N	Marginal Percentage
Sad	Moderately	9	5.8%
	Most of the time	95	60.9%
	Extremely	52	33.3%
Living with Fear	A Little	3	1.9%
	Moderately	25	16.0%
	Quite a Bit	109	69.9%
	Extremely	19	12.2%
Upset all the Time	Very Slightly	1	0.6%
	Moderately	10	6.4%
	Quite a Bit	98	62.8%
	Extremely	47	30.1%
Feeling of Guilty	Very Slightly	2	1.3%
	Moderately	21	13.5%
	Quite a Bit	106	67.9%
	Extremely	27	17.3%
Nervousness/Anxiety	Very Slightly	3	1.9%
	Moderately	24	15.4%
	Quite a Bit	91	58.3%
	Extremely	38	24.4%
Alone (Loneliness)	Very Little or None	2	1.3%
	Little	1	0.6%
	Moderately	21	13.5%
	Most of the time	118	75.6%
	Extremely	14	9.0%
Valid		156	100.0%
Missing		0	
Total		156	

In this analysis, I tested the link between PTSD and depression with the assumption that PTSD might affect depression outcome (sad or sadness) among survivors was supported. The results in the model fitting information (Table 54) showed the likelihood ration c*hi*-square X^2 (16, N = 156) = 47.799, p = 0.000 (< 0.05), which indicated the test was a better fit of the final than any other model without predictors. With p = 0.000 < 0.05, there was a very strong relationship between PTSD and depression.

Table 54

PTSD Symptoms and Depression (Sadness): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	164.855			
Final	117.055	47.799	16	.000

Link function: Logit.

The goodness-of-fit results (Table 55) also showed the Pearson *chi*-square of 81.749 with significance level p = 0.986 > 0.05 and deviance *chi*-square statistics of 82.623, with significance level p = 0.983 > 0.05. Both p-values (0.986 and 0.983) were greater than α (0.05). The results showed a strong indication that the model was a better fit for the data.

Table 55

PTSD Symptoms and Depression (Sadness): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	81.749	112	.986
Deviance	82.623	112	.983

Link function: Logit.

The pseudo *R*-square Table 56 provided results that verified the strength of the relationship between predictors and the intercept variables. The proportion of variation

with highest pseudo *r*-square value showed the Nagelkerke result of 0.325 or (36%). The Nagelkerke results also explained the model and suggested a strong level of association between PTSD and depression.

Table 56

PTSD Symptoms and Depression (Sadness): Correlation measures

Cox and Snell	*.264*
Nagelkerke	*.325*
McFadden	*.184*

Link function: Logit.

The threshold portion of the constants/intercepts of the model in Table 57 was sad (sad = 3, sad = 4). When the significance of each variable contribution to the model was evaluated for location, the predictors upset=4 ($p = 0.026$), guilty=3 ($p = 0.003$), guilty=4 ($p = 0.018$), and alone=4 ($p = 0.034$) significantly contributed to the depression outcome compared to all other predictors. A negative relationship exists between upset=4, guilty=3, guilty=4, and alone=4 and depression outcome (sad). A unit decrease in any of these predictors will result in *OR* of exponential decrease in the probability of experiencing the ordinal outcome depression (sadness).

Table 57

PTSD Symptoms and Depression (Sadness): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Sad = 3]	-6.982	1.006	48.214	1	.000	-8.953	-5.011
	[Sad = 4]	-2.825	.873	10.462	1	.001	-4.536	-1.113
Location	[Afraid=2]	-.411	1.518	.073	1	.786	-3.387	2.564
	[Afraid=3]	-.047	.770	.004	1	.951	-1.557	1.462
	[Afraid=4]	.110	.629	.031	1	.861	-1.122	1.343
	[Afraid=5]	0[a]	.	.	0	.	.	.
	[Upset=1]	19.651	.000	.	1	.	19.651	19.651
	[Upset=3]	-.162	.817	.039	1	.843	-1.764	1.440
	[Upset=4]	-1.063	.477	4.964	1	.026	-1.997	-.128
	[Upset=5]	0[a]	.	.	0	.	.	.
	[Guilty=1]	-2.294	1.808	1.610	1	.204	-5.837	1.249
	[Guilty=3]	-2.351	.784	9.005	1	.003	-3.887	-.816
	[Guilty=4]	-1.332	.563	5.600	1	.018	-2.436	-.229
	[Guilty=5]	0[a]	.	.	0	.	.	.
	[Nervous=1]	-.424	1.348	.099	1	.753	-3.066	2.219
	[Nervous=3]	-.563	.661	.727	1	.394	-1.859	.732
	[Nervous=4]	-.277	.492	.316	1	.574	-1.240	.687
	[Nervous=5]	0[a]	.	.	0	.	.	.
	[Alone=1]	.267	1.827	.021	1	.884	-3.314	3.848
	[Alone=2]	-2.342	2.537	.853	1	.356	-7.314	2.629
	[Alone=3]	-1.473	.957	2.366	1	.124	-3.349	.404
	[Alone=4]	-1.761	.833	4.472	1	.034	-3.393	-.129
	[Alone=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

Further, the test of parallel lines (Table 58) assessed whether the assumption was reasonable for all categories with the same parameters. The test of parallel lines also assessed whether any set of coefficients for the categories was appropriate. The results showed a General *p*-value $p = 0.815 > \alpha$ (0.05). The result indicated that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate.

Table 58

PTSD Symptoms and Depression (Sadness): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	117.055			
General	106.140[b]	10.916[c]	16	.815

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

PTSD and Depression (Shaky or Feeling Unsafe). We also performed an ordinal regression analysis to test the relationship between PTSD predictors variables, including living with fear, upset all the time, scared all the time, afraid all the time, and depression outcome variable, shaky [i.e., feeling unsafe]. In Table 59, the null model used the modal class, quite a bit, with 48.1% of model's prediction accuracy for those who felt unsafe experienced depression symptoms. Over 1/4 of participants (25.6%) felt moderately unsafe and 3.2% who felt extremely unsafe.

Table 59

PTSD and Depression (Shaky - Feeling Unsafe): Case Processing Summary

		N	Marginal Percentage
Shaky (Feeling Unsafe)	Very Slightly	24	15.4%
	A Little	12	7.7%
	Moderately	40	25.6%
	Quite a Bit	75	48.1%
	Extremely	5	3.2%
Living with Fear	A Little	3	1.9%
	Moderately	25	16.0%
	Quite a Bit	109	69.9%
	Extremely	19	12.2%
Upset all the Time	Very Slightly	1	0.6%
	Moderately	10	6.4%
	Quite a Bit	98	62.8%
	Extremely	47	30.1%
Scared all the Time	Very Slightly	5	3.2%
	Moderately	10	6.4%
	Quite a Bit	101	64.7%
	Extremely	40	25.6%
Afraid all the Time	Very Slightly	1	0.6%
	Moderately	12	7.7%
	Quite a Bit	98	62.8%
	Extremely	45	28.8%
Valid		156	100.0%
Missing		0	
Total		156	

The model fitting information (Table 60) provided the results of the likelihood ration *chi*-square X^2 (12, N = 156) = 31.189, p = 0.002 < 0.05. With a p-value lesser than, the result indicated a significantly better fit of the final model than any other model without predictors. The result also supported the assumption that PTSD might affect depression outcome (shaky) among survivors.

Table 60

PTSD and Depression (Shaky - Feeling Unsafe): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	223.287			
Final	192.098	31.189	12	.002

Link function: Logit.

The results from the goodness-of-fit (Table 61) provided Pearson *chi*-square of 167.060, $p = 0.092$ *and* deviance *chi*-square Statistics of 128.545, $p = 0.817$. The significance values $p = 0.092$ and $p = 0.817$ were greater than α (0.05). The larger *p*-values of the Pearson and Deviance in the goodness-of-fit Table 62, indicated that the model was a better fit for the data.

Table 61

PTSD and Depression (Shaky - Feeling Unsafe): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	167.060	144	.092
Deviance	128.545	144	.817

Link function: Logit.

Similarly, the results of the Pseudo *r*-square (Table 62) provided results that verified the strength of the relationship between the predictors and intercept variables. The Nagelkerke test shows the proportion of variation with highest pseudo *r*-square value 0.196 (20%) which explained the model and reflect a strong level of association between PTSD and depression. All three *p*-values than 0.05 with a higher Nagelkerke of 0.196 (19.6%) indicated a moderate strength of relationship between the predictor and outcome variables was significant.

Table 62

PTSD and Depression (Shaky - Feeling Unsafe): Correlation Measures

Cox and Snell	.181
Nagelkerke	.196
McFadden	.077

Link function: Logit.

The parameter estimate Table 63 showed the threshold portion of the constants/intercepts of the model, including feeling unsafe (shaky=1, shaky=2, shaky=3, shaky=4). When the significance of each variable contribution to the model was evaluated for location, the predictors significantly contributed to the depression outcome (feeling unsafe), compared to all other predictors, (i.e., afraid=2 (p = 0.029), afraid=3 (p = 0.004), afraid=2 (p = 0.004), and upset=4 (p = 0.008)). The analysis showed a negative relationship between upset=4, guilty=3, guilty=4, and alone=4 and depression shaky (feeling unsafe). A unit decrease in any of these predictors will result in *OR* of exponential decrease in the probability of experiencing the ordinal outcome depression 'feeling unsafe'.

Table 63

PTSD and Depression (shaky - Feeling Unsafe): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Shaky = 1]	-3.565	.626	32.435	1	.000	-4.792	-2.338
	[Shaky = 2]	-2.997	.610	24.130	1	.000	-4.193	-1.801
	[Shaky = 3]	-1.673	.586	8.147	1	.004	-2.822	-.524
	[Shaky = 4]	2.210	.623	12.572	1	.000	.988	3.432
Location	[Afraid=2]	-2.678	1.225	4.781	1	.029	-5.078	-.278
	[Afraid=3]	-1.999	.695	8.267	1	.004	-3.361	-.636
	[Afraid=4]	-1.668	.587	8.087	1	.004	-2.818	-.519
	[Afraid=5]	0[a]	.	.	0	.	.	.
	[Upset=1]	.875	2.320	.142	1	.706	-3.673	5.423
	[Upset=3]	-1.214	.690	3.095	1	.079	-2.567	.138
	[Upset=4]	-1.056	.397	7.087	1	.008	-1.834	-.279
	[Upset=5]	0[a]	.	.	0	.	.	.
	[Scared=1]	-1.904	.994	3.671	1	.055	-3.851	.044
	[Scared=3]	1.086	.732	2.201	1	.138	-.349	2.521
	[Scared=4]	.793	.412	3.698	1	.054	-.015	1.601
	[Scared=5]	0[a]	.	.	0	.	.	.
	[Frightened=1]	-2.406	1.892	1.617	1	.204	-6.114	1.302
	[Frightened=3]	-.220	.658	.112	1	.738	-1.510	1.070
	[Frightened=4]	.269	.392	.472	1	.492	-.499	1.037
	[Frightened=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

In the test of parallel lines (Table 64), I assessed whether the assumption was reasonable for all categories with the same parameters, and whether there was one set of coefficients for the categories was appropriate. The results showed a General *p*-value $p = 0.076 > \alpha$ (0.05). It was concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate.

Table 64

PTSD and Depression (Shaky - Feeling Unsafe): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	192.098			
General	143.366[b]	48.732[c]	36	.076

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

The results discussed in both ordinal regression analyses established evidence that known factors of PTSD may be associated with depression among the women survivors of violent sexual rape. The results from this ordinal regression test demonstrated that PTSD was significantly associated with depression symptoms. The null hypothesis that here is no association between including PTSD symptoms and depression experience among women victims of violent sexual rape in eastern DRC was rejected.

Research Question 4. Feelings of Worthlessness Association with Chronic Pain and Depression

RQ4: Is there an association between mental health effects (including feelings of worthlessness) and the chronic pain and depression experience among women victims of

violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

$H_0$4: There is no association between mental health effect (feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

$H_1$4: There is an association between mental health effect (feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Feelings of Worthlessness and Chronic Pain (Prolonged Illness Over 6 Months). A multinomial logistic regression test was performed to model the relationship between the predictors variables mental health factor (worthlessness - feeling of guilt, angry with self, blameworthy, and felling of shame) and the intercept - chronic pain outcome variable (prolonged illness over 6 months). For all the tests in this analysis, the criterion of tradition 0.05 statistical significance was utilized. The assumption was: mental health factors - feelings of worthlessness, (including feeling of guilt, angry with self, blameworthy, and felling of shame) may be linked to chronic pain or depression outcome among survivors of violent sexual rape in eastern DRC. Table 65 provides the results of a multinomial logistic analysis that tested the relationship between feelings of worthlessness and chronic pain. The results showed the modal class used by the null

model ‘yes’ (chronic illness over 6 months), with 85.9% of prediction accuracy, with only 14.1% without chronic illnesses connected to violent sexual rape.

Table 65

Worthlessness and Prolonged Illness Over 6 Months: Case Processing Summary

		N	Marginal Percentage
Prolonged Illness over 6 months	No	22	14.1%
	Yes	134	85.9%
Guilty (Feeling of Guilty)	Very Slightly	2	1.3%
	Moderately	21	13.5%
	Quite a Bit	106	67.9%
	Extremely	27	17.3%
Shame (Feeling of Shame)	Very Slightly	2	1.3%
	Moderately	8	5.1%
	Quite a Bit	114	73.1%
	Extremely	32	20.5%
Angry with self	Very Little or None	1	0.6%
	Little	1	0.6%
	Moderately	7	4.5%
	Most of the time	96	61.5%
	Extremely	51	32.7%
Blameworthy	Moderately	11	7.1%
	Most of the time	111	71.2%
	Extremely	34	21.8%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		34[a]	

a. The dependent variable has only one value observed in 25 (73.5%) subpopulations.

The model fitting information Table 66 provided results that indicated a strong association between feelings of worthlessness and chronic pain ‘chronic illness over 6 months). The showed a likelihood ration *chi*-square X^2 (12, $N = 156$) = 23.486, $p < 0.024$, which suggested that the final model fitted better than any other model without predictors. The results also supported the assumption for this analysis.

Table 66

Worthlessness and Prolonged Illness Over 6 Months: Model Fitting Information

	Model Fitting Criteria			Likelihood Ratio Tests		
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	51.248	54.297	49.248			
Final	51.762	91.410	25.762	23.486	12	.024

Table 68 shows the results of the goodness-of-fit test with the Pearson *chi*-square X^2 (21, N = 156) = 5.390, p = 1.000. The that table is also shown the deviance *chi*-square statistics X^2 (21, N = 156) = 7.089, p = 0.998. With the final model significance value $p <$ 0.05 (0.024), larger Pearson chi-square and deviance p – values greater than 0.05 (1.000 and 0.998) in Table 67 was an indication that the intercepts significantly improved the fitting of model for the data

Table 67

Feelings of Worthlessness and Prolonged Illness Over 6 Months: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	5.390	21	1.000
Deviance	7.089	21	.998

Table 68 has the results of the pseudo r-square which reflected the estimates of relationship strength between feelings of worthlessness and chronic pain (prolonged illness over 6 months). The Nagelkerke test results with highest pseudo *r*-square value R^2 = 0.251 (25%) indicated the proportion of variation. The highest Nagelkerke pseudo value of R^2 = 25% was important because it explained the model and reflected a moderate level of association between feelings of worthlessness and chronic pain.

Table 68

Worthlessness and Prolonged Illness Over 6 Months: Pseudo R-Square

Cox and Snell	.140
Nagelkerke	.251
McFadden	.185

I evaluated the contribution for each variable to the model in Table 69. The likelihood ratio tested how the model elements compared to the full model to determine meaningfully contribution of each predictor variable to the model. As compared to all other predictor variables, only blameworthy was found as significant contributor to model, $p = 0.028$.

Table 69

Worthlessness and Prolonged Illness Over 6 Months: Likelihood Ratio Tests

	Model Fitting Criteria			Likelihood Ratio Tests		
Effect	AIC of Reduced Model	BIC of Reduced Model	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	51.762	91.410	25.762[a]	.000	0	.
Guilty (Feeling of Guilty)	53.580	84.078	33.580	7.818	3	.050
Feeling of Shame	51.767	82.265	31.767	6.005	3	.111
Angry with Self	48.937	76.385	30.937	5.175	4	.270
Blameworthy	54.934	88.483	32.934	7.172	2	.028

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 70, the parameter estimates of other predictor variables “feeling of guilt, Angry with self, and Feeling of shame, and Blameworthy” were compared. Only blameworthy=4 as compared to blameworthy=3 and blameworthy=5, was found to

significantly impact the chronic pain outcome, *OR* = 0.265, (95%, *CI* 0.083 to 0.841), *p* = 0.024. The experience of feeling of guilt, feeling of shame, and angry with self did not show any significance significant impact on chronic pain outcome.

Table 70

Worthlessness and Prolonged Illness Over 6 Months: Parameter Estimates

Prolonged Illness over 6 monthss[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
No	Intercept	-1.471	.693	4.499	1	.034			
	[Feeling of Guilty=1]	-16.426	9862.568	.000	1	.999	7.352E-8	.000	.[b]
	[Feeling of Guilty=3]	-16.886	2616.978	.000	1	.995	4.638E-8	.000	.[b]
	[Feeling of Guilty=4]	.531	.882	.362	1	.547	1.701	.302	9.582
	[Feeling of Guilty=5]	0[c]	.	.	0	.	.	.	.
	[Feeling of Shame=1]	23.561	.000	.	1	.	17081527820.000	17081527820.000	17081527820.000
	[Feeling of Shame=3]	.175	1.342	.017	1	.896	1.192	.086	16.535
	[Feeling of Shame=4]	-.594	.694	.732	1	.392	.552	.142	2.151
	[Feeling of Shame=5]	0[c]	.	.	0	.	.	.	.
	[Angry with self=1]	-6.775	.000	.	1	.	.001	.001	.001
	[Angry with self=2]	.423	.000	.	1	.	1.527	1.527	1.527
	[Angry with self=3]	-16.010	4804.020	.000	1	.997	1.114E-7	.000	.[b]
	[Angry with self=4]	1.231	.694	3.150	1	.076	3.424	.879	13.334
	[Angry with self=5]	0[c]	.	.	0	.	.	.	.
	[Blameworthy=3]	-17.940	3698.834	.000	1	.996	1.617E-8	.000	.[b]
	[Blameworthy=4]	-1.329	.590	5.083	1	.024	.265	.083	.841
	[Blameworthy=5]	0[c]	.	.	0	.	.	.	.

a. The reference category is: Yes.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

Feelings of Worthlessness and Chronic Pain (Chronic Illness due to Violent Sexual Rape). Another multinomial logistic regression test was performed to check the relationship between the predictors variables mental health factor – Worthlessness, including guilt, ashamed, angry, blameworthy and chronic pain outcome variable (i.e. chronic illness due to violent sexual rape). The statistical significance criterion was α = 0.05. The assumption was: mental health factors – feelings of worthlessness, including guilt, ashamed, angry, and blameworthy is associated with survivors' chronic pain

outcome (i.e. chronic illness due to viol) among survivors of violent sexual rape in eastern DRC. In the case processing summary Table 71 above, the null model used the modal class 'Yes' with 85.8% of model's prediction accuracy for those who felt blameworthy and who experienced chronic illness due to violent sexual rape, as compared to only 14.2% who did not experience sexual rape-related chronic illness following violent their sexual rape experience.

Table 71

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Processing Summary

		N	Marginal Percentage
Chronic Illness due to Viol	No	22	14.2%
	Yes	133	85.8%
Guilty	Very Little or None	2	1.3%
	Moderately	20	12.9%
	Most of the time	106	68.4%
	Extremely	27	17.4%
Ashamed	Very Little or None	2	1.3%
	Moderately	8	5.2%
	Most of the time	113	72.9%
	Extremely	32	20.6%
Angry with self	Very Little or None	1	0.6%
	Little	1	0.6%
	Moderately	7	4.5%
	Most of the time	95	61.3%
	Extremely	51	32.9%
Blameworthy	Moderately	11	7.1%
	Most of the time	111	71.6%
	Extremely	33	21.3%
Valid		155	100.0%
Missing		1	
Total		156	
Subpopulation		34[a]	

a. The dependent variable has only one value observed in 25 (73.5%) subpopulations.

The results in the model fitting information in Table 72 showed the final model with a significance *p*-value of $0.026 < 0.05$. These results reflected a significant association between feelings of worthlessness and chronic illness due to sexual rape. With the likelihood ration chi-square was X^2 (12, $N = 156$) = 23.181, $p < 0.026$, the

results indicated that the model was a better fit than any other model without predictors. These results supported the assumption that mental health factor - feelings of worthlessness, including guilt, ashamed, angry, and blameworthy is associated with survivors' chronic pain outcome - chronic illness due to viol, among survivors of violent sexual rape in eastern DRC.

Table 72

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	48.943			
Final	25.762	23.181	12	.026

Table 73 provides the results of the goodness-of-fit test. The Pearson and deviance *chi*-square values were greater than α, X^2 (21, N = 156) = 5.390, p = 1.000 and X^2 (21, N = 156) = 7.089, p = 0.998, respectively. The larger Pearson and deviance p – values of 1.000 and 0.998 > 0.05 indicated that the intercepts significantly improved the fitting of the model for the data.

Table 73

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	5.390	21	1.000
Deviance	7.089	21	.998

The results in Table 74 provides the results of the correlation measures, which reflected the association between feelings of worthlessness and chronic pain. The Nagelkerke test results showed the proportion of variation with highest pseudo *r*-square

value $R^2 = 0.249$. The Nagelkerke test *r*-square 25% was the highest value of the correlation measures, which explained the model and reflected the association strength between worthlessness and chronic pain.

Table 74

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Pseudo R-Square

Cox and Snell	.139
Nagelkerke	.249
McFadden	.183

The contribution for each variable to the model was evaluated in the Likelihood Ratio Tests (Table 75) to assess how the model elements compared to the full model to determine a meaningful contribution of each predictor variable to the model. As compared to all other predictor variables, only blameworthy was found as significant contributor to model, $p = 0.028$.

Table 75

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	25.762[a]	.000	0	.
Guilty	32.732	6.970	3	.073
Ashamed	31.767	6.005	3	.111
Angry with self	30.937	5.175	4	.270
Blameworthy	32.934	7.172	2	.028

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

The parameter estimates (Table 76) of other predictor variables guilt, ashamed, angry with self, and blameworthy) were compared. The results showed that blameworthy=4 had a significant (p = 0.024) positive impact on outcome (chronic illness due to violent sexual rape) compared to all other predictor variables. As blameworthy=4 increases, so does the probability of experiencing of chronic illness due to violent sexual rape. In other words, blameworthy=4 was more prone to predict the experiencing of chronic pain outcome chronic illness due to viol, *OR* = 3.78 (95% *CI* 1.190 to 11.997), p = 0.24.

Table 76

Feelings of Worthlessness and Chronic Illness due to Sexual Rape: Parameter Estimates

								95% Confidence Interval for Exp(B)	
Chronic Illness due to Viol[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	Lower Bound	Upper Bound
Yes	Intercept	1.471	.693	4.499	1	.034			
	[Guilty=1]	16.420	9835.709	.000	1	.999	13524244.940	.000	.[b]
	[Guilty=3]	16.791	2687.199	.000	1	.995	19596605.650	.000	.[b]
	[Guilty=4]	-.531	.882	.362	1	.547	.588	.104	3.314
	[Guilty=5]	0[c]	.	.	0	.	.	.	.
	[Ashamed=1]	-23.524	.000	.	1	.	6.079E-11	6.079E-11	6.079E-11
	[Ashamed=3]	-.175	1.342	.017	1	.896	.839	.060	11.640
	[Ashamed=4]	.594	.694	.732	1	.392	1.810	.465	7.050
	[Ashamed=5]	0[c]	.	.	0	.	.	.	.
	[Angry with Self=1]	6.733	.000	.	1	.	839.480	839.480	839.480
	[Angry with Self=2]	-.433	.000	.	1	.	.648	.648	.648
	[Angry with Self=3]	16.006	4794.902	.000	1	.997	8942265.371	.000	.[b]
	[Angry with Self=4]	-1.231	.694	3.150	1	.076	.292	.075	1.137
	[Angry with Self=5]	0[c]	.	.	0	.	.	.	.
	[Blameworthy=3]	17.944	3704.622	.000	1	.996	62114895.700	.000	.[b]
	[Blameworthy=4]	1.329	.590	5.083	1	.024	3.778	1.190	11.997
	[Blameworthy=5]	0[c]	.	.	0	.	.	.	.

a. The reference category is: No.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

Feelings of Worthlessness and Depression (Living with Fear). An ordinal regression test was conducted to address the categorical outcome with ordinal nature. The analysis focused on determining the direction of the relationship between each predictor (Worthlessness - feeling of guilt, feeling of shame, disgusted with self, angry with self, blameworthy, and dissatisfied with self) and the outcome variable depression, living with fear). This ordinal regression analysis tested the assumption that victims of violent sexual rape who feel worthless as a result of their past events may experience depression symptom of living with fear. The statistical significance criterion was based on the tradition $\alpha = 0.05$. The ordinal regression analysis (Table 77) shows the modal class that was used by the Null model, including quite a bit living with fear at 69.9% of prediction accuracy, with 12.2% of extremely living with fear, 16.0% moderately living with fear, but only 1.9% who responded that they do a little or not at all live with fear.

Table 77.

Feelings of Worthlessness and Depression (Living with Fear): Case Processing Summary

		N	Marginal Percentage
Living with Fear	A Little	3	1.9%
	Moderately	25	16.0%
	Quite a Bit	109	69.9%
	Extremely	19	12.2%
Feeling of Guilty	Very Slightly	2	1.3%
	Moderately	21	13.5%
	Quite a Bit	106	67.9%
	Extremely	27	17.3%
Feeling of Shame	Very Slightly	2	1.3%
	Moderately	8	5.1%
	Quite a Bit	114	73.1%
	Extremely	32	20.5%
Disgusted with Self	Very Little or None	1	0.6%
	Moderately	18	11.5%
	Most of the time	106	67.9%
	Extremely	31	19.9%
Angry with Self	Very Little or None	1	0.6%
	Little	1	0.6%
	Moderately	7	4.5%
	Most of the time	96	61.5%
	Extremely	51	32.7%
Blameworthy	Moderately	11	7.1%
	Most of the time	111	71.2%
	Extremely	34	21.8%
Dissatisfied with Self	Very Little or None	1	0.6%
	Moderately	9	5.8%
	Most of the time	90	57.7%
	Extremely	56	35.9%
Valid		156	100.0%
Missing		0	
Total		156	

The results of model fitting information Table 78 show the likelihood ration *chi*-square X^2 (17, N = 156) = 43.801, p = 0.000. The significant level p-0.00 < 0.05 indicated that the model was a better fit than any other model without predictors. These results strongly supported the assumption that victims of violent sexual rape who feel worthless as a result of their past events may experience depression symptom of living with fear

Table 78

Feelings of Worthlessness and Depression (Living with Fear): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	202.831			
Final	159.030	43.801	17	.000

Link function: Logit.

In Table 79, I utilized the *chi*-square goodness-of-fit to assess the overall fit of the data. The residuals of the Pearson test showed the *chi*-square X^2 (211, N = 156) = 218.951, p = 0.339 and the residuals of deviance test showed the *chi*-square statistics X^2 (211, N = 156) = 124.950, p = 1.000. With a significance value p = 0.00 < 0.05 in the Final model in Table 79, and larger p – values (0.339 and 1.000) > 0.05 in Table 80, the intercepts significantly improved the fitting of the model for the data.

Table 79

Feelings of Worthlessness and Depression (Living with Fear): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	218.951	211	.339
Deviance	124.950	211	1.000

Link function: Logit.

In Table 80, I analyzed the effect of improvement on the data by the Nagelkerke, Cox and Snell's *R*-square values. The Nagelkerke test with larger $R^2 = 0.296$ showed an improvement over Cox and Snell's. The Nagelkerke R^2 indicated the proportion of variation that occurred with highest pseudo *r*-square value $R^2 = 0.296$ (30%) which explained the model and reflected a significant level of association between worthlessness and depression experience among the survivors of violent sexual rape in eastern DRC.

Table 80

Feelings of Worthlessness and Depression (Living with Fear): Pseudo R-Square

Cox and Snell	.245
Nagelkerke	.296
McFadden	.160

Link function: Logit.

The results in Table 81 presented the threshold portion of the constants/intercepts of the model living with fear. When the significance of each variable contribution to the model was evaluated for location, the predictors guilty=1 ($p = 0.000$), ashamed=1 ($p = 0.000$), disgustedSelf=3 ($p = 0.033$), and disgustedSelf=4 ($p = 0.032$) significantly contributed to predictors' outcome compared to all other predictors. A positive relationship exists between feeling guilty (guilty=1). As guilty=1 increases, so does the probability of experiencing ordinal outcome of depression 'feeling blue'. Any one-unit increase in guilt=1' will result in *OR* of exp (3.9) increase in the probability of experiencing the ordinal outcome depression 'feeling blue'. However, ashamed=1,

disgustedself=3, and disgustedself=4, have a negative relationship with the ordinal outcome. In other words, when ashamed=1, ashamed=3, ashamed=4 or blameworthy=4 decreases, their probability of experiencing ordinal outcome depression 'living with fear' also decreases.

Table 81

Feelings of Worthlessness and Depression (Living with Fear): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Afraid = 2]	-6.466	.913	50.181	1	.000	-8.255	-4.677
	[Afraid = 3]	-3.770	.688	29.987	1	.000	-5.119	-2.421
	[Afraid = 4]	.671	.559	1.445	1	.229	-.423	1.766
Location	[Guilty=1]	22.086	3.750	34.679	1	.000	14.735	29.437
	[Guilty=3]	-1.481	.792	3.496	1	.062	-3.033	.071
	[Guilty=4]	-.433	.623	.483	1	.487	-1.654	.788
	[Guilty=5]	0[a]	.	.	0	.	.	.
	[Ashamed=1]	-21.536	2.616	67.793	1	.000	-26.662	-16.409
	[Ashamed=3]	.191	.967	.039	1	.843	-1.705	2.087
	[Ashamed=4]	.986	.526	3.521	1	.061	-.044	2.016
	[Ashamed=5]	0[a]	.	.	0	.	.	.
	[DisgustedSelf=1]	20.737	.000	.	1	.	20.737	20.737
	[DisgustedSelf=3]	-1.662	.779	4.552	1	.033	-3.188	-.135
	[DisgustedSelf=4]	-1.190	.556	4.579	1	.032	-2.281	-.100
	[DisgustedSelf=5]	0[a]	.	.	0	.	.	.
	[AngrySelf=1]	0[a]	.	.	0	.	.	.
	[AngrySelf=2]	-3.572	2.211	2.609	1	.106	-7.906	.763
	[AngrySelf=3]	-.994	1.011	.967	1	.325	-2.976	.987
	[AngrySelf=4]	-1.012	.549	3.403	1	.065	-2.088	.063
	[AngrySelf=5]	0[a]	.	.	0	.	.	.
	[Blameworthy=3]	-.950	.869	1.196	1	.274	-2.653	.753
	[Blameworthy=4]	-.358	.479	.561	1	.454	-1.296	.579
	[Blameworthy=5]	0[a]	.	.	0	.	.	.
	[DissatisfiedSelf=1]	-.554	2.564	.047	1	.829	-5.580	4.473
	[DissatisfiedSelf=3]	-1.428	.821	3.022	1	.082	-3.037	.182
	[DissatisfiedSelf=4]	.041	.433	.009	1	.925	-.808	.889
	[DissatisfiedSelf=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

In Table 82, the Test of Parallel Lines was assessed whether the assumption was reasonable for all categories with the same parameters, and whether there was one set of coefficients for the categories was appropriate. The results showed a General *p*-value $p = 0.070 > \alpha$ (0.05). It was concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate.

Table 82

Feelings of Worthlessness and Depression (Living with Fear): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	159.030			
General	112.152	46.878	34	.070

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Feelings of Worthlessness and Depression (Feeling Blue). An ordinal regression test was conducted to address the categorical outcome with ordinal nature. The analysis focused on determining the direction of the relationship between each predictor (Worthlessness - feeling of guilt, feeling of shame, disgusted with self, angry with self, blameworthy, and dissatisfied with self) and the depression outcome variable - feeling blue. The statistical significance criterion was based on the tradition $\alpha = 0.05$.

Table 83 reflects the results the case processing summary, which showed the modal class used by the null model (most of the time, feeling blue) with 73.1% of prediction accuracy for feeling blue most of the time, 13.5% extremely feeling blue, and only 1.9% who of those who do not at all feel blue.

Table 83

Worthlessness and Depression (Feeling Blue): Case Processing Summary

		N	Marginal Percentage
Blue	Very Little or None	3	1.9%
	Little	5	3.2%
	Moderately	13	8.3%
	Most of the time	114	73.1%
	Extremely	21	13.5%
Feeling of Guilty	Very Slightly	2	1.3%
	Moderately	21	13.5%
	Quite a Bit	106	67.9%
	Extremely	27	17.3%
Feeling of Shame	Very Slightly	2	1.3%
	Moderately	8	5.1%
	Quite a Bit	114	73.1%
	Extremely	32	20.5%
Disgusted with Self	Very Little or None	1	0.6%
	Moderately	18	11.5%
	Most of the time	106	67.9%
	Extremely	31	19.9%
Angry with Self	Very Little or None	1	0.6%
	Little	1	0.6%
	Moderately	7	4.5%
	Most of the time	96	61.5%
	Extremely	51	32.7%
Blameworthy	Moderately	11	7.1%
	Most of the time	111	71.2%
	Extremely	34	21.8%
Dissatisfied with Self	Very Little or None	1	0.6%
	Moderately	9	5.8%
	Most of the time	90	57.7%
	Extremely	56	35.9%
Valid		156	100.0%
Missing		0	
Total		156	

Table 84 displays the results of model fitting information. The final mode showed the likelihood ratio *chi*-square X^2 (17, N = 156) = 33.906, $p < 0.006$. This suggested that the model was a better fit than any other model without predictors.

Table 84

Worthlessness and Depression (Feeling Blue): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	204.121			
Final	170.215	33.906	17	.009

Link function: Logit.

In Table 85, I tested the overall goodness-of-fit of data. The results showed the Pearson *chi*-square X^2 (287, N = 156) = 229.480 p = 0.995 and deviance *chi*-square statistics X^2 (287, N = 156) = 135.837, p = 1.000. With final model significance value, p = 0.009 < 0.05 in Table 117, and larger p – values (0.995 and 1.000) > 0.05 in Table 118, the intercepts significantly improved the fitting of the model for the data.

Table 85

Worthlessness and Depression (Feeling Blue): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	229.480	287	.995
Deviance	135.837	287	1.000

Link function: Logit.

To determine the effect of improving the data, I analyzed the Nagelkerke, Cox, and Snell's *R*-square values in Table 86. The highest pseudo *r*-square value of the Nagelkerke test R^2 = 0.235 (23.5%) indicated the proportion of variation with which explained the model. That value of 23.5% also reflected a positive level of association between worthlessness and depression experience among the survivors of violent sexual rape in eastern DRC.

Table 86

Worthlessness and Depression (Feeling Blue): Pseudo R-Square

Cox and Snell	.195
Nagelkerke	.235
McFadden	.122

Link function: Logit.

The threshold portion of Table 87 showed the constants/intercepts 'Blue (feeling blue) of the model. The significance of each variable contribution to the model was

evaluated for location. guilty=1 (p = 0.000), ashamed=1 (p = 0.000), ashamed=3 (p = 0.005), ashamed=4 (p = 0.005), and blameworthy=4 (p = 0.037) were significant predictors as compared to all other predictors. A positive relationship exists between feeling guilty (guilty=1), because as guilty=1 increases, so does the probability of experiencing ordinal outcome of depression 'feeling blue'. A unit increase in 'guilt=1' will result in an *OR* of exp (3.75) increase in the probability of experiencing the ordinal outcome depression 'feeling blue'. Controversially, ashamed=1, ashamed=3, ashamed=4 and blameworthy=4, have a negative relationship with the ordinal outcome. In other words, as ashamed=1, ashamed=3, ashamed=4 or blameworthy=4 decreases, so does the probability of experiencing ordinal outcome depression 'feeling blue'.

Table 87

Worthlessness and Depression (Feeling Blue): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Blue = 1]	-6.692	.909	54.144	1	.000	-8.475	-4.910
	[Blue = 2]	-5.658	.785	51.998	1	.000	-7.196	-4.120
	[Blue = 3]	-4.528	.724	39.136	1	.000	-5.946	-3.109
	[Blue = 4]	-.026	.550	.002	1	.963	-1.104	1.053
Location	[Guilty=1]	24.347	3.801	41.023	1	.000	16.897	31.798
	[Guilty=3]	-.783	.807	.940	1	.332	-2.365	.799
	[Guilty=4]	.228	.631	.131	1	.718	-1.009	1.466
	[Guilty=5]	0[a]	.	.	0	.	.	.
	[Ashamed=1]	-25.602	2.643	93.802	1	.000	-30.782	-20.421
	[Ashamed=3]	-2.765	.987	7.852	1	.005	-4.699	-.831
	[Ashamed=4]	-1.617	.575	7.924	1	.005	-2.744	-.491
	[Ashamed=5]	0[a]	.	.	0	.	.	.
	[DisgustedSelf=1]	23.937	.000	.	1	.	23.937	23.937
	[DisgustedSelf=3]	-.439	.790	.309	1	.578	-1.988	1.110
	[DisgustedSelf=4]	-.399	.551	.523	1	.470	-1.479	.682
	[DisgustedSelf=5]	0[a]	.	.	0	.	.	.
	[AngrySelf=1]	0[a]	.	.	0	.	.	.
	[AngrySelf=2]	.135	2.723	.002	1	.960	-5.202	5.471
	[AngrySelf=3]	.851	1.041	.668	1	.414	-1.189	2.891
	[AngrySelf=4]	-.204	.531	.148	1	.700	-1.245	.837
	[AngrySelf=5]	0[a]	.	.	0	.	.	.
	[Blameworthy=3]	-.838	.928	.817	1	.366	-2.656	.980
	[Blameworthy=4]	-1.055	.505	4.362	1	.037	-2.046	-.065
	[Blameworthy=5]	0[a]	.	.	0	.	.	.
	[DissatisfiedSelf=1]	.566	2.592	.048	1	.827	-4.513	5.646
	[DissatisfiedSelf=3]	1.061	.917	1.340	1	.247	-.735	2.858
	[DissatisfiedSelf=4]	.215	.437	.241	1	.624	-.643	1.072
	[DissatisfiedSelf=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The Test of Parallel Lines in Table 88 was run to test whether the assumption is reasonable for all categories with the same parameters, and whether there is appropriateness in one set of coefficients for the categories. Based on *p*-value (sig) for the General $p = 0.998 > \alpha$ (0.05), it can be concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate.

Table 88

Worthlessness and Depression (Feeling Blue): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	170.215			
General	144.025[b]	26.190[c]	51	.998

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.
a. Link function: Logit.
b. The log-likelihood value cannot be further increased after maximum number of step-halving.
c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Research Question 5: Social Rejection Association with Chronic Pain and Depression

RQ5: Is there an association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

$H_0$5: There is no association between social health effect (social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

$H_1$5: There is an association between social health effect (social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Social Rejection and Chronic Pain (Fistula). The multinomial logistic regression analysis was conducted based on the assumption that social rejection

experience significantly contributes to chronic pain outcomes among survivors of violent sexual rape. I used the predictor variables of social rejection which including someone you can count on, someone to give you information, someone who takes me to the doctor, someone who prepares a meal for me, and someone who helps when confined and chronic pain outcome variable [i.e., experienced fistula]. The results of the analysis in Table 89 were as follow: The processing summary reflected the results of the modal class used by the null model 'Yes' for experiencing fistula with 62.2% of prediction accuracy among respondents who feel rejected in the society.

Table 89

Social Rejection and Chronic Pain (Fistula): Case Processing Summary

		N	Marginal Percentage
Experienced fistula	Yes	97	62.2%
	No	59	37.8%
Someone you can count on	None of the time	10	6.4%
	A little of the time	23	14.7%
	Some of the time	51	32.7%
	Most of the time	38	24.4%
	All of the time	34	21.8%
Someone to give you information	None of the time	5	3.2%
	A little of the time	25	16.0%
	Some of the time	54	34.6%
	Most of the time	39	25.0%
	All of the time	33	21.2%
Someone who takes me to the Dr.	None of the time	15	9.6%
	A little of the time	28	17.9%
	Some of the time	42	26.9%
	Most of the time	34	21.8%
	All of the time	37	23.7%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Someone who helps when confined	None of the time	36	23.1%
	A little of the time	32	20.5%
	Some of the time	31	19.9%
	Most of the time	24	15.4%
	All of the time	33	21.2%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		121[a]	

a. The dependent variable has only one value observed in 114 (94.2%) subpopulations.

The results in the model fitting information Table 90 show the Likelihood Ratio Tests *chi*-square of X^2 (20, N = 156) = 35.595, p = 0.017. This p = 0.017 of significance level suggested a better fit of the final model than any other model without predictors. The results strongly supported the assumption that social rejection significantly contributes to chronic pain outcome ‘chronic damage injuries’ among survivors.

Table 90

Social Rejection and Chronic Pain (Fistula): Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	183.463			
Final	147.868	35.595	20	.017

The Goodness-of-Fit results in Table 91 also reflect the Pearson *chi*-square of 114.900 with significance level $p = 0.145 > 0.05$ and deviance *chi*-square statistics of 135.771 and a significance level $p = 0.10 > 0.05$. Both the Person and deviance *p*-values, 0.145 and 0.10 respectively, were greater than α (0.05). Therefore, the model that was used was a fit for the data.

Table 91

Social Rejection and Chronic Pain (Fistula): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	114.990	100	.145
Deviance	135.771	100	.010

The Pseudo *R*-Square Table 92 provided results that verified the strength of effect of improvement by the Nagelkerke *R*-square over the other tests (i.e. the Cox and Snell and McFadden's *r*-squares). The proportion of variation with highest pseudo *r*-square value showed the Nagelkerke result of 0.278 (28%) which explained the model improvement and justified a strong level of association between PTSD and depression.

Table 92

Social Rejection and Chronic Pain (Fistula): Pseudo R-Square

Cox and Snell	.204
Nagelkerke	.278
McFadden	.172

To test the effect significance of the predictor variables over the outcome variable in the Likelihood Ratio Tests (Table 93), the model elements were compared to the full model to determine how each predictor variables meaningfully contributes to the chronic pain outcome. The results indicated that as compared to all predictors, the need for 'someone who helps when confined' predicted chronic pain outcome among survivors of violent sexual rape, $p = 0.047 < \alpha$ (0.05).

Table 93

Social Rejection and Chronic Pain (Fistula): Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	147.868[a]	.000	0	.
Someone you can count on	157.282	9.413	4	.052
Someone to give you information	155.050	7.182	4	.127
Someone who Takes me to the Dr.	154.938	7.070	4	.132
Someone who prepares a meal for me	154.106	6.238	4	.182
Someone who Helps when confined	157.528	9.659	4	.047

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 94, the parameter estimates of the predictor variable - Social Rejection which included the 'someone you can count on, someone to give you information, someone who takes me to the doctor, someone who prepares a meal for me, and someone who helps when confined', and chronic pain outcome variable 'experienced fistula' were compared. The results indicated that the need for 'someone who takes me to the doctor' compared to all other survivors, had a negative relationship with the experience of fistula.

In other words, survivors who were in need for someone who takes them to the doctor were more likely to be experiencing the chronic pain (fistula), *OR* = 12.288, (95%, CI 1.067 to 165.518), $p = 0.044$.

Table 94

Social Rejection and Chronic Pain (Fistula): Parameter Estimates

Experienced fistula[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Yes	Intercept	.742	.472	2.477	1	.116			
	[Someone you can count on=1]	2.394	1.350	3.146	1	.076	10.958	.778	154.429
	[Someone you can count on=2]	.328	.920	.127	1	.721	1.389	.229	8.422
	[Someone you can count on=3]	-.605	.724	.698	1	.403	.546	.132	2.256
	[Someone you can count on=4]	-.596	.602	.982	1	.322	.551	.169	1.792
	[Someone you can count on=5]	0[b]	.	.	0	.	.	.	.
	[Someone to give you information=1]	-.680	1.552	.192	1	.661	.507	.024	10.605
	[Someone to give you information=2]	-.972	.953	1.042	1	.307	.378	.058	2.447
	[Someone to give you information=3]	.453	.743	.373	1	.542	1.574	.367	6.751
	[Someone to give you information=4]	-.655	.623	1.107	1	.293	.519	.153	1.760
	[Someone to give you information=5]	0[b]	.	.	0	.	.	.	.
	[Someone who Takes me to the Dr.=1]	2.587	1.287	4.041	1	.044	13.288	1.067	165.518
	[Someone who Takes me to the Dr.=2]	1.142	.899	1.613	1	.204	3.132	.538	18.228
	[Someone who Takes me to the Dr.=3]	.490	.781	.394	1	.530	1.632	.353	7.542
	[Someone who Takes me to the Dr.=4]	-.147	.749	.039	1	.844	.863	.199	3.744
	[Someone who Takes me to the Dr.=5]	0[b]	.	.	0	.	.	.	.
	[Someone who prepares a meal for me=1]	-1.479	.889	2.767	1	.096	.228	.040	1.302
	[Someone who prepares a meal for me=2]	.051	.766	.004	1	.947	1.052	.234	4.723
	[Someone who prepares a meal for me=3]	.485	.704	.475	1	.491	1.624	.409	6.456
	[Someone who prepares a meal for me=4]	-.288	.727	.157	1	.692	.750	.180	3.118
	[Someone who prepares a meal for me=5]	0[b]	.	.	0	.	.	.	.
	[Someone who Helps when confined=1]	.715	.839	.728	1	.394	2.045	.395	10.581
	[Someone who Helps when confined=2]	-1.343	.816	2.711	1	.100	.261	.053	1.291
	[Someone who Helps when confined=3]	.120	.741	.026	1	.871	1.128	.264	4.817
	[Someone who Helps when confined=4]	-.330	.740	.199	1	.656	.719	.169	3.066
	[Someone who Helps when confined=5]	0[b]	.	.	0	.	.	.	.

a. The reference category is: No.
b. This parameter is set to zero because it is redundant.

Social Rejection and Chronic Pain (Chronic Illness due to Violent Sexual Rape). Another multinomial logistic regression test was conducted to check the relationship between the social rejection predictors chronic pain outcome variables. Social rejection variables included need someone to give you information, need someone

who understands, need someone provides daily help, need someone who assists in illness, and need someone who prepares a meal for me, and the chronic pain outcome variable, included chronic illness due to violent sexual rape. The statistical significance criterion was $\alpha = 0.05$. The results in Table 95 reflects the modal class used by the null model that was used, 'Yes' (chronic illness due to violent sexual rape) with 85.9% of prediction accuracy ($F = 134$) for those who experienced social rejection, compared to only 14.1% of those who did not have chronic illness due to violent sexual rape.

Table 95

Social Rejection and Chronic Illness due to Sexual Violence: Case Processing Summary

		N	Marginal Percentage
Chronic Illness due to Viol	No	22	14.1%
	Yes	134	85.9%
Someone to give you information	None of the time	5	3.2%
	A little of the time	25	16.0%
	Some of the time	54	34.6%
	Most of the time	39	25.0%
	All of the time	33	21.2%
Someone who understands	None of the time	14	9.0%
	A little of the time	23	14.7%
	Some of the time	43	27.6%
	Most of the time	46	29.5%
	All of the time	30	19.2%
Someone who provides daily help	None of the time	24	15.4%
	A little of the time	35	22.4%
	Some of the time	35	22.4%
	Most of the time	26	16.7%
	All of the time	36	23.1%
Someone who assists in illness	None of the time	46	29.5%
	A little of the time	35	22.4%
	Some of the time	33	21.2%
	Most of the time	24	15.4%
	All of the time	18	11.5%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		131[a]	

a. The dependent variable has only one value observed in 128 (97.7%) subpopulations.

The following figures are Tables 96 and 97 display the results of model fitting information and the goodness-of-fit. Table 96 showed the likelihood ration *chi*-square X^2 (20, $N = 156$) = 31,923, $p < 0.044$, which indicated that the model was a better fit for this test than any other model without predictors. In Table 98, the goodness-of-fit test showed a Pearson *chi*-square X^2 (110, $N = 156$) = 100.462, $p = 0.732$ and deviance *chi*-square statistics X^2 (110, $N = 156$) = 83.914, $p = 0.970$. With Final model significance value $p =$

0.44 < 0.05 in Table 98, and larger p – values (0.732 and 0.970) in Table 98, the intercepts significantly improved the fitting of the model for the data: X^2 (20, N = 156) = 31.923, Nagelkerke R^2 = 0.332, p = 0.044, < .05.

Table 96

Social Rejection and Chronic Illness due to Sexual Violence: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	120.572			
Final	88.649	31.923	20	.044

Table 97

Social Rejection and Chronic Illness due to Sexual Violence: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	100.462	110	.732
Deviance	83.914	110	.970

In the pseudo *R*-square Table 98, I analyzed the Cox and Snell, Nagelkerke, and McFadden tests results. The Nagelkerke test yielded the highest pseudo *r*-square value R^2 = 0.332. The 33.2% being the highest pseudo *r*-square reflected the proportion of variation which explained the model and justified a positive level of association between social rejection and chronic pain outcome among the survivors of violent sexual rape in eastern DRC.

Table 98

Social Rejection and Chronic Illness due to Sexual Violence: Pseudo R-Square

Cox and Snell	.185
Nagelkerke	.332
McFadden	.252

In Table 99, I evaluated the effect contribution of each variable to the model. The Likelihood Ratio Tested how the model elements compared to the full model to determine a meaningful contribution of each predictor variable to the model. As compared to the full model, there was no predictor variable that significantly contribute to model.

Table 99

Social Rejection and Chronic Illness due to Sexual Violence: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	88.649[a]	.000	0	.
Someone to give you information	94.182	5.533	4	.237
Someone who understands	96.081	7.432	4	.115
Someone who provides daily help	96.220	7.571	4	.109
Someone who assists in illness	92.354	3.706	4	.447
Someone who prepares a meal for me	94.019	5.371	4	.251

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 100, the parameter estimates of other predictor variables social rejection, including need someone to give you information, need someone who understands, need someone provides daily help, need someone who assists in illness, and need someone who prepares a meal for me were compared to chronic illness due to violent sexual rape. The results showed that among all the respondents who said they needed someone to prepare meal for the and who thought they felt worthless, those who were quite a bit disgusted with self were less likely to without experiencing chronic illness due to sexual

violence than any other group, *OR* = 0.094, (95%, *CI* 0.010 – 0.912), *p* = 0.041. No other predictor reflected a significant effect to the outcome variable.

Table 100

Social Rejection and Chronic Illness due to Sexual Violence: Parameter Estimates

								95% Confidence Interval for Exp(B)	
Chronic Illness due to Viol[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	Lower Bound	Upper Bound
No	Intercept	-3.492	1.210	8.328	1	.004			
	[One to give you information=1]	-18.170	.000	.	1	.	1.285E-8	1.285E-8	1.285E-8
	[One to give you information=2]	.592	1.401	.179	1	.673	1.808	.116	28.136
	[One to give you information=3]	.947	1.043	.825	1	.364	2.578	.334	19.900
	[One to give you information=4]	1.590	.964	2.718	1	.099	4.901	.741	32.434
	[One to give you information=5]	0[b]	.	.	0	.	.	.	.
	[One who understands=1]	-18.305	8440.089	.000	1	.998	1.123E-8	.000	.[c]
	[One who understands=2]	.528	1.188	.197	1	.657	1.695	.165	17.405
	[One who understands=3]	.626	1.055	.352	1	.553	1.871	.236	14.803
	[One who understands=4]	1.401	.958	2.139	1	.144	4.058	.621	26.522
	[One who understands=5]	0[b]	.	.	0	.	.	.	.
	[One who provides daily help=1]	-.066	1.379	.002	1	.962	.936	.063	13.963
	[One who provides daily help=2]	-1.607	1.433	1.257	1	.262	.201	.012	3.327
	[One who provides daily help=3]	1.281	.988	1.682	1	.195	3.601	.519	24.971
	[One who provides daily help=4]	1.439	1.124	1.641	1	.200	4.217	.466	38.140
	[One who provides daily help=5]	0[b]	.	.	0	.	.	.	.
	[One who assists in illness=1]	1.342	.993	1.827	1	.176	3.828	.547	26.816
	[One who assists in illness=2]	.942	1.113	.717	1	.397	2.565	.290	22.698
	[One who assists in illness=3]	.776	1.126	.475	1	.491	2.174	.239	19.754
	[One who assists in illness=4]	-.246	1.163	.045	1	.832	.782	.080	7.634
	[One who assists in illness=5]	0[b]	.	.	0	.	.	.	.
	[One who prepares a meal for me=1]	-1.571	1.498	1.101	1	.294	.208	.011	3.914
	[One who prepares a meal for me=2]	-.873	1.019	.734	1	.392	.418	.057	3.077
	[One who prepares a meal for me=3]	-2.368	1.161	4.160	1	.041	.094	.010	.912
	One who prepares a meal for me=4]	-1.918	1.119	2.938	1	.087	.147	.016	1.317
	[One who prepares a meal for me=5]	0[b]	.	.	0	.	.	.	.

a. The reference category is: Yes.
b. This parameter is set to zero because it is redundant.
c. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

The results in classification table for this multinomial test provided insight on case prediction by the five social rejection variables. Overall, the multinomial logistic regression with the five variables predicted 87.2% of cases precisely (See Table 101). Based on the results in both multinomial regression analyses, there is an established

evidence that social rejection may be associated with chronic experience among the women survivors of violent sexual rape in eastern DRC.

Table 101

Social Rejection and Chronic Illness due to Sexual Violence: Classification

	Predicted		
Observed	No	Yes	Percent Correct
No	4	18	18.2%
Yes	2	132	98.5%
Overall Percentage	3.8%	96.2%	87.2%

Social Rejection and Depression (Lonely). Ordinal regression analysis was performed based on the assumption that social rejection predictors affects the depression outcome experience among women survivors of violent sexual rape in eastern DRC. The analysis was intended to explore the direction of relationships between predictors variables of social rejection included ‘need someone you can count on, need someone who gives you information, need someone who gives you good advice, need someone to confide in about self, need someone whose advice is needed) and the depression outcome variable ‘lonely were used. The statistical significance criterion was $\alpha = 0.05$.

Table 102 is the results of the case processing summary for the test of association between social rejection and depression (loneliness). The modal class used by the null model ‘most of the time’ was used for lonely, with 75.6% of prediction accuracy ($F =$ 118) for those who were lonely and experienced social rejection, 13.5% at moderately lonely, 9% extremely lonely, and only 1.3% very little or not at all lonely.

Table 102

Social Rejection and Depression (Lonely): Case Processing Summary

		N	Marginal Percentage
Lonely	Very Little or None	2	1.3%
	Little	1	0.6%
	Moderately	21	13.5%
	Most of the time	118	75.6%
	Extremely	14	9.0%
Need someone you can count on	None of the time	10	6.4%
	A little of the time	23	14.7%
	Some of the time	51	32.7%
	Most of the time	38	24.4%
	All of the time	34	21.8%
Need someone to give you information	None of the time	5	3.2%
	A little of the time	25	16.0%
	Some of the time	54	34.6%
	Most of the time	39	25.0%
	All of the time	33	21.2%
Need someone to give you good advice	None of the time	6	3.8%
	A little of the time	31	19.9%
	Some of the time	55	35.3%
	Most of the time	34	21.8%
	All of the time	30	19.2%
Need someone to confide in about self	None of the time	15	9.6%
	A little of the time	30	19.2%
	Some of the time	48	30.8%
	Most of the time	35	22.4%
	All of the time	28	17.9%
Need someone whose advice is needed	None of the time	16	10.3%
	A little of the time	37	23.7%
	Some of the time	46	29.5%
	Most of the time	32	20.5%
	All of the time	25	16.0%
Valid		156	100.0%
Missing		0	
Total		156	

The result in Table 103, model fitting information, showed the likelihood ration *chi*-square X^2 (20, N = 156), 41.932, $p = 0.003 < \alpha$ (0.05), an indication that the full model fit significantly predicted better than any model without predictors. The final model $p = 0.003$ (<0.05) in Table 138 indicated that the model provided better accuracies for the reference outcome and outperformed compared to the null model. In other words, the model was a better fit than any other model without predictors. The assumption that

there may exist a relationship between social rejection and depression experience (feeling blue) among violent rape survivors was supported.

Table 103

Social Rejection and Depression (Lonely): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	219.609			
Final	177.677	41.932	20	.003

Link function: Logit.

The goodness-of-fit in Table 104 provides clarifying data, which showed supporting evidence of good fit for the model with adequate predictions compared to the intercept (null model). With the final model significance $p = 0.003$ in Table 103, the Pearson *chi*-square X^2 (408, $N = 156$) = 368.653, $p = 0.919$ and deviance *chi*-square statistics X^2 (408, $N = 156$) = 164.245, $p = 1.000$ provided further evidence of good fit of the model. In other words, the intercepts significantly improved the fitting of the model.

Table 104

Social Rejection and Depression (Lonely): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	368.653	408	.919
Deviance	164.245	408	1.000

Link function: Logit.

In the Pseudo *R*-square Table 105, I analyzed the results of the Cox and Snell's test, Nagelkerke test, and the McFadden test, which are the measures of the model's usefulness. Nagelkerke test provided the highest pseudo *R*-square value $R^2 = 0.298$. The 30% of proportion of variation explained the model and supported a strong level of association between social rejection and depression outcome.

Table 105

Social Rejection and Depression (Lonely): Pseudo R-Square

Cox and Snell	.236
Nagelkerke	.298
McFadden	.171

Link function: Logit.

The threshold portion of Table 106 showed the constants/intercepts Alone (alone=1, alone=2, alone=3, alone4=) of the model. The evaluation of the significance of each variable contribution to the model for Location indicated that onewithcoodInfo=3 (p = 0.040), advisorincrisis=1 (p = 0.000), advisorincrisis=2 (p = 0.000), advisorincrisis=3 (p = 0.000), advisorincrisis=4 (p = 0.000), onetoconfidein=1 (p = 0.35), and onewithgoodadvice=1 (p = 0.010) significantly predicted the outcome as compared to all other predictors. A positive relationship exists between advisorincrisis=1, advisorincrisis=2, advisorincrisis=3, advisorincrisis=4 and depression outcome 'alone' (loneliness), because as a need for counseling advisorincrisis) increases, so does the probability of experiencing ordinal outcome of depression 'Alone (loneliness'.

In other words, a one-unit increase in need of someone who can provide needed advice 'advisorincrisis=1' will result in an *OR* of exp (633.3) increase in the probability of experiencing the ordinal outcome depression 'alone' (loneliness); A one-unit increase in need of someone who can provide needed advice advisorincrisis=2 will result in an *OR* of exp (52.1) increase in the probability of experiencing the ordinal outcome depression 'alone' (loneliness); A one-unit increase in need of someone who can provide needed advice advisorincrisis=3 will result in an *OR* of exp (99) increase in the probability of experiencing the ordinal outcome depression of alone (i.e., loneliness); and A one-unit

increase in need of someone who can provide needed advice advisorincrisis=4 will result in an *OR* of exp (27) increase in the probability of experiencing the ordinal outcome depression 'alone' (i.e., loneliness).

Controversially, onewithgoodinfo=3, onetoconfidein=1, and onewithgoodadvice=1, had a negative relationship with the ordinal outcome. In other words, as any decreases in the need of someone with good information 'onewithgoodInfo=3', someone to confide to 'onetoconfidein=1', and someone with food advice 'onewithgoodadvice=1' would also results in the decrease in probability of experiencing ordinal outcome depression 'alone'

Table 106

Social Rejection and Depression (Lonely): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Lonely = 1]	-5.158	.926	31.002	1	.000	-6.973	-3.342
	[Lonely = 2]	-4.713	.835	31.900	1	.000	-6.349	-3.078
	[Lonely = 3]	-2.231	.618	13.023	1	.000	-3.442	-1.019
	[Lonely = 4]	2.876	.671	18.384	1	.000	1.561	4.191
Location	[Onetocounton=1]	1.820	1.182	2.370	1	.124	-.497	4.137
	[Onetocounton=2]	.002	1.057	.000	1	.999	-2.071	2.074
	[Onetocounton=3]	-.171	.916	.035	1	.852	-1.967	1.625
	[Onetocounton=4]	.289	.806	.129	1	.720	-1.291	1.870
	[Onetocounton=5]	0[a]	.	.	0	.	.	.
	[OnewithGoodInfo=1]	-2.567	1.572	2.666	1	.103	-5.649	.515
	[OnewithGoodInfo=2]	-.553	1.015	.297	1	.586	-2.543	1.437
	[OnewithGoodInfo=3]	-1.747	.861	4.119	1	.042	-3.435	-.060
	[OnewithGoodInfo=4]	-.800	.711	1.268	1	.260	-2.193	.593
	[OnewithGoodInfo=5]	0[a]	.	.	0	.	.	.
	[AdvisorInCrisis=1]	6.451	1.657	15.161	1	.000	3.204	9.698
	[AdvisorInCrisis=2]	3.954	1.018	15.099	1	.000	1.960	5.948
	[AdvisorInCrisis=3]	4.594	.986	21.710	1	.000	2.661	6.526
	[AdvisorInCrisis=4]	3.298	.957	11.869	1	.001	1.422	5.174
	[AdvisorInCrisis=5]	0[a]	.	.	0	.	.	.
	[OnetoConfidein=1]	-2.514	1.195	4.430	1	.035	-4.856	-.173
	[OnetoConfidein=2]	-1.669	1.056	2.500	1	.114	-3.738	.400
	[OnetoConfidein=3]	-1.463	.960	2.320	1	.128	-3.345	.419
	[OnetoConfidein=4]	-1.631	.913	3.193	1	.074	-3.420	.158
	[OnetoConfidein=5]	0[a]	.	.	0	.	.	.
	[OnewithGoodAdvice=1]	-2.769	1.077	6.612	1	.010	-4.880	-.658
	[OnewithGoodAdvice=2]	-1.731	.904	3.666	1	.056	-3.504	.041
	[OnewithGoodAdvice=3]	-1.477	.811	3.316	1	.069	-3.066	.113
	[OnewithGoodAdvice=4]	-.462	.774	.357	1	.550	-1.980	1.055
	[OnewithGoodAdvice=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The Test of Parallel Lines in Table 107 tested whether the assumption is reasonable for all categories with the same parameters. The results also tested whether there is appropriateness in one set of coefficients for the categories. Based on *p*-value (sig) for the general $p = 0.884 > \alpha$ (0.05), it can be concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate. This ordinal regression test yielded convincing

evidence of strong association between social rejection and depression symptom ‘loneliness’.

Table 107

Social Rejection and Depression (Lonely): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	177.677			
General	130.406[b]	47.271[c]	60	.884

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Social Rejection and Depression (Downhearted). An ordinal regression test was performed to address the categorical outcome with ordinal nature. The analysis helped in determining the direction of the relationship between each predictor of depression (including someone to share private worries, someone to turn to, someone who helps when confined, someone who takes me to the doctor) and the depression outcome variable (including downhearted). Table 109 provided the results of case processing summary of an ordinal regression analysis to test the association between social rejection and depression among survivors of violent sexual rape in eastern DRC. The modal class used by the null model ‘most of the time’ (downhearted), with 69.2% of prediction accuracy, with only 0.6% of those who did not feel downhearted as victims of violent sexual rape.

Table 108

Social Rejection and Depression (Downhearted): Case Processing Summary

		N	Marginal Percentage
Downhearted	Very Little or None	1	0.6%
	Little	1	0.6%
	Moderately	32	20.5%
	Most of the time	108	69.2%
	Extremely	14	9.0%
Someone to share private worries	None of the time	11	7.1%
	A little of the time	32	20.5%
	Some of the time	46	29.5%
	Most of the time	32	20.5%
	All of the time	35	22.4%
Someone to turn to	None of the time	14	9.0%
	A little of the time	24	15.4%
	Some of the time	42	26.9%
	Most of the time	53	34.0%
	All of the time	23	14.7%
Someone who Helps when confined	None of the time	36	23.1%
	A little of the time	32	20.5%
	Some of the time	31	19.9%
	Most of the time	24	15.4%
	All of the time	33	21.2%
Someone who Takes me to the Dr.	None of the time	15	9.6%
	A little of the time	28	17.9%
	Some of the time	42	26.9%
	Most of the time	34	21.8%
	All of the time	37	23.7%
Valid		156	100.0%
Missing		0	
Total		156	

The results of model fitting information Table 109 show the likelihood ration chi-square X^2 (16, N = 156) = 33.880, p < 0.006. The significant result indicated that the model was a better fit than any other model without predictors. The significance of the result p = 0.006 supported the research question hypothesis that there is a relationship between social rejection and depression ‘downhearted’.

Table 109

Social Rejection and Depression (Downhearted): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	228.447			
Final	194.567	33.880	16	.006

Link function: Logit.

The results in the goodness-of-fit Table 110 show the Pearson *chi*-square X^2 (384, $N = 156$) = 424.965, $p = 0.073$. The results also provide the values of the deviance *chi*-square statistics X^2 (384, $N = 156$) = 166.450, $p = 1.000$. With final model significance value $p = 0.006 < 0.05$ in Table 109, and higher p – values (0.073 and 1.000) > 0.05 in Table 110, the analysis provides evidence that the intercepts significantly improved the fitting of the model for the data.

Table 110

Social Rejection and Depression (Downhearted): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	424.965	384	.073
Deviance	166.450	384	1.000

Link function: Logit.

Table 111 contains the results of all three pseudo *R*-square results. The Nagelkerke test showed highest pseudo *r*-square value $R^2 = 0.238$. These results indicated the proportion of variation (24%), which explained the model and a positive level of association between social rejection and depression experience among the survivors of violent sexual rape in eastern DRC.

Table 111

Social Rejection and Depression (Downhearted): Pseudo R-Square

Cox and Snell	.195
Nagelkerke	.238
McFadden	.126

Link function: Logit.

The threshold portion of Table 112 shows the constants/intercepts ‘downhearted (downhearted=1, downhearted=2, downhearted=3 and downhearted=4) of the model. The

significance of each variable contribution to the model was verified for Location. onetoturnto=1 ($p = 0.005$), onetoturnto=4 $p \leq 0.050$, onewhohelps=1 ($p = 0.001$), and onewhohelps=3 ($p = 0.024$) were significant predictors as compared to all other predictors. A positive relationship existed between onetoturnto=1 ($p = 0.005$), onetoturnto=4 $p \leq 0.050$, because as the need for some to turn to (onetoturnto=1) increases, so does the probability of experiencing ordinal outcome of depression 'dowhearted'. This means that a unit increase in onetoturnto=1 will result in an *OR* of exp(25.0) increase in the probability of experiencing the ordinal outcome depression 'downhearted'. Also, a one unit increase in onetoturnto=3 will result in an *OR* of exp(3.74). In the contrary, onewhohelps=1 and onewhohelps=3 had a negative relationship with the ordinal outcome. In other words, as the need for onewhohelps=1 and onewhohelps=3 decreases, so does the probability of experiencing ordinal outcome depression 'downhearted'.

Table 112

Social Rejection and Depression (Downhearted): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Downhearted = 1]	-6.046	1.191	25.784	1	.000	-8.380	-3.712
	[Downhearted = 2]	-5.333	.938	32.342	1	.000	-7.170	-3.495
	[Downhearted = 3]	-1.871	.579	10.434	1	.001	-3.007	-.736
	[Downhearted = 4]	2.414	.603	16.043	1	.000	1.233	3.596
Location	[OnetoSharePrivateWorries=1]	-1.666	1.054	2.496	1	.114	-3.732	.401
	[OnetoSharePrivateWorries=2]	-.368	.828	.198	1	.656	-1.990	1.254
	[OnetoSharePrivateWorries=3]	-.967	.686	1.990	1	.158	-2.311	.377
	[OnetoSharePrivateWorries=4]	-1.227	.647	3.597	1	.058	-2.496	.041
	[OnetoSharePrivateWorries=5]	0[a]	.	.	0	.	.	.
	[OnetoTurnto=1]	3.257	1.159	7.905	1	.005	.987	5.528
	[OnetoTurnto=2]	1.150	.991	1.346	1	.246	-.793	3.093
	[OnetoTurnto=3]	1.080	.797	1.839	1	.175	-.481	2.642
	[OnetoTurnto=4]	1.320	.674	3.835	1	.050	-.001	2.640
	[OnetoTurnto=5]	0[a]	.	.	0	.	.	.
	[Onewhohelps=1]	-2.846	.827	11.853	1	.001	-4.466	-1.226
	[Onewhohelps=2]	-.967	.754	1.646	1	.199	-2.445	.510
	[Onewhohelps=3]	-1.645	.728	5.099	1	.024	-3.073	-.217
	[Onewhohelps=4]	-.806	.733	1.209	1	.272	-2.242	.631
	[Onewhohelps=5]	0[a]	.	.	0	.	.	.
	[Onewhotakestocare=1]	1.351	.983	1.889	1	.169	-.576	3.279
	[Onewhotakestocare=2]	-.079	.775	.010	1	.919	-1.599	1.441
	[Onewhotakestocare=3]	1.138	.674	2.851	1	.091	-.183	2.459
	[Onewhotakestocare=4]	.286	.663	.186	1	.666	-1.014	1.586
	[Onewhotakestocare=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The Test of Parallel Lines in Table 113 tested whether the assumption was reasonable for all categories with the same parameters, and whether there was appropriateness in one set of coefficients for the categories. The result with a *p*-value (sig) for the general $p = 0.686 > \alpha$ (0.05), it can be concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate. Based on the results described above in this section, there is an established the evidence that social rejection may significantly predicted chronic pain and depression outcomes. Therefore, the null hypothesis that there is no

association between social rejection and chronic pain and depression among women victims of violent sexual rape in eastern DRC was rejected.

Table 113

Social Rejection and Depression (Downhearted): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	194.567			
General	151.781	42.786	48	.686

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.
a. Link function: Logit.

Research Question 6 – Social Support from Family/Friends and Chronic Pain and Depression

RQ6: Is there an association between social health effects (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

$H_0$6: There is no association between social health effect (support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

$H_1$6: There is an association between social health effect (support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Social Support from Family/Friends and Chronic Pain (Prolonged Illness Over 6 Months). The below multinomial logistic regression analysis was performed based on the following assumption: that lack of support from family/friends affect the chronic pain outcome. Variable used in this test comprised the predictors variables of support from family/friend, included 'need someone you can turn to, and need someone who prepares a meal for me, need someone to provides daily help, need someone who shows love/affection, need someone who assists in illness, need someone for getting things off mind, and the chronic pain outcome variable (including prolonged or chronic internal injuries).

In Table 114, the results of case processing summary showed the results for the case processing summary. The null model used the modal class 'Yes' for survivors with chronic pain 'experience 'prolonged or chronic internal injuries' as the model prediction accuracy – 85.9% comparing with 14.1% who experienced no prolonged illness over 6 months. For this multinomial logistic regression test, the statistical significance criterion was $\alpha = 0.05$.

Table 114

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Case Processing Summary

		N	Marginal Percentage
Prolonged Illness over 6 Months	No	22	14.1%
	Yes	134	85.9%
Someone to turn to	None of the time	14	9.0%
	A little of the time	24	15.4%
	Some of the time	42	26.9%
	Most of the time	53	34.0%
	All of the time	23	14.7%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Someone who provides daily help	None of the time	24	15.4%
	A little of the time	35	22.4%
	Some of the time	35	22.4%
	Most of the time	26	16.7%
	All of the time	36	23.1%
Someone who shows love/affection	None of the time	24	15.4%
	A little of the time	41	26.3%
	Some of the time	29	18.6%
	Most of the time	30	19.2%
	All of the time	32	20.5%
Someone who assists in illness	None of the time	46	29.5%
	A little of the time	35	22.4%
	Some of the time	33	21.2%
	Most of the time	24	15.4%
	All of the time	18	11.5%
Someone for Getting Things Off Mind	None of the time	18	11.5%
	A little of the time	32	20.5%
	Some of the time	55	35.3%
	Most of the time	33	21.2%
	All of the time	18	11.5%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		141[a]	

a. The dependent variable has only one value observed in 139 (98.6%) subpopulations.

The model fitting information results in Table 115 showed the likelihood ration *chi*-square X^2 (24, $N = 156$), 36.333, $p = 0.025 < \alpha$ (0.05). The results indicated that the full model fitting predicted significantly better than any model without predictors. The assumption that support from family/friends affects the chronic pain outcome was supported.

Table 115

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	124.156			
Final	84.823	39.333	24	.025

The goodness-of-fit in Table 116 provided results showing whether the model adequately fits the data. With Pearson *chi*-square X^2 (116, N = 156) = 97.520, p = 0.893 and deviance *chi*-square statistics X^2 (116, N = 156) = 82.050, p = 0.993. The final model significance value p = 0.025 < 0.05 in Table 115, and larger p – values (0.893 and 0.993) in Table 147, there is clear indication that the model adequately fits the data.

Table 116

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	97.520	116	.893
Deviance	82.050	116	.993

Table 117 shows the pseudo *R*-square analysis of the proportion of variation being explained by the model. The Nagelkerke *chi*-square statistics R^2 = 0.400 was the highest pseudo *r*-square value R^2 = 0.400 which explained the model. The results also yielded 40% as the proportion of variation, which also reflected a strong level of association

between social rejection and chronic pain outcome among the survivors of violent sexual rape in eastern DRC.

Table 117

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Pseudo R-Square

Cox and Snell	.223
Nagelkerke	.400
McFadden	.310

To evaluate the effect significance of the predictor variables over the outcome variable, the Likelihood Ratio Tests in Table 118 compared all the model elements to the full model to determine how each predictor variable meaningfully contributes to the outcome, considering the full model. Based on the statistical significance criterion was $\alpha = 0.05$. Need someone to provides daily help, need someone who shows love/affection, need someone who prepares a meal for me, and need someone you can turn to significantly ($p < 0.05$) contributed to chronic pain outcome 'prolonged illness over 6 months', but 'need someone who assists in illness and need someone for getting things off mind' had no significant contribution to that chronic pain outcome.

Table 118

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	84.823[a]	.000	0	.
Someone to turn to	94.560	9.737	4	.045
Someone who prepares a meal for me	95.511	10.688	4	.030
Someone who provides daily help	98.009	13.186	4	.010
Someone who shows love/affection	96.186	11.363	4	.023
Someone who assists in illness	91.527	6.704	4	.152
Someone for Getting Things Off Mind	85.695	.872	4	.929

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.
a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 119, the outcome Yes, and No 'prolonged illness over 6 months' were compared to 'support from family/friends' variables. Those survivors with 'some of the time - need someone who prepares for me' were less likely to experience chronic pain 'prolonged illness over 6 months', *OR* = 0.034 (95% *CI* 0.003 – 0.443), *p* = 0.10 followed by those with 'most of the time - need someone who prepares a meal for me', *OR* = 0.033 (95% *CI* 0.002 – 0.515), *p* = 0.15. Similarly, survivors with 'most of the time – need someone who provides daily help' were more likely to experience chronic pain 'prolonged illness over 6 months', *OR* = 18.211 (95% *CI* 1.397 – 237.372), *p* = 0.27, followed by those with 'some of the time – need someone who provide daily help', *OR* = 11.741 (95% *CI* 1.161 – 118.775), *p* = 0.37, compared to all others predictors.

Table 119

Social Support from Family/Friends and Prolonged Illness Over 6 Months: Parameter Estimates

Prolonged illness over 6 months[a]		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
No	Intercept	-3.576	1.477	5.861	1	.015			
	[Someone to turn to=1]	-19.284	.000	.	1	.	4.219E-9	4.219E-9	4.219E-9
	[Someone to turn to=2]	.504	1.336	.142	1	.706	1.656	.121	22.732
	[Someone to turn to=3]	-.290	1.112	.068	1	.794	.748	.085	6.619
	[Someone to turn to=4]	1.884	1.189	2.509	1	.113	6.578	.639	67.679
	[Someone to turn to=5]	0[b]	.	.	0	.	.	.	.
	[Someone who prepares a meal for me=1]	-1.641	1.889	.755	1	.385	.194	.005	7.858
	[Someone who prepares a meal for me=2]	-.734	1.187	.383	1	.536	.480	.047	4.913
	[Someone who prepares a meal for me=3]	-3.394	1.316	6.648	1	.010	.034	.003	.443
	[Someone who prepares a meal for me=4]	-3.397	1.395	5.931	1	.015	.033	.002	.515
	[Someone who prepares a meal for me=5]	0[b]	.	.	0	.	.	.	.
	[Someone who provides daily help=1]	1.064	1.758	.367	1	.545	2.899	.092	90.879
	[Someone who provides daily help=2]	-1.252	1.559	.644	1	.422	.286	.013	6.079
	[Someone who provides daily help=3]	2.463	1.181	4.352	1	.037	11.741	1.161	118.775
	[Someone who provides daily help=4]	2.902	1.310	4.907	1	.027	18.211	1.397	237.372
	[Someone who provides daily help=5]	0[b]	.	.	0	.	.	.	.
	[Someone who shows love/affection=1]	-1.540	1.355	1.293	1	.256	.214	.015	3.049
	[Someone who shows love/affection=2]	-.433	1.166	.138	1	.711	.649	.066	6.381
	[Someone who shows love/affection=3]	.742	1.219	.370	1	.543	2.099	.192	22.895
	[Someone who shows love/affection=4]	1.966	1.068	3.388	1	.066	7.139	.880	57.896
	[Someone who shows love/affection=5]	0[b]	.	.	0	.	.	.	.
	[Someone who assists in illness=1]	2.305	1.315	3.075	1	.080	10.026	.762	131.850
	[Someone who assists in illness=2]	.418	1.309	.102	1	.749	1.520	.117	19.749
	[Someone who assists in illness=3]	.509	1.222	.173	1	.677	1.663	.152	18.245
	[Someone who assists in illness=4]	-.276	1.196	.053	1	.818	.759	.073	7.906
	[Someone who assists in illness=5]	0[b]	.	.	0	.	.	.	.
	[Someone for Getting Things Off Mind=1]	.581	1.671	.121	1	.728	1.789	.068	47.296
	[Someone for Getting Things Off Mind=2]	-.209	1.299	.026	1	.872	.812	.064	10.348
	[Someone for Getting Things Off Mind=3]	.317	1.228	.067	1	.796	1.373	.124	15.257
	[Someone for Getting Things Off Mind=4]	-.339	1.307	.067	1	.795	.712	.055	9.227
	[Someone for Getting Things Off Mind=5]	0[b]	.	.	0	.	.	.	.

a. The reference category is: Yes.
b. This parameter is set to zero because it is redundant.

Based on the results described above in this section, there is an established the evidence that support from family/friends may significantly predicted chronic pain and depression outcomes. Therefore, the null hypothesis that there is no association between support from family/friends and chronic pain, and between support from family/friends and depression among women victims of violent sexual rape in eastern DRC was rejected.

Social Support from Family/Friends and Chronic Pain (Prolonged or Chronic Internal Injuries). We performed a multinomial logistic regression analysis to verify whether support from family/friends affects chronic pain outcome. The predictors variables support from family/friends (including need someone to turn to, need someone who prepares a meal for me, need someone who shows love/affection, need someone who assists in illness, need someone who helps when confined) and the depression outcome variable (including prolonged or chronic internal injuries). In Table 120, the null model used the modal class 'Yes' for survivors with chronic pain 'prolonged or chronic internal injuries' with the model's prediction accuracy – 97.4% and who needed social support and only 2.6% of those who did not experience prolonged chronic internal injuries.

Table 120

Social Support from Family/Friends and Prolonged Internal Injuries: Case Processing Summary

		N	Marginal Percentage
Prolonged or Chron Internal Injuries	Yes	152	97.4%
	No	4	2.6%
Someone to turn to	None of the time	14	9.0%
	A little of the time	24	15.4%
	Some of the time	42	26.9%
	Most of the time	53	34.0%
	All of the time	23	14.7%
Someone who Helps when confined	None of the time	36	23.1%
	A little of the time	32	20.5%
	Some of the time	31	19.9%
	Most of the time	24	15.4%
	All of the time	33	21.2%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Someone who assists in illness	None of the time	46	29.5%
	A little of the time	35	22.4%
	Some of the time	33	21.2%
	Most of the time	24	15.4%
	All of the time	18	11.5%
Someone who shows love/affection	None of the time	24	15.4%
	A little of the time	41	26.3%
	Some of the time	29	18.6%
	Most of the time	30	19.2%
	All of the time	32	20.5%
Valid		156	100.0%
Missing		0	
Total		156	
Subpopulation		137[a]	

a. The dependent variable has only one value observed in 137 (100.0%) subpopulations.

Based on a statistical significance criterion of $\alpha = 0.05$, the model fitting information results in Table 121 showed the likelihood ration *chi*-square X^2 (20, $N = 156$), 37.205, $p = 0.011$. The results indicated that the full model fitted significantly better than any model without predictors, which supported out assumption that 'support from family/friends' affects the 'chronic pain' outcome.

Table 121

Social Support from Family/Friends and Prolonged Internal Injuries: Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	37.205			
Final	.000	37.205	20	.011

The goodness-of-fit in Table 122 test checked whether the model adequately fitted the data. The results showed the Pearson *chi*-square X^2 (116, N = 156) = 0.000, p = 1.000 and deviance *chi*-square statistics X^2 (116, N = 156) = 0.000, p = 1.000. The final model significance value $p = 0.011 < 0.05$ in Table 159, and larger Pearson and deviance p – values (1.000 and 1.000) in Table 160 revealed that the model adequately fitted the data.

Table 122

Social Support from Family/Friends and Prolonged Internal Injuries: Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	.000	116	1.000
Deviance	.000	116	1.000

To analyze the proportion of variation being explained by the model was analyzed, the Nagelkerke *chi*-square statistics in Table 123 showed the highest pseudo *R*-Square R^2 = 1.000, suggesting (100%) explained by the model. The R^2 = 1.000 reflected a strong level of association between social rejection and depression outcome among the survivors of violent sexual rape in eastern DRC.

Table 123

Social Support from Family/Friends and Prolonged Internal Injuries: Pseudo R-Square

Cox and Snell	.212
Nagelkerke	1.000
McFadden	1.000

To evaluate the effect significance of the predictor variables over the outcome variable in the Likelihood Ratio Tests in Table 124 compared all the model elements to the full model to determine how each predictor variable meaningfully contributes to the outcome. Based on the statistical significance criterion was $\alpha = 0.05$, 'need someone who prepares a meal for me, need someone who shows love/affection, need someone who assists in illness, and need someone who helps when confined' significantly contributed to the 'chronic pain' (prolonged or chronic internal injuries' but 'need someone to turn' to did not. 'Need someone who shows love/affection contributed more strongly (p = 0.000) than all other predictors, followed by 'need someone who prepares a meal for me (p = 0.006), 'need someone who helps when confined (p = 0.012), and 'need someone who assists in illness' (p = 0.044).

Table 124

Social Support from Family/Friends and Prolonged Internal Injuries: Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	.000[a]	.000	0	.
Need someone to turn to	8.318	8.318	4	.081
Need someone who Helps when confined	12.897	12.897	4	.012
Need someone who prepares a meal for me	14.366	14.366	4	.006
Need someone who assists in illness	9.783	9.783	4	.044
Need someone who shows love/affection	23.397	23.397	4	.000

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

In Table 125, the outcome chronic pain ‘prolonged or chronic internal injuries’ was compared to ‘support from family/friend’ variables. The results did not provide data suggesting that specific predictors significant influenced chronic pain experience. Although, the test results in this analysis there is an established evidence that ‘support from family/friends’ significantly affects chronic pain.

Table 125

Social Support from Family/Friends and Prolonged Internal Injuries: Parameter Estimates

Prolonged or Chron Internal Injuries		B	Std. Error	Wald	*df*	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	95% Confidence Interval for Exp(B) Upper Bound
Yes	Intercept	91.455	19109.741	.000	1	.996			
	[Someone to turn to=1]	-3.427	.000	.	1	.	.032	.032	.032
	[Someone to turn to=2]	-43.476	.000	.	1	.	1.314E-19	1.314E-19	1.314E-19
	[Someone to turn to=3]	-72.398	13579.780	.000	1	.996	3.612E-32	.000	.[b]
	[Someone to turn to=4]	-4.319	11846.159	.000	1	1.000	.013	.000	.[b]
	[Someone to turn to=5]	0[c]	.	.	0	.	.	.	.
	[Someone who helps when confined=1]	33.842	5465.575	.000	1	.995	498280907200000.000	.000	.[b]
	[Someone who helps when confined=2]	35.698	.000	.	1	.	3188472375000000.000	3188472375000000.000	3188472375000000.000
	[Someone who helps when confined=3]	1.702	8447.045	.000	1	1.000	5.484	.000	.[b]
	[Someone who helps when confined=4]	108.570	.000	.	1	.	1.417E+47	1.417E+47	1.417E+47
	[Someone who helps when confined=5]	0[c]	.	.	0	.	.	.	.
	[Someone who prepares a meal for me=1]	-38.247	12341.156	.000	1	.998	2.453E-17	.000	.[b]
	[Someone who prepares a meal for me=2]	-73.291	14470.374	.000	1	.996	1.480E-32	.000	.[b]
	[Someone who prepares a meal for me=3]	-32.646	12021.710	.000	1	.998	6.639E-15	.000	.[b]
	[Someone who prepares a meal for me=4]	-105.653	8040.148	.000	1	.990	1.305E-46	.000	.[b]
	[Someone who prepares a meal for me=5]	0[c]	.	.	0	.	.	.	.
	[Someone who assists in illness=1]	-64.458	18506.976	.000	1	.997	1.014E-28	.000	.[b]
	[Someone who assists in illness=2]	2.935	20272.758	.000	1	1.000	18.821	.000	.[b]
	[Someone who assists in illness=3]	-70.002	14800.920	.000	1	.996	3.966E-31	.000	.[b]
	[Someone who assists in illness=4]	-.837	15010.625	.000	1	1.000	.433	.000	.[b]
	[Someone who assists in illness=5]	0[c]	.	.	0	.	.	.	.
	[Someone who shows love/affection=1]	67.374	12284.721	.000	1	.996	182004497200000000000000000000.000	.000	.[b]
	[Someone who shows love/affection=2]	135.195	20031.863	.000	1	.995	5.181E+58	.000	.[b]
	[Someone who shows love/affection=3]	173.167	15456.117	.000	1	.991	1.606E+75	.000	.[b]
	[Someone who shows love/affection=4]	141.202	.000	.	1	.	2.106E+61	2.106E+61	2.106E+61
	[Someone who shows love/affection=5]	0[c]	.	.	0	.	.	.	.

a. The reference category is: No.
b. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.
c. This parameter is set to zero because it is redundant.

Results from both multinomial logistic regression tested provided strong statistical evidence that social support from family/friends was significantly associated with chronic illness for over 6 months, final model significance value $p = 0.025$, and that social support from family/friends was significantly associated to prolonged internal injuries, with significant value, $p = 0.011$.

Social Support from Family/Friends and Depression (Excited)

An ordinal regression analysis was performed using the predictors variables of support from family/friend, including 'need someone to share private worries, need someone to turn to, need someone who understands, need someone who helps when confined, need someone who takes me to the doctor, need someone who prepares a meal for me' and the depression outcome variable 'excited'. This analysis was intended to explore the direction of relationship between the predictor variables 'support from family/friend' and depression. The assumption was that support from family/friends affects the depression outcome 'feeling excited' among violent sexual rape survivors. In the case processing summary Table 126, the null model used the modal class 'moderately' as the model prediction accuracy of 0.6% for participants who answered that they were excited in doing things and who needed social support from family and friends, compared to 96.8% of participants who responded they were slightly or not excited at all. For this test, the statistical significance criterion was $\alpha = 0.05$.

Table 126

Social Support from Family/Friends and Depression (Excited): Case Processing Summary

		N	Marginal Percentage
Excited	Very Slightly	151	96.8%
	A Little	4	2.6%
	Moderately	1	0.6%
Someone to share private worries	None of the time	11	7.1%
	A little of the time	32	20.5%
	Some of the time	46	29.5%
	Most of the time	32	20.5%
	All of the time	35	22.4%
Someone to turn to	None of the time	14	9.0%
	A little of the time	24	15.4%
	Some of the time	42	26.9%
	Most of the time	53	34.0%
	All of the time	23	14.7%
Someone who understands	None of the time	14	9.0%
	A little of the time	23	14.7%
	Some of the time	43	27.6%
	Most of the time	46	29.5%
	All of the time	30	19.2%
Someone who Helps when confined	None of the time	36	23.1%
	A little of the time	32	20.5%
	Some of the time	31	19.9%
	Most of the time	24	15.4%
	All of the time	33	21.2%
Someone who Takes me to the Dr.	None of the time	15	9.6%
	A little of the time	28	17.9%
	Some of the time	42	26.9%
	Most of the time	34	21.8%
	All of the time	37	23.7%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Valid		156	100.0%
Missing		0	
Total		156	

With a statistical significance criterion $\alpha = 0.05$, the model fitting information results in Table 127 showed the likelihood ration *chi*-square X^2 (24, $N = 156$), 45.087, $p = 0.006 < \alpha$ (0.05), which indicated that the full model fitting predicted significantly better than any model without predictors. The results supported the assumption that support from family/friends affects the depression outcome (feeling excited) among violent rape survivors.

Table 127

Social Support from Family/Friends and Depression (Excited): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	45.087			
Final	.000	45.087	24	.006

Link function: Logit.

In Table 128 the results of goodness-of-fit test to check whether the model adequately fitted the data showed the Pearson *chi*-Square X^2 (246, $N = 156$) = 15.597, $p = 1.000$ and deviance *chi*-square statistics X^2 (246, $N = 156$) = 9.484, $p = 1.000$. The final model significance value $p = 0.006 < 0.05$ and larger Pearson and deviance p – values (1.000 and 1.000) > 0.05 are a clear indication that the model adequately fitted the data.

Table 128

Social Support from Family/Friends and Depression (Excited): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	15.597	246	1.000
Deviance	9.484	246	1.000

Link function: Logit.

Table 129 shows the analysis of the proportion of variation being explained by the model. The Nagelkerke *chi*-square statistics with the highest pseudo *R*-Square $R^2 = 0.927$

(93%) that explained the model and reflected a strong level of association between support from family/friends and depression outcome among the survivors of violent sexual rape in Eastern DRC.

Table 129

Social Support from Family/Friends and Depression (Excited): Pseudo R-Square

Cox and Snell	.251
Nagelkerke	.927
McFadden	.916

Link function: Logit.

The threshold portion of Table 130 showed the constants/intercepts excited (excited=1, excited=2) of the model. The evaluation of the significance of each variable contribution to the model for Location indicated that all the predictor variables 'support from family/friend' did not have a significant difference in predicting the depression outcome.

Table 130

Social Support from Family/Friends and Depression (Excited): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Excited = 1]	1.804	1.013	3.168	1	.075	-.182	3.790
	[Excited = 2]	4.706	1.750	7.233	1	.007	1.277	8.135
Location	[OnetoSharePrivateWorries=1]	.759	44.039	.000	1	.986	-85.556	87.074
	[OnetoSharePrivateWorries=2]	8.575	50.809	.028	1	.866	-91.009	108.160
	[OnetoSharePrivateWorries=3]	6.941	14.588	.226	1	.634	-21.651	35.533
	[OnetoSharePrivateWorries=4]	-.272	16.163	.000	1	.987	-31.952	31.407
	[OnetoSharePrivateWorries=5]	0[a]	.	.	0	.	.	.
	[OnetoTurnto=1]	-14.367	259.652	.003	1	.956	-523.276	494.542
	[OnetoTurnto=2]	-17.835	38.173	.218	1	.640	-92.653	56.982
	[OnetoTurnto=3]	-11.698	27.332	.183	1	.669	-65.268	41.872
	[OnetoTurnto=4]	-5.556	13.897	.160	1	.689	-32.793	21.681
	[OnetoTurnto=5]	0[a]	.	.	0	.	.	.
	[OnewhoUnderstands=1]	2.809	252.284	.000	1	.991	-491.658	497.275
	[OnewhoUnderstands=2]	4.392	46.181	.009	1	.924	-86.120	94.905
	[OnewhoUnderstands=3]	1.517	25.142	.004	1	.952	-47.761	50.796
	[OnewhoUnderstands=4]	1.869	15.854	.014	1	.906	-29.203	32.941
	[OnewhoUnderstands=5]	0[a]	.	.	0	.	.	.
	[Onewhohelps=1]	-25.117	25.941	.937	1	.333	-75.960	25.727
	[Onewhohelps=2]	-21.979	28.038	.614	1	.433	-76.933	32.975
	[Onewhohelps=3]	-18.617	26.659	.488	1	.485	-70.869	33.634
	[Onewhohelps=4]	-11.575	20.181	.329	1	.566	-51.128	27.979
	[Onewhohelps=5]	0[a]	.	.	0	.	.	.
	[Onewhotakestocare=1]	20.145	50.372	.160	1	.689	-78.582	118.871
	[Onewhotakestocare=2]	23.124	28.213	.672	1	.412	-32.171	78.420
	[Onewhotakestocare=3]	13.708	13.137	1.089	1	.297	-12.040	39.456
	[Onewhotakestocare=4]	1.387	15.996	.008	1	.931	-29.965	32.738
	[Onewhotakestocare=5]	0[a]	.	.	0	.	.	.
	[Onewhomakesmeal=1]	-4.610	22.127	.043	1	.835	-47.977	38.758
	[Onewhomakesmeal=2]	-7.303	17.273	.179	1	.672	-41.157	26.551
	[Onewhomakesmeal=3]	-8.940	27.900	.103	1	.749	-63.623	45.743
	[Onewhomakesmeal=4]	-9.219	21.452	.185	1	.667	-51.264	32.826
	[Onewhomakesmeal=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

However, the Test of Parallel Lines in Table 131, checked whether the assumption was reasonable for all categories with the same parameters, and whether there was appropriateness in one set of coefficients for the categories. With a *p*-value (sig) for the General $p = 1.000 > \alpha$ (0.05), it was concluded that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was appropriate.

Table 131

Social Support from Family/Friends and Depression (Excited): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	.000			
General	.000[b]	.000	24	1.000

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value is practically zero. There may be a complete separation in the data. The maximum likelihood estimates do not exist.

Social Support from Family/Friends and Depression (Interested).

Another ordinal regression analysis was performed based on the assumption that 'support from family/friends' predictors affects the depression 'interested (loss of interest) experience of among women survivors of violent sexual rape in eastern DRC. The analysis explored the direction of relationships between predictors variables 'support from family/friends' included 'need someone to share private worries, need someone to turn to, need someone who understands, need someone who helps when confined, need someone who takes me to the doctor, need someone who prepares a meal for me' and the depression outcome variable 'Interested' (loss of interest) were used.

In Table 132, the results of case processing summary provided the null model with the modal class 'moderately' for survivors who said they felt interest in doing

things and who needed social support from family/friends. The model prediction accuracy was 1.9% of those who responded that they felt interested in doing things compared to 88.5% of those who said they were very slightly or not at all interested. For this multinomial logistic regression test, the statistical significance criterion was $\alpha = 0.05$.

Table 132

Social Support from Family/Friends and Depression (Interested): Case Processing Summary

		N	Marginal Percentage
Interested	Very Slightly	138	88.5%
	A Little	14	9.0%
	Moderately	3	1.9%
	Quite a Bit	1	0.6%
Someone to share private worries	None of the time	11	7.1%
	A little of the time	32	20.5%
	Some of the time	46	29.5%
	Most of the time	32	20.5%
	All of the time	35	22.4%
Someone to turn to	None of the time	14	9.0%
	A little of the time	24	15.4%
	Some of the time	42	26.9%
	Most of the time	53	34.0%
	All of the time	23	14.7%
Someone who understands	None of the time	14	9.0%
	A little of the time	23	14.7%
	Some of the time	43	27.6%
	Most of the time	46	29.5%
	All of the time	30	19.2%
Someone who Helps when confined	None of the time	36	23.1%
	A little of the time	32	20.5%
	Some of the time	31	19.9%
	Most of the time	24	15.4%
	All of the time	33	21.2%
Someone who Takes me to the Dr.	None of the time	15	9.6%
	A little of the time	28	17.9%
	Some of the time	42	26.9%
	Most of the time	34	21.8%
	All of the time	37	23.7%
Someone who prepares a meal for me	None of the time	23	14.7%
	A little of the time	32	20.5%
	Some of the time	30	19.2%
	Most of the time	32	20.5%
	All of the time	39	25.0%
Valid		156	100.0%
Missing		0	
Total		156	

Using a traditional statistical significance criterion of $\alpha = 0.05$, the result in Table 133, model fitting information, showed the likelihood ration *chi*-square X^2 (24, $N = 156$), 36.811, $p = 0.046$, an evidence that the full model fit significantly predicted better than any model without predictors. The final model $p = 0.046 < 0.05$ in Table 138 indicated that the model provided better accuracies for the reference outcome and outperformed compared to the null model. The assumption that 'support from family/friends' predictors affects the depression 'excited' outcome experience of among women survivors of violent sexual rape in eastern DRC was supported.

Table 133

Social Support from Family/Friends and Depression (Interested): Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Intercept Only	125.208			
Final	88.397	36.811	24	.046

Link function: Logit.

Tables 134 and 135 provides the results of the goodness-of-fit and pseudo *R*-square analyses. The goodness-of-fit results provided clarifying data, which showed supporting evidence of good fit for the model with adequate predictions compared to the intercept (null model). With the final model significance $p = 0.046$, the Pearson *chi*-square X^2 (381, $N = 156$) = 133.886, $p = 1.000$ and deviance *chi*-square statistics X^2 (381, $N = 156$) = 81.898, $p = 1.000$, it was clear that the fitting of the model was significantly improved for the data. The Pseudo *R*-Square results showed the Nagelkerke test values of the proportion of variation, *R*-square value $R^2 = 0.363$ (36%), which explained the model

and reflected a strong level of association between social rejection and depression outcome.

Table 134

Social Support from Family/Friends and Depression (Interested): Goodness-of-Fit

	Chi-Square	*df*	Sig.
Pearson	133.886	381	1.000
Deviance	81.898	381	1.000

Link function: Logit.

Table 135

Social Support from Family/Friends and Depression (Interested): Pseudo R-Square

Cox and Snell	.210
Nagelkerke	.363
McFadden	.272

Link function: Logit.

The threshold portion of Table 136 showed the constants/intercepts Interested (interested=1, interested=2, interested=3) of the model. The evaluation of the significance of each variable contribution to the model for location indicated that ‘onetoturnto=3’ (someone to turn to), significantly predicted the outcome compared to all other predictors. A positive relationship exists between ‘onetoturnto=3’ (someone to turn to) and depression outcome ‘Interested’ (loss of interest), because as a need for someone to turn to ‘onetoturnto=3’ increases, so does also the probability of experiencing ordinal outcome of depression ‘Interested’ (loss of interest). In other words, a one-unit increase in need of someone to turn to ‘onetoturnto=3’ will result in an Exp(B) 69.1 increase in the probability of experiencing the ordinal outcome depression ‘Interested’ (loss of interest.

Table 136

Social Support from Family/Friends and Depression (Interested): Parameter Estimates

							95% Confidence Interval	
		Estimate	Std. Error	Wald	*df*	Sig.	Lower Bound	Upper Bound
Threshold	[Interested = 1]	3.567	1.253	8.100	1	.004	1.111	6.024
	[Interested = 2]	5.642	1.382	16.657	1	.000	2.933	8.352
	[Interested = 3]	7.425	1.696	19.162	1	.000	4.101	10.750
Location	[OnetoSharePrivateWorries=1]	2.856	1.709	2.794	1	.095	-.493	6.205
	[OnetoSharePrivateWorries=2]	-1.592	1.701	.875	1	.350	-4.926	1.743
	[OnetoSharePrivateWorries=3]	-.079	1.165	.005	1	.946	-2.363	2.204
	[OnetoSharePrivateWorries=4]	.060	1.091	.003	1	.956	-2.078	2.198
	[OnetoSharePrivateWorries=5]	0[a]	.	.	0	.	.	.
	[OnetoTurnto=1]	5.297	2.830	3.503	1	.061	-.250	10.844
	[OnetoTurnto=2]	2.800	2.428	1.329	1	.249	-1.960	7.559
	[OnetoTurnto=3]	4.236	1.837	5.316	1	.021	.635	7.837
	[OnetoTurnto=4]	1.624	1.440	1.272	1	.259	-1.198	4.445
	[OnetoTurnto=5]	0[a]	.	.	0	.	.	.
	[OnewhoUnderstands=1]	-25.964	.000	.	1	.	-25.964	-25.964
	[OnewhoUnderstands=2]	-2.187	1.914	1.306	1	.253	-5.939	1.565
	[OnewhoUnderstands=3]	-1.393	1.238	1.267	1	.260	-3.819	1.033
	[OnewhoUnderstands=4]	.557	1.091	.260	1	.610	-1.582	2.695
	[OnewhoUnderstands=5]	0[a]	.	.	0	.	.	.
	[Onewhohelps=1]	-1.367	1.365	1.003	1	.317	-4.043	1.309
	[Onewhohelps=2]	.990	1.216	.663	1	.415	-1.393	3.373
	[Onewhohelps=3]	-.965	1.367	.499	1	.480	-3.644	1.713
	[Onewhohelps=4]	.015	1.296	.000	1	.991	-2.524	2.555
	[Onewhohelps=5]	0[a]	.	.	0	.	.	.
	[Onewhotakestocare=1]	-.496	2.245	.049	1	.825	-4.895	3.904
	[Onewhotakestocare=2]	.829	1.398	.352	1	.553	-1.910	3.569
	[Onewhotakestocare=3]	-.334	1.182	.080	1	.777	-2.651	1.982
	[Onewhotakestocare=4]	1.103	1.321	.697	1	.404	-1.486	3.692
	[Onewhotakestocare=5]	0[a]	.	.	0	.	.	.
	[Onewhomakesmeal=1]	-.403	1.551	.068	1	.795	-3.442	2.636
	[Onewhomakesmeal=2]	-.698	1.173	.354	1	.552	-2.997	1.601
	[Onewhomakesmeal=3]	-2.591	1.434	3.266	1	.071	-5.401	.219
	[Onewhomakesmeal=4]	-.708	1.199	.348	1	.555	-3.058	1.643
	[Onewhomakesmeal=5]	0[a]	.	.	0	.	.	.

Link function: Logit.

a. This parameter is set to zero because it is redundant.

The Test of Parallel Lines in Table 137 verified whether the assumption was reasonable for all categories with the same parameters, and whether one set of coefficients was appropriate for the categories. The results with *p*-value (sig) for the general $p = 1.000 > \alpha$ (0.05) indicated that the assumption was reasonable for all the categories with the same parameters and the one set of coefficients for the categories was

appropriate. Based on the results described above in this analysis there is an established evidence that ‘support from family/friend’ significantly affects chronic pain and depression. Therefore, the null hypothesis that there is no association between ‘support from family/friends’ and ‘chronic pain and depression’ among women victims of violent sexual rape in eastern DRC was rejected.

Table 137

Social Support from Family/Friends and Depression (Interested): Test of Parallel Lines[a]

Model	-2 Log Likelihood	Chi-Square	*df*	Sig.
Null Hypothesis	88.397			
General	79.809[b]	8.588[c]	48	1.000

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.
b. The log-likelihood value cannot be further increased after maximum number of step-halving.
c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Summary

In this chapter, I delivered the results of the study that I conducted to address six research questions. Four accepted instruments were utilized to collect data on the impacts of violent sexual rape among the women victims of sexual assaults in eastern DR Congo. The data analysis yielded the following results:

In investigating research question one, I utilized data related to fistula experience. I used two multinomial regression analyses to examine the association between fistula and the experience of chronic pain and depression. The results of the first multinomial regression analysis showed a strong evidence of association between fistula and chronic

pain with a significance level $p = 0.003$. Similarly, the second multinomial regression analysis and between fistula and depression with a significance value of $p = 0.033$.

In addressing research question two, I conducted 3 multinomial logistic regression analyses to assess the relationship between other sexual rape-related injuries and chronic pain, as well as between other sexual rape-related injuries and depression. The results from the first multinomial regression analysis test provided proof of significant association between sexual-rape related injuries (including attack by knife or weapon, injured during sexual violence, experienced fistula, physical damage/handicap, real disability or immediate death in family, and chronic disability or death) and chronic pain (including chronic illness due to sexual violence), $p = 0.001$. The results from the second multinomial analyses also showed that other sexual rape-related injuries (including attack by knife or weapon, injured during sexual violence, experienced fistula, physical damage/handicap, real disability or immediate death in family, and chronic disability or death) were significantly associated with depression symptom 'irritable', $p = 0.004$. Likewise, the last multinomial regression analysis also yielded results that indicated significant relationship between other violent rape-related injuries and and depression symptom of lack of desire for activity (unable to engage in activities), $p = 0.037$.

When I analyzed data for research question three, I utilized one multinomial regression analysis and two ordinal regression analyses to evaluated how PTSD symptoms, including irritable [i.e., feeling irritability], fear [i.e., living with fear], upset [i.e., upset all the time], guilt [i.e., feeling of guilt], nervous [i.e., nervousness, anxiety or pain], hostile [i.e., feeling of unfriendliness], relax [i.e., unable to relax], and ashamed

[i.e., feeling of shame] may be associated to chronic pain and depression experience among women victims of violent sexual rape. For the test of association between PTSD and chronic pain, the results from a multinomial logistic regression analysis provided evidence of significant relationship between PTSD symptoms including irritable [i.e., feeling irritability], fear [i.e., living with fear], upset [i.e., upset all the time], guilt [i.e., feeling of guilt], nervous [i.e., nervousness, anxiety or pain], hostile [i.e., feeling of unfriendliness], relax [i.e., unable to relax], and ashamed [i.e., feeling of shame] and chronic illnesses due to violent sexual rape, $p = 0.004$. Additionally, I utilized the ordinal regression analysis to test the association between PTSD symptoms and depression (sad or sadness). PTSD symptoms (including fear [i.e., living with fear], nervous [i.e., nervousness or anxiety], upset [i.e., upset all the time], guilt [i.e., feeling guilty], and alone [i.e., avoidance or withdrawal] were found strongly associated with repression symptom (sad or sadness), $p = 0.000$. Lastly, I conducted another ordinal regression analysis by which these PTSD symptoms were also found to be associated with depression symptom shaky [i.e., feeling unsafe], $p = 0.002$.

The assessment of research question four involved also the use of two multinomial logistic regression analyses to test the association between worthless feeling and chronic pain, as well as two ordinal regression analyses to test the relationship between feelings of worthlessness and depression. The results from the multinomial regression analyses revealed sufficient evidence of significant association between feelings of worthlessness including guilt [i.e., feeling of guilt], angry with self, blameworthy, and ashamed [i.e., feeling of shame] and chronic pain (prolonged illness

over 6 months), $p = 0.024$, and a significant association between feelings of worthlessness guilt [i.e., feeling of guilt], angry with self, blameworthy, ashamed [i.e., feeling of shame] and chronic illness due to violent sexual rape, $p = 0.026$. Also, results from the two ordinal regression analyses showed a strong association between feelings of worthlessness, including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], disgusted with self', angry [i.e., angry with self], blameworthy, and dissatisfied with self and depression symptom including fear [i.e., living with fear], $p = 0.000$; and a significant association between feelings of worthlessness, including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], disgusted with self, angry [i.e., angry with self], blameworthy, and dissatisfied with self and depression symptom, including blue [i.e., feeling blue], $p = 0.006$.

To analyze research question five, I conducted two multinomial logistic regression analyses to assess the relationship between social rejection and chronic pain outcome (experienced fistula), and between social rejection and chronic pain (including chronic illness due to violent sexual rape. The results of the first multinomial revealed that social rejection characteristics (including someone you can count on, someone to give you information, someone who takes me to the doctor, someone who prepares a meal for me, and someone who helps when confined) were strongly associated with the prolonged fistula experience among the victims of violent sexual rape, $p = 0.017$. Similarly, the second multinomial analysis showed that social rejection characteristics (including someone you can count on, someone to give you information, someone who takes me to the doctor, someone who prepares a meal for me, and someone who helps

when confined) also had strong association with chronic illness due to sexual violence among the victims violent sexual rape, $p = 0.044$.

To test the association between social rejection and depression, I conducted two ordinal regression analyses. A strong association was found between social rejection variables, including someone you can count on, someone to give you information, someone to give you advice, someone to confide in about self, and someone whose advice is needed and depression variable, including alone [avoidance or withdrawal], $p = 0.003$. The results also showed strong association between social rejection variables, including someone you can count on, someone to give you information, someone to give you advice, someone to confide in about self, and someone whose advice is needed and depression variable, including downhearted, $p = 0.006$.

Finally, I analyzed research question six to test the relationship between social support from family and friends/family and chronic pain, and between social support from family/friends and depression. Two multinomial logistic regression analyses and two ordinal regression analyses were performed. The results from the first multinomial regression analysis indicated sufficient evidence of significant association between social support from family/friends, including someone to turn to, someone who prepares a meal for me, someone who provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind and chronic pain, including prolonged illness over 6 months, $p = 0.025$. The second multinomial regression analysis test also showed significant association between social support from family/friends, including someone to turn to, someone who prepares a meal for me, someone who

provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind and chronic pain the outcome, including prolonged or chronic internal injuries, $P = 0.011$.

When I tested the association between the social support from family/friends and depression, I run the first ordinal regression analysis by which I found that social support from family/friends, including someone share private worries, someone to turn to, someone who understand, someone who helps when confined, and someone who takes me to the doctor had a significant association with depression symptoms, including excited (loss of excitement) among the survivors of violent sexual rape, $p = 0.006$. Similarly, in a second multinomial regression analysis, I found that social support from family/friends, including someone share private worries, someone to turn to, someone who understand, someone who helps when confined, and someone who takes me to the doctor was also significantly associated with depression symptom, including interested (or loss of interest in doing things) among the victims of violent sexual rape, $p = 0.046$.

In this chapter, I discussed the data analysis of association between the independent variables (including fistula, other injuries from rape, PTSD, feelings of worthlessness, social rejection, and social support from family/friends) and dependent variables (including chronic pain and depression). The analysis of each of the six research questions showed a strong association between the independent variables and chronic pain and a strong association between the independent variables and depression symptoms. The statistical analysis of collected data using four approved instruments has yielded results establishing that there is a relationship between fistula and chronic pain

and between fistula and depression; there is a relationship between other sexual rape-related injuries and chronic and a relationship between other sexual rape-related injuries and depression experience among female survivors of violent sexual rape in eastern DRC. The study findings have also proven that PTSD, feelings of worthlessness, social rejection and social support from family/friend are strongly associated with the outcome of chronic pain and depression in that population. Therefore, all six stated null hypotheses were found not true and were consequently rejected. The following chapter 5 provides a discussion and interpretation of the key findings of this study. In that chapter, I made recommendations and highlighted the implications for social change.

Chapter 5: Discussion, Conclusion, and Recommendations

Introduction

The purpose of this quantitative study was to explore the relationship between the physical health effects (including fistula and other injuries due to rape), mental health effects (PTSD and feelings of worthlessness), social health effects (rejection and support from family/friends) and the chronic pain and depression experience of the women survivors of violent sexual rape in eastern DRC. DRC is a country where structured violence has stolen women's identity, body, integrity, livelihood, health, home, family, and all hope of life possibilities (Trenholm, Olssom, Blomqvist, & Ahberg, 2016).

This study included 156 women participants, who were survivors of violent sexual rape in eastern DRC. I recruited them through a local nonprofit organization that provides social, educational, and financial development support to communities, especially to women, youths, and children in eastern DRC. In interviews, each participant responded to questions from four different questionnaire instruments: (a) the DHS7-Module-Fistula Questionnaire (USAID, 2016), which helped to collect data regarding violent sexual rape-related physical health effects (i.e., fistula and the chronic nature of injuries); (b) the LSMS (Brock et al. 2013), which was used to gather data on violent rape-related physical health effects (i.e., other injuries, the chronic nature of injuries, and psychological distress); (c) the MOS-SSS (Sherbourne & Stewart, 1991) which was used to assess social health factors that affect the survivors' functioning and well-being (i.e., social rejection and social support from family/friends); and (d) the PANAS-X (Watson

& Clark, 1994), which assessed the positive/negative feeling and emotions (i.e., PTSD and depression indicators among the violent sexual rape victims).

Interpretation of Key Findings

The results of this study established strong evidence of an association between rectovaginal fistula and chronic pain, rectovaginal fistula and depression, other injuries due to sexual rape and chronic pain. The results also revealed a strong relationship between PTSD (feelings of worthlessness) and chronic pain, PTSD (feelings of worthlessness) and depression. Lastly, findings also showed that social rejection was significantly associated with chronic pain, as well as with depression.

Research Question 1

Is there any association between physical health effects (including fistulas) and the chronic pain and depression experience of women victims of violent sexual rape in eastern DRC as measured by the DHS7-Module-Fistula Questionnaire, the LSMS, the MOS-SSS, and the PANAS-X scale?

Fistula association with chronic pain. To investigate the relationship between independent variables (predictors) and dependent variables (intercepts), I first performed statistical tests for the physical health effects of fistula (including experienced fistula, sought care, seen by provider, had surgery, and was cured) and chronic pain (including prolonged illness over 6 months). The results from a multinomial logistic regression analysis showed a model prediction accuracy of 86% of participants who experienced chronic illness over 6 months. Of all the participants ($N = 156$), 62% experienced rectovaginal fistula, 19% received reparation surgery, but 41% did not; 34% got healed

completely but 17% were not healed. With the final Likelihood Ratio Test chi-square of X^2 (6, N = 156), 19.732, p = 0.003 < 0.05 and an adequate fitting model with Pearson chi-square statistics of 0.921, p = .922, the results of the multinomial logistic regression analysis provided sufficient evidence to establish that the experience of fistula was associated with chronic pain among the survivors of violent sexual rape in eastern DRC.

Fistula association with depression. I tested the association between fistula and depression in two multinomial logistic regression analyses. In the first multinomial regression analysis, the association was tested using fistula sub variables (i.e., experienced fistula, causes of fistula, sought care, seen by provider, had surgery, and was cured) and the depression outcome sub variable (i.e., upset or feeling upset all the time). The test results showed that 63% of women who (most of the time) felt upset all the time because of their fistula experience, with 30.1% feeling extremely upset for what they went through. The final model showed a significance level of association p = 0.033 < 0.05 and an adequate fitting model with Pearson chi-square statistics of 23.514, p = .990, which provided sufficient evidence to establish that the experience of a fistula was associated with the depression descriptor upset (feeling upset all the time) among the survivors of violent sexual rape in eastern DRC.

The association between fistula and the depression descriptor blue (i.e., feeling depressed or lost happiness) was also tested. About 61% experienced feeling blue (most of the time) because of their fistula, while 33.3% felt extremely blue. The final model indicated a significant probability of association, p = 0.042 with a Pearson chi-square of 7.141, p = 0.929.

The results of my multinomial analyses of the associations between fistula and chronic pain and fistula and depression provided evidence that a fistula was significantly associated with chronic pain as well as with the depression experience among survivors of violent sexual rape in DRC. The above findings supported the hypothesis that there is an association between physical health effects (i.e., fistulas) and the chronic pain and depression experience among women victims of violent sexual rape in Eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS-SSS, and the PANAS-X. I, therefore, rejected the null hypothesis that there is no association between fistula experience and the chronic pain and depression among women survivors of violent sexual rape in eastern DRC.

Research Question 2

Is there an association between physical health effects (including other sexual rape-related injuries) and the chronic pain and depression experience of women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS-SSS, and the PANAS-X?

Other injuries related to violent sexual rape and chronic pain. I tested the association between other injuries related to violent sexual rape and chronic pain experience in a multinomial logistic analysis. The independent variables (i.e., predictors) of other injuries related to violent sexual rape (including attack by knife or weapon, injured during sexual violence, experienced fistula, physical damage/handicap, real disability or immediate death in family, and chronic disability or death) and the dependent variables (i.e., intercepts) of chronic pain (including chronic illness due to

sexual violence) were used. The results showed that 86% of participants had experienced some type of chronic illness because of injuries they sustained during violent sexual rape, with a significant probability of association between other injuries related to sexual violence and chronic pain, the final likelihood ratio test chi-square X^2 (5, N = 156), 21.380, $p = 0.001 < 0.05$. The test model fitting was confirmed by a Pearson chi-square of .351. These results indicated that other injuries sustained during violent sexual rape were significantly associated with chronic pain among the women survivors of violent sexual rape in eastern DRC.

Other injuries related to violent sexual rape and depression. I conducted a multinomial logistic regression analysis to assess the association between the predictor variable of other injuries related to violent sexual rape (including attack by knife or weapon, injured during sexual violence, experienced fistula, physical damage/handicap, real disability or immediate death in family, and chronic disability or death) and the intercept variable of feeling irritable. The results for the model prediction indicated that 20% of the participants said they felt moderately irritable, 65% felt quite a bit irritable, and 10.3% felt extremely irritable. Of the 156 respondents, 86% (n = 134) experienced chronic illness because of violent sexual aggression, 97.4% (n = 152) experienced prolonged illness as a result of violent sexual aggression, 90% (n = 140) were forced to perform sexual acts, and 100% were violently forced to have sex. The results of the association test with the final likelihood ratio test chi-square of X^2 (12, N = 156), 28.788, $p = 0.004 < 0.05$ and the Pearson *chi*-square statistics of 5.103, $p = 0.277 > 0.05$ revealed

strong evidence that other injuries from violent rape were significantly associated with the depression descriptor of irritable [i.e., feeling irritable].

I performed another multinomial logistic regression analysis to evaluate the association between other injuries from violent sexual rape (including injuries during sexual violence, chronic damage injuries, physical damage - handicap, physically forced to have sex, chronic illness due to violence and family members died during attack) and the depression descriptor of active (i.e., inability to engage in any activity). The results of the modal class null model showed that 89% of participants reported very little or no activity at all, and the association test in the likelihood ratio test *chi*-square X^2 (12, N = 156), 22.092, $p = 0.037 < 0.05$, and the Pearson *chi*-square statistics of 7.642, $p = 0.996 > 0.05$ revealed a significant association between other injuries from violent sexual rape and depression descriptor of active (i.e., inability to engage in any activity). The results of the discussed multinomial logistic regression analyses provided sufficient evidence that other injuries due to violent sexual rape were significantly associated with chronic pain and depression among the women survivors of violent sexual rape in eastern DRC. Based on the findings discussed above, I therefore, rejected the null hypothesis that there is no association between other sexual rape-related injuries and the chronic pain and depression among the survivors of violent sexual rape in eastern DRC, as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS-SSS, and the PANAS-X .

Research Question 3

RQ3: Is there an association between mental health effect (including PTSD) and the chronic pain and depression experience of women victims of violent sexual rape in

eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS-SSS, and the PANAS-X?

PTSD and chronic pain. To analyze the association between the mental health descriptor of PTSD and chronic pain, I conducted a multinomial logistic regression analysis. The independent (predictor) variable of PTSD descriptors (including irritable [i.e., feeling irritability]; fear [i.e., living with fear]; upset [i.e., upset all the time]; guilt [i.e., feeling of guilt]; nervous [i.e., nervousness, anxiety, or pain]; hostile [i.e., feeling of unfriendliness]; relax [i.e., unable to relax], and ashamed [i.e., feeling of shame]), and the dependent outcome variable of chronic illness due to violent sexual rape were used. The null model modal class found that 86% of survivors said they experienced chronic illness due to violence and the PTSD descriptors. The results of the multinomial logistic regression analysis indicated that the PTSD symptoms (including feeling irritable, living with fear, upset all the time, feeling of guilt, nervousness or anxiety, unfriendliness - hostile or aggressive behavior, unable to relax, and feeling of shame) significantly affected chronic illness due to violent sexual rape, with the association test in the likelihood ratio test chi-square X^2 (28, $N = 156$), 51.965, $p = 0.004 < 0.05$, and the Pearson chi-square statistics of 70.417, $p = 0.977 > 0.05$.

PTSD and depression. Because both the ordinal nature of both PTSD and depression variables, I conducted an ordinal regression analysis to test the association between PTSD symptoms (predictors variables), including fear [i.e., living with fear], nervous [i.e., nervousness or anxiety], upset [i.e., upset all the time], guilt [i.e., feeling guilty], and alone [i.e., avoidance or withdrawal] and depression outcome variable,

including sad [i.e., sadness]. The ordinal regression analysis showed results that suggested significant association between PTSD and depression, with the model fitting information showing the likelihood ratio test chi-square X^2 (16, N = 156), 47.799, p = 0.000 < 0.05, the Pearson chi-square statistics of 81.749, p = 0.986 > 0.05, and the test of parallel line with a general p = 0.815 > 0.05 which confirmed that our assumption was reasonable for all categories.

I performed another ordinal regression analysis for the PTSD predictors variables, including fear [i.e., living with fear], upset [i.e., upset all the time], scared [i.e., scared all the time], afraid [i.e., afraid all the time] and depression outcome variable, including shaky [i.e., feeling unsafe all the time]. The results revealed that PTSD descriptors including fear [i.e., living with fear], nervous [i.e., nervousness or anxiety], upset [i.e., upset all the time], guilt [i.e., feeling guilty], and alone [i.e., avoidance or withdrawal] were significantly associated with depression outcome, including shaky [i.e., feeling unsafe] with the model fitting information indicating the likelihood ratio test *chi*-Square X^2 (12, N = 156) = 31.189, p = 0.002 < 0.05, and a confirmed reasonable assumption for all categories, test of parallel line with a general p = 0.076 > 0.05. The three results discussed above established clear evidence that the PTSD symptoms or descriptors experienced among the women survivors of violent sexual rape in eastern DRC were associated with chronic pain and depression in that population. I, therefore, rejected the null hypothesis that there is no association between PTSD and the chronic pain and depression among women survivors of violent sexual rape in eastern DRC, as measured

by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS-SSS, and the PANAS-X.

Research Question 4

RQ4: Is there an association between mental health effects (including feelings of worthlessness) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

Feelings of worthlessness and Chronic Pain. To test the association between feelings of worthlessness and chronic pain, I performed a multinomial logistic regression analysis. I utilized independent (predictor) variables 'feelings of worthlessness' (including guilt [i.e., feeling of guilt], angry with self, blameworthy, and ashamed [i.e., feeling of shame]) and dependent (outcome) variables, including prolonged illness over 6 months. The results showed the modal class null model with 86% of prediction accuracy in 'Yes', the association test in the model fitting information with likelihood ratio test *chi*-square X^2 (12, $N = 156$), 23.486, $p = 0.024 < 0.05$, and the Pearson *chi*-square statistics of 5.390, $p = 1.000 > 0.05$. These results revealed a significant association between feelings of worthlessness (including guilt, angry with self, blameworthy, and ashamed) and dependent (outcome) variables (prolonged illness over 6 months).

I performed another multinomial analysis to test the association between feelings of worthlessness (including guilt, ashamed, angry, blameworthy) and the chronic pain outcome variable, including chronic illness due to violent sexual rape. The results showed a modal class Yes with 86% of model prediction accuracy for those who felt

blameworthy who experienced chronic illness due to violent sexual rape. The association tests showed the results of final model likelihood ratio tests *chi*-square X^2 (12, $N = 156$), 23.181, $p = 0.026 < 0.05$ and a goodness-of-fit with Pearson c*hi*-square statistics of 5.390, $p = 1.000 > 0.05$. These results of the above analysis indicated a significant association between feelings of worthlessness, including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], angry [i.e., angry with self], blameworthy) and the chronic pain outcome variable, including chronic illness due to violent sexual rape.

Feelings of Worthlessness and Depression. I used the ordinal regression analysis to test the association between feelings of worthlessness, including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], disgusted with self, angry [i.e., angry with self], blameworthy, dissatisfied with self, and depression symptoms, including fear [i.e., living with fear]. The results showed a modal class 'quite a bit' with 70% of model prediction accuracy for survivors who felt in fear and blamed themselves for everything. Feelings of worthlessness, including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], disgusted with self, angry [i.e., angry with self], blameworthy, dissatisfied with self was found significantly associated with depression and fear [i.e., living with fear], as confirmed by the association tests in the final model likelihood ratio tests c*hi*-square X^2 (17, $N = 156$), 43.801, $p = 0.000 < 0.05$, the goodness-of-fit with Pearson c*hi*-Square statistics of 218.951, $p = 0.339 > 0.05$, and the test of parallel line with a general $p = 0.070 > 0.05$ suggesting a reasonable assumption for all categories.

Another ordinal regression analysis was also conducted to test the association between feelings of worthlessness and depression using the independent (predictor)

variables including guilt [i.e., feeling of guilt], ashamed [i.e., felling of shame], disgusted with self, angry [i.e., angry with self], blameworthy, dissatisfied with self and the dependent outcome variables, including blue [i.e., feeling blue]. The results of model fitting information showed the probability ratio c*hi*-square X^2 (17, N = 156) = 33.906, p < 0.006, and Pearson chi-square of 229.480, p = 0.998. With the significance p-value general p = 0.998 > 0.05 in the test of parallel lines, the results indicated that worthlessness was significantly associated with depression.

The overall results of both multinomial logistic regression analyses and both ordinal regression analyses provided sufficient evidence confirming that mental health factor, including feelings of worthlessness', was significantly associated with chronic pain and depression among the women survivors of violent sexual rape in eastern DRC. For this reason, I rejected the null hypothesis that there is no relationship between feelings of worthlessness and the chronic pain and depression among the women survivors of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Research Question 5

RQ5: Is there an association between social health effect (including social rejection) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

Social Rejection and Chronic Pain. I performed two multinomial logistic regression analyses to test the association between social rejection and chronic pain. For

the first multinomial logistic regression analysis, the independent variables (predictors) for social rejection included someone you can count on, someone to give you information, someone who takes me to the doctor, someone who prepares a meal for me, and someone who helps when confined, and independent variables (outcomes) included experienced fistula. In this statistical analysis, the results of the modal class 'Yes' showed 62.2% of model prediction accuracy for survivors who experienced rectovaginal fistula. The results of the model fitting information indicated a probability ratio *chi*-square X^2 (20, $N = 156$) = 35.595, $p = 0.017$, and Pearson *chi*-square of 114.990, $p = 0.145 > 0.05$. With the final model significance p-value = $0.017 < 0.05$, the test suggested strong relationship between social rejection and chronic pain.

I conducted another multinomial logistic regression analysis to assess the association between independent (predictor) variables of social rejection (including someone to count on, someone who understands, someone who provides daily help, someone who assists in illness, someone who prepares a meal for me) and dependent (outcome) variable, including chronic illness due to viol. The findings of the test showed a modal class 'Yes' with 86% prediction accuracy of the model. The test also yielded results that revealed the model fitting information likelihood ratio tests *chi*-square X^2 (20, $N = 156$) = 31.923, $p = 0.044$, and Pearson *chi*-square of 100.462, $p = 0.732 > 0.05$. Both multinomial results revealed that social rejection was significantly associated with chronic pain.

Social Rejection and Depression. To test the association between social rejection and depression, I performed an ordinal regression analysis because of the

ordinal nature of the predictor and outcome variables. I utilized the independent (predictors) variables of social rejection (including someone you can count on, someone to give you information, someone to give you advice, someone to confide in about self, and someone whose advice is needed), and dependent variable of alone (including avoidance or withdrawal). The results showed the modal class 'most of the time' 76% for those who said they felt alone but would otherwise rely on someone for help. With the model fitting information likelihood ratio tests *chi*-square X^2 (20, $N = 156$) = 41.932, p = 0.003 in the final model, a large Pearson *chi*-square of 368.653, $p = 0.919 > 0.05$, and a large general significance level $p = 0.884 > 0.05$, the test showed evidence of significant association between social rejection and depression.

I ran another ordinal regression analysis to assess the association between predictors variables, including someone to share private worries, someone to turn to, someone who helps when confined, someone who takes me to the doctor, and the outcome variable, including downhearted. With a modal class null model prediction accuracy rate was 69.2% of respondents who said they felt downhearted most of the time but would otherwise wish they had someone for help. The results of the model fitting information likelihood ratio tests yielded a *chi*-square of X^2 (16, $N = 156$) = 33.880, p = 0.006 in the final model, a Pearson *chi*-square of 424.965, $p = 0.073 > 0.05$ and a large general significance level $p = 0.686 > 0.05$, the test showed evidence that social rejection was significantly association with depression.

Both multinomial logistic regression tests and both ordinal logistic regression tests showed statistical results that provided sufficient evidence that social rejection was

significantly associated with chronic pain and depression among the women survivors of violent sexual rape in eastern DRC. I therefore, rejected the null hypothesis that there is no association between social health effect (social rejection) and chronic pain and depression experience among women victims of violent sexual rape in eastern DRC, as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

Research Question 6

RQ6: Is there an association between social health effects (including support from family/friends) and the chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale?

Social Support from Family/Friends and Chronic Pain. To test how support from family/friends was associated with chronic pain, I performed a multinomial logistic regression analysis. The independent (predictor) variables included someone to turn to, someone who prepares a meal for me, someone who provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind, and the dependent (outcome) variable was prolonged illness over 6 months. The results showed the modal class null model with 86% of prediction accuracy in 'Yes' and the association test in the model fitting information yielded a likelihood ratio tests *chi*-square X^2 (24, N = 156), 39.333, p = 0.025 < 0.05 in the final model, and the Pearson *chi*-square statistics of 97.520, p = .893 > 0.05. These results revealed a significant association between the independent variable social support family/friends, including

someone to turn to, someone who prepares a meal for me, someone who provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind and the dependent (outcome) variable, including prolonged illness over 6 months.

In another multinomial logistic regression analysis that I conducted, I used the predictor variables, including someone to turn to, someone who prepares a meal for me, someone who provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind, and the outcome variable was prolonged or chronic internal injuries, to test the association between social support from family/friends and chronic pain. The results showed a modal class 'Yes' with 97.4% of model prediction accuracy for prolonged or chronic internal injuries experience among those who needed help from someone. The association tests showed the results of final model likelihood ratio tests *chi*-square X^2 (20, $N = 156$), 37.205, $p = 0.011 < 0.05$ and a goodness-of-fit with Pearson *chi*-square statistics of .000, $p = 1.000 > 0.05$. These results indicated a significant association between support from family/friends, including someone to turn to, someone who prepares a meal for me, someone who provides daily help, someone who shows love/affection, someone who assists in illness, someone for getting things off mind and the dependent (outcome) variable, including prolonged or chronic internal illness.

Social Support from Family/Friends and Depression. Due to the ordinal nature of the predictor and outcome variables, I performed an ordinal regression analysis to test the association between social support from family/friends and depression. The

independent variables (predictors) included someone share private worries, someone to turn to, someone who understand, someone who helps when confined, and someone who takes me to the doctor and the dependent variable included excited. The results showed the modal class 'very slightly or not at all' excited, with 97% prediction accuracy among the respondents who needed help from someone. With the model fitting information likelihood ratio tests *chi*-square X^2 (24, $N = 156$) = 45.087, $p = 0.006 < 0.05$ in the final model, a large Pearson *chi*-square of 15.597, $p = 1.000 > 0.05$, and a large general significance level $p = 1.000 > 0.05$, the test showed evidence of significant association between social support from family/friends and depression.

I processed another ordinal regression analysis using the predictors variables someone share private worries, someone to turn to, someone who understand, someone who helps when confined, someone who takes me to the doctor, and someone who prepares a meal for me, and the outcome variable, including interested. With a modal class very slightly or not at all interested, 89% prediction accuracy among those who needed someone for help, a model fitting information likelihood ratio tests *chi*-square X^2 (24, $N = 156$) = 36.811, $p = 0.046 < 0.05$ in the final model, a Pearson *chi*-square of 133.886, $p = 1.000 > 0.05$ and a large general significance level $p = 1.000 > 0.05$, the test showed evidence that social support from family/friends was significantly association with depression.

Both the multinomial logistic regression tests and ordinal regression tests showed statistical results that provided sufficient evidence that social support from family/friends was significantly associated with chronic pain and depression among the women

survivors of violent sexual rape in eastern DRC. Therefore, I rejected the null hypothesis that there is no association between social health effect (support from family/friends) and chronic pain and depression experience among women victims of violent sexual rape in eastern DRC as measured by the LSMS, the DHS7-Module-Fistula Questionnaire, the MOS SSS, and the PANAS-X scale.

On the one hand, the findings in this study elucidate the work of Brown (2013), Carlsen (2009), Christian et al. (2011), Jonhson et al. (2010), Linos et al, 2012), who have found that the sexual violence related physical damages experienced by Congolese women could have disabling physical, mental, and social health implications among the victims. The findings also support the horrible nature of brutal rapes that were reported by Slegh et al. (2014) and Kasangye et al. (2014), which inflicted rape-related rectal and vaginal fistulas that led to physical, mental, and social functional impairments among the Congolese women victims. The findings in this study clarify the conclusion by Cannon (2012) who reported over 5,810 gynecological surgeries that were performed between 1999 and 2010, which included 2,551 sever cases of fistula repair. These findings also aligned with the work of Baaz & Stern (2011), Schalinski et al. (2011), Brown (2012), Bartels et al. (2013), Kasangye et al. (2014) who concluded that the nature of sexual rape experienced by women in DRC inflict trauma that is often accompanied with prolonged severe pain, mental disturbance, depression, and stress.

On the other hand, the findings in this study could extend knowledge of health issues faced by women in conflict areas. Violence against women had been previously studied in armed conflicts in Afghanistan, Kosovo, Liberia, Rwanda, Sudan, and Sri

Lanka, and all studies had established the motive as to use rape as a strategic weapon to conquer and destroy the community. However, this is the first study that attempted to understanding the relationship between independent variables, including fistula, various rape-related injuries, PTSD, feelings of worthlessness, social rejection, and support from families/friends, and dependent variables, including chronic pain and depression. The results. The findings in this study have now established strong association between each independent variable and chronic pain, as well as between each independent variable and depression.

Interpretation of Findings related to the Conceptual Framework

This study was guided by the EMISAWMH which is used to understand the ecological health impacts of sexual rape and phenomenon of psychological impacts following the sexual assault event (Campbell et al., 2009). Using various levels of influence, including the individual, assault, microsystem, meso/exosystem, macrosystem, and chronosystem, the EMISAWMH can be used to investigate numerous factors of sexual rape and physical, mental, and social health impacts (Campbell et al., 2009; Neville & Heppner, 1999).

At the individual level of analysis, the EMISAWMH examines the individual characteristics and maladaptive coping responses related to mental health suffering while emphasizing the contributions of specific individual factors such as personal experience affecting family and cultural values, self-identity, race, gender, abilities and life status among the victims who suffered violent sexual rape (Neville & Heppner, 1999). In this study, all the participants were of the same race, gender, and cultural values. At the

individual level of analysis, the physical health impacts, including fistulas and other injuries due to violent sexual rape were investigated. Whereas EMISAWMH would predict the outcome of sexual assault to include negative outcomes of personal experience that affect family, culture values, self-identity, race, gender, abilities, and health status, preexisting mental predisposition, personality, and genetic/biological factors at individual level of influence, and these negative outcomes would only be improved by decisive coping responses. The EMISAWMH indicated the evidence of effects of individual level of personal suffering experience on family, culture values, self-identity, race, gender, and health status, which was supported by this study finding that physical health effects 'rectovaginal fistula' and physical and psychological were significantly associated with chronic pain and depression outcomes among women survivors of sexual rape in the DRC.

At the assault level of analysis, the EMISAWMH focuses on analyzing the characteristics of sexual assault including the location where the violent rape took place (urban/rural), victim's association with the predator (familiar or stranger), the rape event-related injuries and psychological outcomes (depression, PTSD resulting from the severity of the injury due to abuses, beatings, inflicted suffering, terrorization, threats and use of weapons (Campbell et al., 2009). At the assault level, the EMISAWMH would predict the association between rape and increased symptomatology, depression, general trauma, PTSD, and injuries due to use of weapons (Campbell et al., 2009).

At the assault level of influence, this investigation looked at physical health effects variables including injuries resulting from violent sexual rape and physical

damages predictors, chronic pain and mental health effect (depression) outcomes. There was sufficient evidence that supported assault level of influence, which demonstrated that injuries sustained during violent sexual rape were significantly associated with the physical suffering outcome (chronic pain) and mental health outcome (depression).

The microsystem level of analysis seeks to understand the roles of peers, family members and friends. In other words, the microsystem level of analysis focuses on the role of the proximal situation that affects the survivors' life, and the importance of positive actions in fostering support (Neville & Heppner, 1999). While the presence of and assistance at this level of influence could predict reduced psychological distress among the victims, (Baynard, 2011; Campbell et al., 2009), the microsystem level of analysis in this study was used to connect the mental health effect variables (including PTSD and feelings of worthlessness), the social health variables (including social support from family/friends and social rejection) chronic pain and depression. There was significant evidence of strong relationship between PTSD, feelings of worthlessness, social rejection, and support from family/friend chronic pain and depression.

At the mesosystem or exosystem level of analysis, victims of sexual assaults would need to seek protection or legal system at the community level (societal variable) (Campbell et al., 2009). The mesosystem/exosystem level assesses the impacts and benefits of seeking mental health service, but when help cannot be found, the EMISAWMH could predict more harm and secondary victimization, which in turn leads to increased psychological health problems, including depression, and PTSD and depression. In this study, investigating the PTSD, feelings of worthlessness, social

support from family/friends and social rejection yielded findings showing significant association with chronic pain and depression, which, therefore, supported the prediction of meso/exosytem level of influence.

At the macrosystem level of analysis, the EMISAWMH uses socio-cultural perspectives to look at social health effects variables including social rejection and supports from family/friends. At this level of influence, the EMISAWMH could predict challenges associated with misunderstanding the social health impacts on the victims if the complex socio-cultural features are not understood (Campbell et al., 2009; Rozzee & Koss, 2001). When the macrosystem level of analysis was tied the physical and social health impacts (rectovaginal fistula, injuries and the levels of social support from family/friend), it was revealed that physical suffering and the level of support significantly affect the chronic and mental health outcomes among the victims of sexual assaults.

The chronosystem level of analysis focuses on factors such as prior history of victimization or revictimization that may directly or indirectly affect rape survivors' recovery outcomes. With the chronosystem process, the EMISAWMH analyzes the effects of several historic circumstances surrounding violent sexual rape as factors that that predict negative stress and depression outcomes and affect recovery (Bronfenbrenner, 1994; Campbell et al., 2009; Neville & Heppner, 1999). Whereas, EMISAWMH predicted the increase of PTSD and Depression as result of environmental and circumstantial factors. This study tied the various circumstances surrounding violent sexual rape to physical health factors: other injuries rape-related injuries (including

fistula, prolonged illnesses, and other physical damages), the social support and social rejection factors (including the need of someone who can help, the experience of sadness, self-blame and self-hate) were associated with chronic pain and depression outcomes among the women survivors, supporting, thus the influence described in the chronosystem level of analysis.

Limitations of the Study

The specific characteristics of the participants (women survivors of violent sexual rape in eastern DRC), in a specific circumstance (extreme violence of war), and during a specific time (2010 - 2015) caused a limited choice to the use of nonprobability sampling method for convenience. This study was conducted among target population with unique circumstances of unstable political conditions in a conflict-affected or post conflict area of study where convenient accessibility and proximity were critical. Therefore, nonprobability sampling or convenience sampling was used for the target population that could be accessed.

Considering the inimitable characteristics of the targeted populations, the place, and time of study, convenient sampling might have posed a threat to external validity because convenient sampling limits the probability for specification of the target population, increases the chance for selection bias, decreasing, thus, the general applicability of the analyses (Brock et al., 2013; Drost, 2011; Polit & Beck, 2012; Trochim, 2006). To explain the effect of ‘people, place, and time’, this study was conducted in an area marked by violent armed conflicts where the impacted populations self-reported their experiences of sexual rape and violence from 2010 and 2014.

Biases might have influenced the study outcomes, including the recall bias and selection bias. Recall bias might have posed a challenge for this demographic and epidemiologic assessment in post conflict areas as respondents might have tried to recount experience of violent events after the time of occurrence has past (Bruck et al., 2013; Deaton, 2001). Selection bias might also have affected the outcomes of the study in a conflict-affected area where a planned survey might have missed to reach the intended target populations due to specials circumstances of insecurity, sensitivity, and political constraints (Arkona & Kalvas, 2008; Kalvas & Kocher, 2009). Similarly, context bias, misleading information, and misstatement of the measures of association might have affected this study in the event where survivors of serious traumatic events might have willingly or unwillingly omitted important information because they were still physically, mentally, and socially/emotionally affected and unable to provide a full account (Bruck et al., 2013). To address these limitations, a theory of approximation was utilized to assure the validity. The theory of approximation focused on describing how the selected sample differed from an ideal sample if it had to be randomly selected (Polit & Beck, 2012; Trochim, 2006). To address the issue, the possible effect of the people who might have been overly represented in the sample versus those who might have been left out during the selection process was investigated.

The threats of internal validity that might have affected this study might have included the existence of confounding, which could be comprised of multiple variables different from those variables of interest for the study. In this study, confounding variables might have included pre-existing chronic pain and depression before the rape

event as well as other situational variables (Polit & Beck, 2012). When not properly addressed, confounding variables could lead to confounding biases, which would threaten the internal or external validity of the study. Confounding might have threatened the study the event the association between the study variables (independent and dependent) was adversely affected by a third variable (Spiengelman et al., 2016). To address the threat to internal validity that was posed by effects of confounding, the approach of the study focused on examining the causal relationships between independent variables and chronic pain and depression experience among the women survivors of violent sexual rape. This process also required the use of a timeline in describing the event to avoid history bias.

Recommendation for Future Research

This study aimed at examining the impacts of violent sexual rapes and whether these impacts were associated with chronic pain and depression experience among the women survivors' sexual rape in eastern DR Congo. Analyzing the association between physical health impacts, mental health impacts, or social health impacts as independent variables and chronic pain and depression as was a big undertaking because each group variables had multiple variable choices to be considered. While rectovaginal fistula, other injuries due to violent sexual rape, PTSD, worthlessness, social rejection and social support from family/friends were found associated with chronic pain and depression experience among the victims of violent sexual rape, further research is required to uniquely focus on understanding that association using one group independent variables and one group of dependent variables at a time.

While this study focused on understanding the relationship between six independent variables and chronic pain and depression. However, hundreds other variables were left out, which could possibly tell the full story of physical, mental, and social health impacts as result of violent sexual rape among the target population. Future studies are needed to examine the issues of sexual assaults health effects in a more detailed scale to better understand the specifics of health outcomes and possible intervention needs.

DRC is country known today as the rape capital of the world, where rape was used as a weapon of war (Ingelaere & Wilen, 2017). In two provinces of South Kivu and North Kivu alone, over 80 armed groups continue to operate looting the country's natural resources, subjugating the population (women, girls, boys and men) including forced labors, sexual slavery, and forced military enrollment (Strearns & Vogel, 2015). Of all 156% participants in this study, 100% had been violently raped and all of them were residents of two neighboring villages. In the region where violence and sexual rape have affected almost every household, more research is needed to understand the social health effects of unwanted pregnancies, implanted extreme poverty, and the well-being of the affected communities. of more studies will be needed for a larger scale examination of health impacts in these populations.

Systematic sexual assaults continue to be perpetrated with extreme violence have been against the populations of DRC, with over 1,000 women and girls being raped every day. However, previous studies have focused more on conflict-related issues, including the crime of violence and rape, the child soldiers, the minerals as main trigger of the

conflict, and political environment in the DRC. More research will be needed to investigate the factors influencing the perpetration of misery of the populations in a country that has more than what it needs to improve the life and health of its populations.

Further, several respondents had difficulties discussing the PTSD descriptors to describe their mental health experience because they feared being mislabeled as schizophrenic because many words in the survey are often used when describing a schizophrenic individual. Similarly, many participants had difficulties disclosing their vaginal or other injury experience for fear of using words they considered unmentionable or for fear of offending God. Future studies should focus on clarifying the cultural value and sensitivity that may humper well intended studies and to address the perceptions of involuntarily offenses.

Implication for Social Change

Serious physical damages and psychological effects have been reported associated with sexual violence (Autesserre, 2012; Baaz & Stern, 2011; Casey et al., 2011; Hall et al., 2014; Kasangye et al., 2014). In this study, four validated models will be incorporated to measure the relationship between physical health effects, mental health effects, and social health effects characteristics and chronic pain and depression experience among women victims of violent rapes in the conflict-affected eastern DRC. The findings from this investigation could fill the gaps in the literature on the relationship between the physical health effects variables, mental health effects variables, and social health effects variables and chronic pain and depression among violent sexual rape survivors in eastern DRC. Assessing the association between chronic pain and the impacts of violent rapes

among the victims in eastern DRC could contribute to advancing public health knowledge and understanding the association between demographic characteristics, physical, mental, and social health experience and chronic pain and depression experience among armed conflict-affect populations.

For positive social change implications, this study could serve as knowledge-base for health care providers, researchers, and health educators for reframing better strategies to promote and protect the physical, psychological, and social health of the populations in armed conflict settings, especially the women, girls, and children who are the most vulnerable to violent sexual rape. As humanitarians and activists, including medical, health policy and public health officials, aid organizations, peacekeeping missions, and government and non-governmental organizations continue to seek answer to complex emergencies in armed conflicts, this study could help in identifying public health priorities, and strategies useful for the reduction of the occurrence of violent sexual rapes in war and post war settings.

Due to the distinct and extreme nature of violent sexual rapes in eastern DRC, this study could provide more helpful information on the impacts of violent sexual rapes in designing new approaches for addressing physical, mental, and social health effects and the suffering of vulnerable populations in armed conflict zones. If basic health care could be restored, violent sexual rapes prevented, priorities identified, and human catastrophe prevention strategies established, local populations (individuals, families, and communities) would benefit in terms of improved quality of life, including improved

physical, mental, and social health status, stability in families and communities, and improved socioeconomic status.

Conclusion

This study was intended to investigate the impacts of sexual violence-related physical, psychological and social health impacts in eastern DRC, and the influence of those health impacts on chronic pain and depression among the victims. The chief reason of undertaking this research was the international outcry about the targeted killings, the extreme violence, and the application of and widespread rape against men, women, girls and children as a weapon of war in the Congo. Twenty-two years since the war broke out in eastern DRC, more than 12 million people have died, nearly 2 million women have been raped by August 2011 (Peterman et al., 2011) and the country is counting by millions the number of malnourished children for the first time since the country became independent in 1960. The populations in the entire country are still in the darkness about why life has been that cruel in a state that has made other countries prosper. The focus of this study was inspired by the systematic sexual rape and the extreme violence against women, men, girls, and children in the DRC. The systematic violence in DRC has been used as a tool to destroy the society, intimidate and control the men, to dominate and conquer lands rich for mining and looting of precious resources. The strategy also included the application of the politics of death and corruption from the highest institutions, which aimed at accelerating the collapse of the country's vital governing institutions as well as the legal, education, economic, and healthcare systems.

To understand the impacts of violent rape in eastern DRC, this study focused on investigating the association between physical, psychological and social health effects and the experience of chronic pain and depression violent among the women survivors of sexual rape in eastern DRC. Most women victim of rape sustained serious injuries during violent rape and gang rape, or sometimes by introducing hard subjects, including sharp wood, broken bottle, raffle nose, or by stirring sharp knife into their vagina after raping them. The study revealed that physical health factors (rectovaginal fistula and other sexual rape-related injuries) were linked to the experience of chronic pain and depression among the rape survivors. The psychological health factors (including PTSD and felling of worthless feeling) were also revealed to be linked to chronic pain and depression experience. Further, social health effects (social rejection and social support from family/friend) were also found associated to the experience of chronic pain among the same population.

These findings imply the need for stronger institutions that will restore the rule of law, assure peace, fight corruption, secure the country's resources, promote economic growth, and protect the people, particularly the most vulnerable groups of populations. The findings also imply a dire need of improved healthcare system to assure the basic health of the country's citizens, through the restoration of improved education systems to produce well trained health care providers, to promote health and nutritional education for disease prevention. A task force is needed to study new strategies for addressing the country's overwhelming mortality rate, by verbalizing the physical, psychological, and

social health determinants, and acknowledging the factors that are leading to premature death and a continued high maternal and mortality rate among the population.

Lastly, health professional need to look at the situation of the DRC as a global health emergency that requires global health attention. Understanding the life of a raped women in the DRC requires more understanding her daily life and not the strategies in a textbook on addressing sexual abuse. Generally, the timeframe for diagnosing a sexual abuse victim with depression or PTSD would be between 3 weeks to three months. In the DRC, regardless of how many years have passed since the rape event took place, a survivor of violent sexual rape (mass rape, rape with torture, rape with intent to destroy, rape with foreign sharp objects) is never forgotten, and women are living the nightmare daily. Their life is marked with fear, loss of trust, confusion, loss of belonging, loss of identity, and chronic mental condition. This is not a condition you find in a women victim of sexual abuse somewhere else. The work of those already striving to save lives needs to be encouraged and supported by all possible means, but the country's institutions need to open the doors to volunteer experts who are willing with good will to help in restoring out health system and share knowledge to improve the lives of Congolese people. The drastic condition of women in DRC requires drastic solution.

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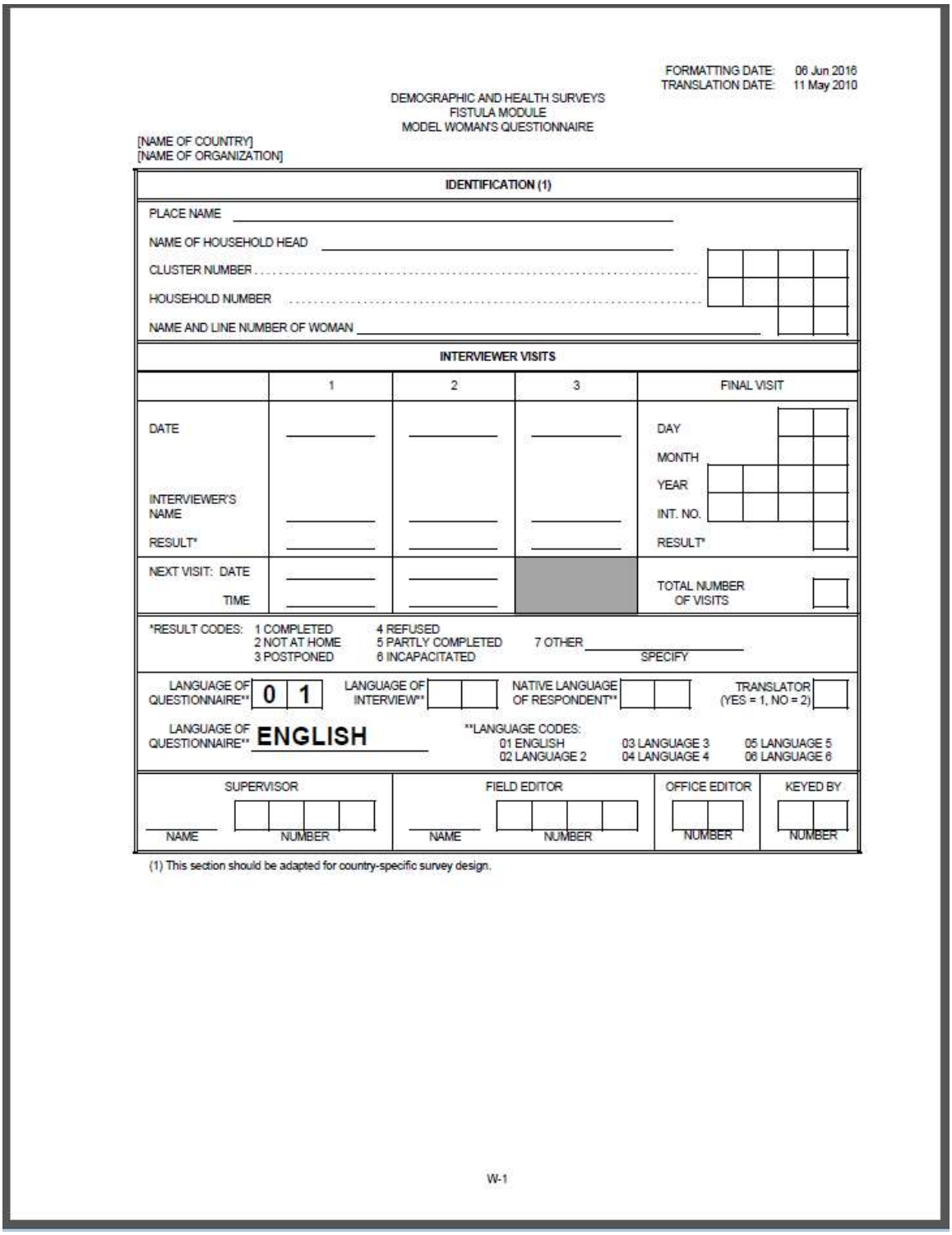
Appendices

Appendix A: Demographic and Health Survey Fistula Module (DHS-7 Module-Fistula)



FORMATTING DATE: 06 Jun 2016
TRANSLATION DATE: 11 May 2010

DEMOGRAPHIC AND HEALTH SURVEYS
FISTULA MODULE
MODEL WOMAN'S QUESTIONNAIRE

[NAME OF COUNTRY]
[NAME OF ORGANIZATION]

IDENTIFICATION (1)

PLACE NAME _____

NAME OF HOUSEHOLD HEAD _____

CLUSTER NUMBER .....

HOUSEHOLD NUMBER .....

NAME AND LINE NUMBER OF WOMAN _____

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
DATE				DAY / MONTH / YEAR
INTERVIEWER'S NAME				INT. NO.
RESULT*				RESULT*
NEXT VISIT: DATE / TIME				TOTAL NUMBER OF VISITS

*RESULT CODES: 1 COMPLETED; 2 NOT AT HOME; 3 POSTPONED; 4 REFUSED; 5 PARTLY COMPLETED; 6 INCAPACITATED; 7 OTHER _____ SPECIFY

LANGUAGE OF QUESTIONNAIRE** 0 1 | LANGUAGE OF INTERVIEW** | NATIVE LANGUAGE OF RESPONDENT** | TRANSLATOR (YES = 1, NO = 2)

LANGUAGE OF QUESTIONNAIRE** ENGLISH

**LANGUAGE CODES:
01 ENGLISH; 02 LANGUAGE 2; 03 LANGUAGE 3; 04 LANGUAGE 4; 05 LANGUAGE 5; 06 LANGUAGE 6

SUPERVISOR		FIELD EDITOR		OFFICE EDITOR	KEYED BY
NAME	NUMBER	NAME	NUMBER	NUMBER	NUMBER

(1) This section should be adapted for country-specific survey design.

W-1

FISTULA

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
F1	Sometimes a woman can have a problem of constant leakage of urine or stool from her vagina during the day and night. This problem usually occurs after a difficult childbirth, but may also occur after a sexual assault or after pelvic surgery. Have you ever experienced a constant leakage of urine or stool from your vagina during the day and night?	YES ..... 1 NO 2	→ F3
F2	Have you ever heard of this problem?	YES ..... 1 NO 2	→ NEXT SEC.
F3	Did this problem start after you delivered a baby or had a stillbirth?	AFTER DELIVERED BABY ..... 1 AFTER HAD STILLBIRTH ..... 2 NEITHER 3	→ F5
F4	Did this problem start after a normal labor and delivery, or after a very difficult labor and delivery?	NORMAL LABOR/DELIVERY ..... 1 VERY DIFFICULT LABOR/DELIVERY 2	→ F6
F5	What do you think caused this problem?	SEXUAL ASSAULT ..... 1 PELVIC SURGERY ..... 2 OTHER _____ 6 (SPECIFY) DON'T KNOW 8	→ F7
F6	How many days after (CAUSE OF PROBLEM FROM F3 OR F5) did the leakage start? ENTER '90' IF 90 DAYS OR MORE.	NUMBER OF DAYS AFTER DELIVERY/OTHER EVENT ..... [ ][ ]	
F7	Have you sought treatment for this condition?	YES ..... 1 NO 2	→ F9
F8	Why have you not sought treatment? PROBE AND RECORD ALL MENTIONED.	DO NOT KNOW CAN BE FIXED ..... A DO NOT KNOW WHERE TO GO ..... B TOO EXPENSIVE ..... C TOO FAR ..... D POOR QUALITY OF CARE ..... E COULD NOT GET PERMISSION ..... F EMBARRASSMENT ..... G PROBLEM DISAPPEARED ..... H OTHER _____ X (SPECIFY)	→ NEXT SEC.
F9	From whom did you last seek treatment?	**HEALTH PROFESSIONAL** DOCTOR ..... 1 NURSE/MIDWIFE ..... 2 **OTHER PERSON** COMMUNITY/VILLAGE HEALTH WORKER ..... 3 OTHER _____ 6 (SPECIFY)	
F10	Did you have an operation to fix the problem?	YES ..... 1 NO 2	
F11	Did the treatment stop the leakage completely? IF NO: Did the treatment reduce the leakage?	YES, STOPPED COMPLETELY ..... 1 NOT STOPPED BUT REDUCED ..... 2 NOT STOPPED AT ALL ..... 3 DID NOT RECEIVE TREATMENT 4	

Appendix B: Demographic Health Survey Fistula Module (French Version)

FORMATTING DATE: 06 juin 2016
FRANÇAIS LANGUAGE: 11 mai 2010

ENQUÊTE DÉMOGRAPHIQUE ET DE SANTÉ
MODULE FISTULE
QUESTIONNAIRE STANDARD FEMME

[NOM DU PAYS]
[NOM DE L'ORGANISATION]

IDENTIFICATION (1)

NOM DE LA LOCALITÉ _____

NOM DU CHEF DE MÉNAGE _____

NUMÉRO DE GRAPPE ..... | | | | |

NUMÉRO DE MÉNAGE ..... | | | | |

NOM ET NUMÉRO DE LIGNE DE LA FEMME _____ | | |

VISITES D'ENQUÊTRICES

	1	2	3	VISITE FINALE
DATE	_____	_____	_____	JOUR | | MOIS | | ANNÉE | | | |
NOM DE L'ENQUÊTRICE	_____	_____	_____	No ENQUÊT | | | |
RÉSULTAT*	_____	_____	_____	RÉSULTAT* | |
PROCHAINE DATE VISITE	_____	_____		NOMBRE TOTAL DE VISITES | |
HEURE	_____	_____		

*CODES RÉSULTAT :
1 COMPLÉTÉ
2 PAS À LA MAISON
3 DIFFÉRÉ
4 REFUSÉ
5 PARTIELLEMENT COMPLÉTÉ
6 INCAPACITÉ
7 AUTRE _____ PRÉCISEZ

LANGUE DU QUESTIONNAIRE** 0 1 | LANGUE DE L'INTERVIEW** | | LANGUE MATERNELLE DE L'ENQUÊTÉE** | | TRADUCTEUR (OUI = 1, NON = 2) |

LANGUE DU QUESTIONNAIRE** FRANÇAIS

**CODES LANGUES :
01 FRANÇAIS
02 LANGUE 2
03 LANGUE 3
04 LANGUE 4
05 LANGUE 5
06 LANGUE 6

CHEF D'ÉQUIPE		CONTRÔLEUSE		CONTRÔLE BUREAU	SAISI PAR
NOM	NUMÉRO	NOM	NUMÉRO	NUMÉRO	NUMÉRO

(1) Cette section doit être adaptée selon le plan de l'enquête spécifique au pays.

FISTULE

No.	QUESTIONS ET FILTRES	CODES	PASSEZ À
F1	Les femmes peuvent parfois avoir, en permanence, le jour et la nuit, un problème de pertes urinaires ou fécales par le vagin. Ce problème survient généralement à la suite d'un accouchement difficile, mais il peut aussi se produire après une agression sexuelle ou après une opération du pelvis. Avez-vous déjà eu, en permanence, durant le jour et la nuit, des pertes urinaires ou fécales par le vagin ?	OUI ..... 1 NON 2	→ F3
F2	Avez-vous déjà entendu parler de ce problème ?	OUI ..... 1 NON 2	→ SEC. SUIV.
F3	Est-ce-que ce problème a commencé après un accouchement ou une fausse-couche ?	APRÈS UN ACCOUCHEMENT ..... 1 APRÈS UNE FAUSSE-COUCHE ..... 2 NI L'UN NI L'AUTRE 3	→ F5
F4	Est-ce que ce problème a commencé après un travail et un accouchement normaux ou après un travail et un accouchement très difficiles ?	TRAVAIL/ACCOUCHEM. NORMAL ..... 1 ACCOUCHEM. TRÈS DIFFICILE 2	→ F6
F5	Selon vous, qu'est-ce qui a causé ce problème ?	AGRESSION SEXUELLE ..... 1 OPÉRATION DU PELVIS ..... 2 AUTRE _____ 6 (SPECIFY) NE SAIT PAS 8	→ F7
F6	Combien de jours après (CAUSE DU PROBLÈME DE F3 OU F5) les pertes ont-elles commencé ? INSCRIVEZ 90 SI 90 JOURS OU PLUS.	NOMBRE DE JOURS APRÈS ACCOUCH/AUTRE ÉVÈNEM. ..... [ ][ ]	
F7	Avez-vous recherché un traitement pour ce problème ?	OUI ..... 1 NON 2	→ F9
F8	Pourquoi n'avez-vous pas recherché de traitement ? INSISTEZ ET ENREGISTREZ TOUT CE QUI EST MENTIONNÉ.	NE SAVAIT PAS QU'ON POUVAIT RÉPARER ..... A NE SAVAIT PAS OÙ ALLER ..... B TROP CHER ..... C TROP ÉLOIGNÉ ..... D MAUVAISE QUALITÉ DES SOINS ..... E N'A PAS PU OBTENIR PERMISSION ..... F GÊNÉE ..... G PROBLÈME A DISPARU ..... H AUTRE _____ X (PRÉCISEZ)	→ SEC. SUIV.

FISTULE

No.	QUESTIONS ET FILTRES	CODES	PASSEZ À
F9	Auprès de qui avez-vous recherché un traitement en dernier ?	**PROFESSIONNEL DE SANTÉ** MÉDECIN ..... 1 INFIRMIÈRE/SAGE-FEMME ..... 2 **AUTRE PERSONNE** AGENT DE SANTÉ COMMUNAUTAIRE/ VILLAGEOISE ..... 3 AUTRE _____ 6 (PRÉCISEZ)	
F10	Avez-vous eu une opération pour résoudre le problème ?	OUI ..... 1 NON 2	
F11	Est-ce-que le traitement a stoppé complètement les pertes ? SI NON : Est-ce que le traitement à réduit les pertes ?	OUI, PERTES STOPPÉES COMPLÈTEMENT ..... 1 PERTES NON STOPPÉES MAIS RÉDUITES ..... 2 PERTES PAS STOPPÉES DU TOUT ..... 3 N'A PAS REÇU DE TRAITEMENT 4	

Appendix C: Use Permission Statement - DHS7- Fistula Module Questionnaire

Statement from Benoit Mirindi, Author Dissertation.

Please note that the DHS7 – Fistula Module Questionnaire, and all the survey tools published by the Demographic Health Survey are publicly funded documents that available to the public without charge. I was advised by a Demographic Health Survey organization official that I did not need to request for a permission to use the DHS7-Fistula Module Questionnaire.

Appendix D: Measuring Conflict Exposure in Micro-Level Surveys (LSMS) – Section D

Section D: harm and health (Unit of Analysis: Household level)

	D1	D2	D3	D4	D5		D6	D7	D8
Code of respondent	**Do you consider** [type of abuse] **as violence?** *(MULTIPLE ANSWERS)*	**Have people in your household experienced any of the following?** *(MULTIPLE ANSWERS)*	**Who was the person experiencing the harm?** *(ENTER CODE OF HOUSEHOLD MEMBER; (MULTIPLE ANSWERS)* RA....99)	**Please specify if the referred person was part of a warring faction when harm was inflicted.**	**When was the harm inflicted for the first time?**		**Where did the incident occur?**	**Code for Perpetrator** *(SPECIFY IN CONTEXT)*	**Has the referred person suffered from any physical or psychological illness of prolonged nature or death, or any afflictions due to the experiences described?**
	Physical.....1 Verbal.....2 Psychological.3 Sexual.....4 Refuse to answer.....99	No (if no, skip to E1).....1 Was verbally threatened.....2 Was verbally insulted, but not threatened.....3 Was threatened with knife, gun or other type of weapon.....4 Was attacked with knife, gun or other type of weapon.....5 Was beaten/assaulted/kicked.....6 Was strangled or burned.....7 Was injured or killed in gun shootings.....8 Was injured by a landmine/UXO.....9 Was physically forced to have sexual intercourse.....10 Was forced to perform other sexual acts the person did not want...11 Lost body parts.....12 Was forced to labour.....13 Was robbed.....14 Was kidnapped/abducted.....15 Was extorted for money or other goods.....16 Don't know.....77 Others.....99		Yes....1 No.....2	Month	Year	On the battlefield/in a combat operation.....1 At home.....2 In a refugee camp.....3 In the neighbourhood....4 At work (if other than home and not military service).....5 During transit (e.g. migration).....6 Other location.....7 Don't know.....77 Refuse to answer.....99	Government army soldiers/military..1 Rebel group.....2 Militia members.....3 Bandits/criminals...4 Neighbour(s).....5 Household member(s).6 Foreigner(s).....7 Stranger(s).....8 Other(s).....9 Don't know.....77 Refuse to answer...99	Yes, illness of prolonged nature.....1 Yes, injury.....2 Yes, handicap.....3 Yes, psychological distress.....4 Yes, immediate death.5 Yes, death in hospital.....6 Yes, death after discharge from hospital.....7 Yes, other.....8 No.....9 Don't know.....77 Refuse to answer....99
		1. ⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋
		2. ⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋
⌊__⌋	⌊__⌋	3. ⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋	⌊__⌋

Appendix E: Measuring Conflict Exposure in Micro-Level Surveys (LSMS) (French)

French.

Pour recueillir des données, la question de recherche sera abordée à l'aide de l'instrument: Étude de mesure standard de vie (LSMS) - Mesure de l'exposition aux conflits dans une enquête de micro-niveau Section D.

La variable spécifique: l'expérience de la fistule sera traitée en utilisant les questions de la section D de l'instrument:

Instruction : Un code numérique sera utilisé pour enregistrer la réponse. Les participants devront choisir le code numérique ou le choix de réponses qu'ils identifient.

Questions:

QD1. Considérez-vous ce genre de viol comme (MULTIPLE ANSWERS)?
(1) physique, (2) Verbal, (3) Psychologique, (4) sexuelle, (99) Ne sais pas

QD2. Les personnes de votre ménage ont-t-elles connu l'une des situations suivantes? (PLUSIEURS REPONSES)

Non (si non, passez à E1) 1
A été verbalement menacé 2
A été verbalement insulté, mais pas Menacé 3
A été menacé de couteau, d'arme ou Autre type d'arme 4
A été attaqué avec un couteau, un fusil ou Autre type d'arme 5
A été battu / assailli / expulsé 6
A été étranglé ou brûlé 7
A été blessé ou tué dans un pistolet Tournages 8
A été blessé par une mine terrestre / UXO 9
Était physiquement forcé d'avoir Rapports sexuels 10
A été obligé d'effectuer d'autres manifestations sexuelles
Actes que la personne ne voulait pas 11
Pièces perdues du corps 12
A été obligé de travailler 13
A été volé 14
A été enlevé / enlevé 15
A été extorqué pour de l'argent ou autre Marchandises 16
Ne sait pas 77
Autres 99

QD3. Qui était la personne qui éprouvait le mal? (ENTRER LE CODE DU MEMBRE MÉNAGE (PLUSIEURS REPONSES) RA 99

QD4. As-tu souffert des maladies physiques internes de nature courte ou prolongée survenues après votre l'expérience de viol décrite-ci haut ? Yes....1; No.....2

QD5. Quand est-ce que l'on vous a blessé pour la première fois (Mois___/Année__/)?

QD6. Où est-ce que l'incident avait eu lieu?

Sur le champ de bataille/dans une opération de combat 1
À la maison 2
Dans un camp de réfugiés 3

Dans le quartier 4
Au travail (si autre qu'à la maison et non militaire service)……..5
Pendant le transit (Par exemple, la migration) 6
Autre emplacement 7
Ne sait pas 77
Refuse de répondre 99

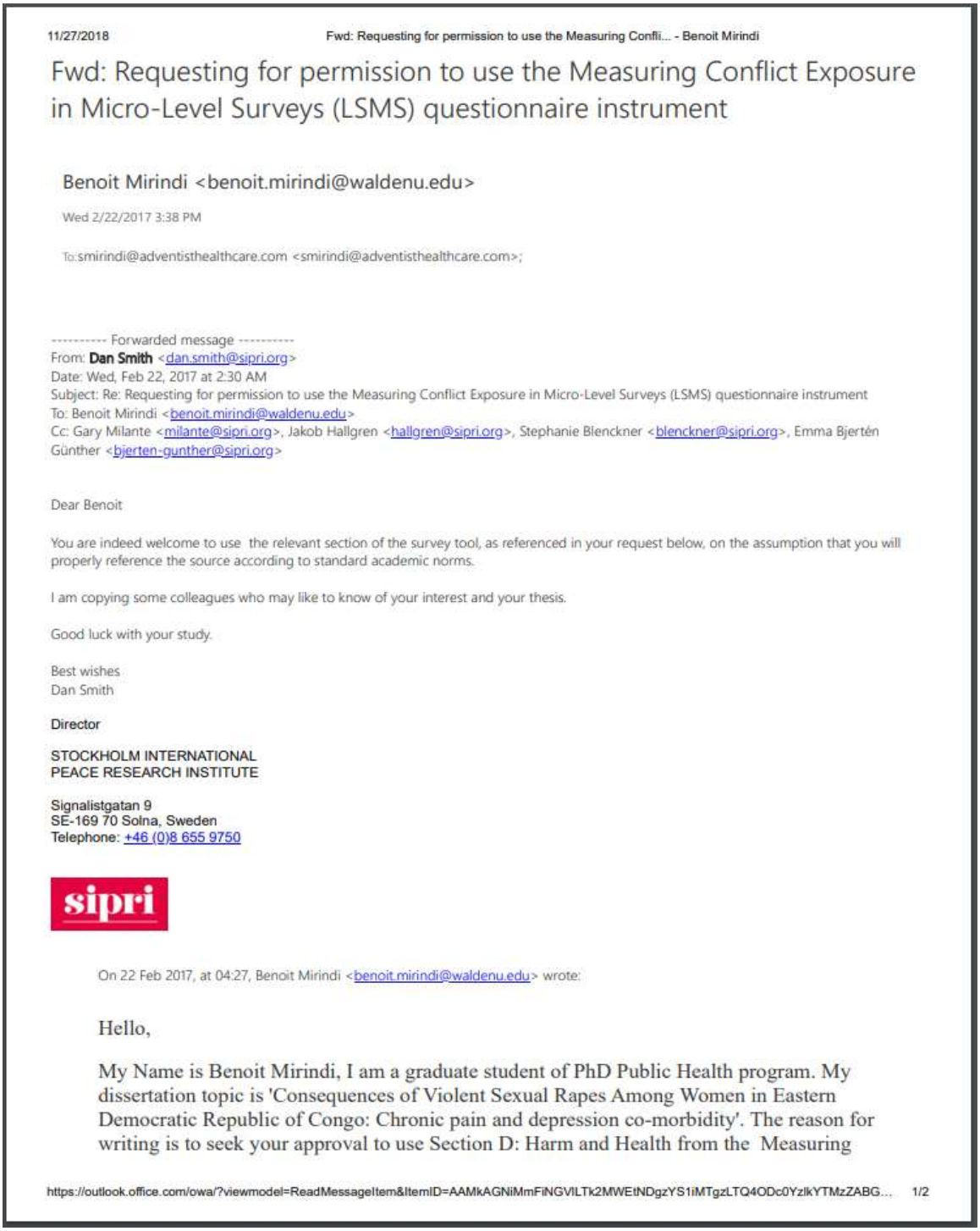
QD7. Code pour l'auteur (PRÉCISER EN CONTEXTE).

Armée gouvernementale - Soldats/militaires 1
Rebel group 2
Membres de la milice 3
Bandits / criminels 4
Voisin (s) 5
Membre (s) du ménage (s) ……..…….6
Étranger (s) ..... ……..……..7
Étranger (s) 8
Autre (s) 9
Ne sait pas 77
Refuse de répondre 99

QD8. La personne visée a-t-elle souffert d'une maladie physique ou psychologique de nature prolongée ou de décès, ou de toute affliction due aux expériences décrites?

Oui, maladie de nature prolongée 1
Oui, blessure 2
Oui, handicap 3
Oui, psychologique détresse 4
Oui, mort immédiate……..…….....5
Oui, mort en Hôpital 6
Oui, décès après Décharge de Hôpital 7
Oui, autre 8
Non 9
Ne sait pas 77
Refuse de répondre ……..……99

Appendix F: Use Permission Approval – Measuring Conflict Exposure in Micro-Level Surveys (LSMS) Questionnaire Instrument



11/27/2018 Fwd: Requesting for permission to use the Measuring Confli... - Benoit Mirindi

Fwd: Requesting for permission to use the Measuring Conflict Exposure in Micro-Level Surveys (LSMS) questionnaire instrument

Benoit Mirindi <benoit.mirindi@waldenu.edu>

Wed 2/22/2017 3:38 PM

To: smirindi@adventisthealthcare.com <smirindi@adventisthealthcare.com>;

---------- Forwarded message ----------
From: **Dan Smith** <dan.smith@sipri.org>
Date: Wed, Feb 22, 2017 at 2:30 AM
Subject: Re: Requesting for permission to use the Measuring Conflict Exposure in Micro-Level Surveys (LSMS) questionnaire instrument
To: Benoit Mirindi <benoit.mirindi@waldenu.edu>
Cc: Gary Milante <milante@sipri.org>, Jakob Hallgren <hallgren@sipri.org>, Stephanie Blenckner <blenckner@sipri.org>, Emma Bjertén Günther <bjerten-gunther@sipri.org>

Dear Benoit

You are indeed welcome to use the relevant section of the survey tool, as referenced in your request below, on the assumption that you will properly reference the source according to standard academic norms.

I am copying some colleagues who may like to know of your interest and your thesis.

Good luck with your study.

Best wishes
Dan Smith

Director

STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE

Signalistgatan 9
SE-169 70 Solna, Sweden
Telephone: +46 (0)8 655 9750

sipri

On 22 Feb 2017, at 04:27, Benoit Mirindi <benoit.mirindi@waldenu.edu> wrote:

Hello,

My Name is Benoit Mirindi, I am a graduate student of PhD Public Health program. My dissertation topic is 'Consequences of Violent Sexual Rapes Among Women in Eastern Democratic Republic of Congo: Chronic pain and depression co-morbidity'. The reason for writing is to seek your approval to use Section D: Harm and Health from the Measuring

https://outlook.office.com/owa/?viewmodel=ReadMessageItem&ItemID=AAMkAGNiMmFiNGVlLTk2MWEtNDgzYS1iMTgzLTQ4ODc0YzlkYTMzZABG... 1/2

Conflict Exposure in Micro-Level Surveys (LSMS) questionnaire by Bruck, T. Justino, P., Werwimp, P. and Tedesco, A. (2013).

My target population include the survivors of violent sexual rape in eastern DRC within the city of Bukavu and its suburbs. I have received oral support from Dr. Denis Mukwege of Panzi Hospital in Eastern DRC City of Bukavu.

Your approval is critical because it will allow me to gain approval of the Independent Review Board for my study to move forward. The results from this study will add to the body of knowledge about the chronic pain and depression comorbidity among violent sexual survivors in armed conflict settings among the target population.

I pledge honesty, integrity and truthfulness as well as ethical considerations in using Section D of this important tool.

In addition to using Section D of the LSMS tool, I will also be using the McGill Pain Questionnaire (Melzak, 2005)to analyze the characteristics of Chronic Pain, the Beck Depression Inventory (BDI) (Beck et al. 1961) to evaluate the level of depression experienced by the sexual rape survivors in Eastern DRC, and the Impact Event Scale - Revised (IES-R) (Weiss & Marmar, 1997).

Would you kindly, please, grant me authorization to use just Section D of the SLMS questionnaire tool.

Your response and approval will be greatly appreciated.

Very Respectfully,

Benoit M. Mirindi, MPH, MPA.
Public Health Analyst
DHHS/HRSA/OFAM
HIV/AIDS and Rural Health Branch
5600 Fishers Lane
Rockville, MD 21702
301.443.6606 - P, 301.443.6343 - F
bmirindi@hrsa.gov; benoit.mirindi@waldenu.edu

Appendix G: MOS Social Support Survey Instrument (with Public Use Information)

MOS Social Support Survey Instrument
Social Support Survey Resources

People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it? Choose one number from each line.

Response Codes:

1 = None of the time
2 = A little of the time
3 = Some of the time
4 = Most of the time
5 = All of the time

Emotional/informational support	
Someone you can count on to listen to you when you need to talk	1 2 3 4 5
Someone to give you information to help you understand a situation	1 2 3 4 5
Someone to give you good advice about a crisis	1 2 3 4 5
Someone to confide in or talk to about yourself or your problems	1 2 3 4 5
Someone whose advice you really want	1 2 3 4 5
Someone to share your most private worries and fears with	1 2 3 4 5
Someone to turn to for suggestions about how to deal with a personal problem	1 2 3 4 5
Someone who understands your problems	1 2 3 4 5
Tangible support	
Someone to help you if you were confined to bed	1 2 3 4 5
Someone to take you to the doctor if you needed it	1 2 3 4 5
Someone to prepare your meals if you were unable to do it yourself	1 2 3 4 5
Someone to help with daily chores if you were sick	1 2 3 4 5
Affectionate support	
Someone who shows you love and affection	1 2 3 4 5
Someone to love and make you feel wanted	1 2 3 4 5
Someone who hugs you	1 2 3 4 5
Positive social interaction	
Someone to have a good time with	1 2 3 4 5
Someone to get together with for relaxation	1 2 3 4 5
Someone to do something enjoyable with	1 2 3 4 5
Additional item	
Someone to do things with to help you get your mind off things	1 2 3 4 5

Social Support Survey Instrument Scoring Instructions

How to Score the Survey

The survey consists of four separate social support subscales and an overall functional social support index. A higher score for an individual scale or for the overall support index indicates more support.

- To obtain a score for each subscale, calculate the average of the scores for each item in the subscale.
- To obtain an overall support index, calculate the average of (1) the scores for all 18 items included in the four subscales, and (2) the score for the one additional item (see last item in the survey).
- To compare to published means in the article referenced below, scale scores can be transformed to a 0-100 scale using the following formula: 100 x ((observed score - minimum possible score) / (maximum possible score - minimum possible score))

Related Reading
The MOS Social Support Survey — 1993

Cathy D. Sherbourne, Anita Stewart

This paper describes the development and evaluation of a brief, multidimensional, self-administered, social support survey that was developed for patients in the Medical Outcomes Study (MOS), a two-year survey that was developed for patients with chronic conditions.

Permissions Information
All of the surveys from RAND Health are public documents, available without charge.

Translations
If you are interested in translating any surveys into another language, ensure to follow our translation guidelines. Email us at RAND_Health@rand.org

Statement from Benoit Mirindi, Author Dissertation.

Please note that the MOS – Social Support Survey tool and all surveys from RAND Health are public and available to public without charge.

Appendix H: MOS Social Support Survey - French

Social Support Survey – FRENCH
(FRENCH)
Instrument d'enquête sur le soutien social MOS
Ressources du sondage sur le soutien social

Les gens regardent parfois les autres pour la compagnie, l'assistance ou d'autres types de soutien. À quelle fréquence chacun des types de support suivants est-il disponible si vous en avez besoin? Choisissez un numéro de chaque ligne.

Codes de réponse:

1 = Jamais
2 = Rarement
3 = Quelques fois
4 = La plupart des fois
5 = Tous les temps

Soutien émotionnel / informationnel

Quelqu'un avec lequel vous pouvez compter vous écouter quand vous avez besoin de parler
1 2 3 4 5
Quelqu'un pour vous donner des informations pour vous aider à comprendre une situation1
1 2 3 4 5
Quelqu'un pour vous donner de bons conseils sur une crise
1 2 3 4 5
Quelqu'un pour se confier ou parler à propos de vous ou de vos problèmes
1 2 3 4 5
Quelqu'un dont vous avez vraiment envie
1 2 3 4 5
Quelqu'un pour partager vos soucis et vos peurs les plus privés avec
1 2 3 4 5
À qui s'adresser pour des suggestions sur la façon de traiter un problème personnel
1 2 3 4 5
Quelqu'un qui comprend vos problèmes
1 2 3 4 5

Support tangible

Quelqu'un pour vous aider si vous avez été confiné au lit
1 2 3 4 5
Quelqu'un pour vous emmener chez le médecin si vous en avez besoin
1 2 3 4 5
Quelqu'un pour préparer vos repas si vous ne pouviez pas le faire vous-même
1 2 3 4 5
Quelqu'un pour aider les tâches quotidiennes si vous étiez malade
1 2 3 4 5

Support Affectioné
Quelqu'un qui vous montre l'amour et l'affection
1 2 3 4 5
Quelqu'un à aimer et à vous faire sentir voulu
1 2 3 4 5
Quelqu'un qui t'embrasse
1 2 3 4 5

Interaction sociale positive
Quelqu'un pour passer un bon moment avec
1 2 3 4 5
Quelqu'un pour se réunir pour la détente
1 2 3 4 5
Quelqu'un pour faire quelque chose de plaisir avec
1 2 3 4 5

Article supplémentaire
Quelqu'un pour faire les choses avec pour vous aider à sortir votre esprit des choses
1 2 3 4 5

Enquête sur le soutien social - Instructions pour la notation des réponses

Comment marquer l'enquête

Le sondage comprend quatre sous-échelles de soutien social distinctes et un indice général de soutien social fonctionnel. Un score plus élevé pour une échelle individuelle ou pour l'indice global de soutien indique plus de soutien.

- Pour obtenir un score pour chaque sous-échelle, calculez la moyenne des scores pour chaque élément dans la sous-échelle.
- Pour obtenir un indice de soutien global, calculez la moyenne de (1) les scores pour les 18 éléments inclus dans les quatre sous-échelles, et (2) le score pour l'élément supplémentaire (voir dernier article dans l'enquête).
- Pour comparer aux moyens publiés dans l'article ci-dessous, les scores de l'échelle peuvent être transformés en une échelle 0-100 en utilisant la formule suivante: 100 x ((score observé - score minimum possible) / (score maximal possible - score minimum possible))

Lecture connexe
L'Enquête de soutien social MOS – 1993
Cathy D. Sherbourne, Anita Stewart

Cet article décrit le développement et l'évaluation d'un sondage sur le soutien social, multidimensionnel, auto-administré, qui a été développé pour les patients dans l'étude des résultats médicaux (MOS), un sondage de deux ans qui a été développé pour les patients souffrant de maladies chroniques.

Informations sur les autorisations
Toutes les enquêtes de RAND Health sont des documents publics, disponibles sans frais.

Traductions
Si vous souhaitez traduire des enquêtes dans une autre langue, assurez-vous de suivre nos directives de traduction. Envoyez-nous un courrier à RAND_Health@rand.org

Appendix I: Positive Affect and Negative Affect Scale – Extended Form (PANA-X)

I. The Hierarchical Structure of Self-Rated Affect

In recent research, two broad, general factors--typically labeled Positive Affect (PA) and Negative Affect (NA)--have emerged reliably as the dominant dimensions of emotional experience. These factors have been identified in both intra- and interindividual analyses, and they emerge consistently across diverse descriptor sets, time frames, response formats, languages, and cultures (Almagor & Ben-Porath, 1989; Mayer & Gaschke, 1988; Meyer & Shack, 1989; Tellegen, 1985; Watson, 1988b; Watson, Clark, & Tellegen, 1984; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). To measure these factors, Watson, Clark, and Tellegen (1988) developed the Positive and Negative Affect Schedule (PANAS), which consists of two 10-item scales for PA and NA, respectively.

These two general dimensions account for most of the variance in self-rated affect--together they account for roughly one-half to three-quarters of the common variance in mood terms (see Watson, 1988b; Watson & Tellegen, 1985). Nevertheless, specific emotional states can also be identified in the same data. In fact, on the basis of earlier work by Tellegen , Watson and Tellegen (1985) proposed a hierarchical taxonomic scheme in which the two broad, higher order dimensions are each composed of several correlated, yet ultimately distinguishable affective states (see also Watson & Clark, 1989, 1992a). In this model, the higher level reflects the *valence* of the mood descriptors (i.e., whether they represent negative or positive states), whereas the lower level reflects their specific *content* (i.e., the distinctive qualities of the individual affects).

To assess these specific emotional states, we have created a 60-item, expanded version of the PANAS (the PANAS-X). In addition to the two original higher order scales, the PANAS-X measures 11 specific affects: Fear, Sadness, Guilt, Hostility, Shyness, Fatigue, Surprise, Joviality, Self-Assurance, Attentiveness, and Serenity. The PANAS-X thus provides for mood measurement at two different levels.

The PANAS-X is simple and easy to administer. Most subjects complete the entire 60-item schedule in 10 minutes or less. However, investigators facing more severe time constraints can select and assess only those scales that are most relevant to their research. A sample PANAS-X protocol is shown in Table 1. In addition, the terms comprising each of the PANAS-X scales are shown in Table 2.

The PANAS-X was created in three relatively distinct stages. As mentioned, the two higher order scales were developed first. Seven specific affect scales primarily involving

Table 1 *Sample* PANAS-X *Protocol Illustrating "Past Few Weeks" Time Instructions*

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers:

1 very slightly or not at all	2 a little	3 moderately	4 quite a bit	5 extremely
_____ cheerful	_____ sad	_____ active		_____ angry at self
_____ disgusted	_____ calm	_____ guilty		_____ enthusiastic
_____ attentive	_____ afraid	_____ joyful		_____ downhearted
_____ bashful	_____ tired	_____ nervous		_____ sheepish
_____ sluggish	_____ amazed	_____ lonely		_____ distressed
_____ daring	_____ shaky	_____ sleepy		_____ blameworthy
_____ surprised	_____ happy	_____ excited		_____ determined
_____ strong	_____ timid	_____ hostile		_____ frightened
_____ scornful	_____ alone	_____ proud		_____ astonished
_____ relaxed	_____ alert	_____ jittery		_____ interested
_____ irritable	_____ upset	_____ lively		_____ loathing
_____ delighted	_____ angry	_____ ashamed		_____ confident
_____ inspired	_____ bold	_____ at ease		_____ energetic
_____ fearless	_____ blue	_____ scared		_____ concentrating
_____ disgusted with self	_____ shy	_____ drowsy		_____ dissatisfied with self

Table 2 *Item Composition of the* PANAS-X *Scales*

General Dimension Scales	
Negative Affect (10)	afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, distressed
Positive Affect (10)	active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, strong
Basic Negative Emotion Scales	
Fear (6)	afraid, scared, frightened, nervous, jittery, shaky
Hostility (6)	angry, hostile, irritable, scornful, disgusted, loathing
Guilt (6)	guilty, ashamed, blameworthy, angry at self, disgusted with self, dissatisfied with self
Sadness (5)	sad, blue, downhearted, alone, lonely
Basic Positive Emotion Scales	
Joviality (8)	happy, joyful, delighted, cheerful, excited, enthusiastic, lively, energetic
Self-Assurance (6)	proud, strong, confident, bold, daring, fearless
Attentiveness (4)	alert, attentive, concentrating, determined
Other Affective States	
Shyness (4)	shy, bashful, sheepish, timid
Fatigue (4)	sleepy, tired, sluggish, drowsy
Serenity (3)	calm, relaxed, at ease
Surprise (3)	amazed, surprised, astonished

Note. The number of terms comprising each scale is shown in parentheses.

different negative affects were constructed next. Finally, four specific positive affect scales were created. In this manual, we recap briefly the development of the original PANAS scales, and present their basic reliability and validity data (the interested reader is referred to Watson et al., 1988, for more detail). We then describe the development of the specific affect (PANAS-X) scales, and present data supporting their reliability and validity. Finally, we discuss several important issues regarding the instrument as a whole.

II. The Higher Order Scales

A. Construction of the Original Positive and Negative Affect Scales

The goal in developing these scales was to create reliable and valid measures that were also brief and simple to administer. The primary concern was to select descriptors that were relatively pure markers of either Negative Affect or Positive Affect; that is, terms that had a substantial loading on one factor but a near-zero loading on the other. As a starting point, we used the 60 terms included in the factor analyses reported by Zevon and Tellegen (1982). Tellegen constructed this set from an initial pool of 117 affective words and phrases derived from the earlier studies of Izard (1972), Nowlis (1965), Zuckerman and Lubin (1965), and Ekman (1971). A principal components analysis of content sortings of this larger pool of items identified 20 synonym groups, and the final list of 60 terms was constructed by choosing three marker terms from each content group (see Zevon & Tellegen, 1982, Table 1). Thus, these terms provide a comprehensive assessment of the affective lexicon.

From this list of 60 terms we selected those descriptors that had an average loading of .40 or greater on the relevant factor across both the within- and between-subjects analyses reported in Zevon and Tellegen (1982). Twenty Positive Affect and 30 Negative Affect markers met this initial criterion. However, as noted previously, we were also concerned that the terms be relatively pure markers of a factor. We therefore specified that the terms not have a secondary loading of |.25| or greater in either analysis. This reduced the pool of candidate descriptors to 12 for Positive Affect and 25 for Negative Affect.

Preliminary reliability and validity analyses indicated that 10 terms were sufficient for the higher order Positive Affect scale. We therefore dropped two terms that had relatively higher secondary loadings on the Negative Affect factor, yielding the final set of 10 descriptors (shown in Table 2).

The 25 Negative Affect candidate terms included all 3 terms from seven of Tellegen's content categories, plus 2 from each of two others. Because we wanted to tap a broad range of content, we constructed a preliminary 14-item scale that included 2 terms from each of the seven complete triads. We found, however, that the terms from the Contempt and Revulsion content categories did not significantly enhance the reliability and validity of the scale. Moreover, these

Appendix J: Positive Affect and Negative Affect Scales – Extended PANAS-X - French

PANAS-X

Cette échelle comprend un certain nombre de mots et d'expressions qui décrivent différents sentiments et émotions. Lisez chaque élément, puis marquez la réponse appropriée dans l'espace à côté de ce mot. Indiquez dans quelle mesure vous avez ressenti de cette façon pendant (sélectionnez un temps). Utilisez l'échelle suivante pour enregistrer vos réponses:

1	2	3	4	5
très légèrement ou pas du tout	un peu	modérément	Suffisamment	extrêmement

_____ gai	_____ triste	_____ actif	_____ fâché contre soi-même
_____ dégoûté	_____ calme	_____ coupable	_____ enthousiaste
_____ attentionné	_____ effrayé	_____ joyeux	_____ découragé
_____ timide	_____ fatigué	_____ nerveux	_____ penaud
_____ paresseux	_____ étonné	_____ solitaire	_____ affligé
_____ audacieux	_____ tremblant	_____ endormi	_____ blâmable
_____ surpris	_____ heureux	_____ excité	_____ déterminé
_____ fort	_____ timide	_____ hostile	_____ effrayé
_____ méprisant	_____ seul	_____ fier	_____ étonné
_____ détendu	_____ alerte	_____ nerveux	_____ intéressé
_____ irritable	_____ contrarié	_____ vif	_____ dégoûtant
_____ enchanté	_____ fâché	_____ honteux	_____ confiant
_____ inspiré	_____ audacieux	_____ à l'aise	_____ énergique
_____ intrépide	_____ bleue	_____ effrayée	_____ se concentrer
_____ dégoûté avec soi-même	_____ timide	_____ somnolent	_____ insatisfait avec soi-même

Composition de l'article des balances PANAS-X

Echelles de dimensions générales

Affect négatif (10): effrayé, effrayé, nerveux, nerveux, irritable, hostile, coupable, honteux, bouleversé, angoissé

Affect positif (10): actif, alerte, attentif, déterminé, enthousiaste, excité, inspiré, intéressé, fier, fort

Échelles d'émotions négatives de base

Peur (6): peur, peur, peur, nervosité, nervosité, tremblement

Hostilité (6): fâché, hostile, irritable, méprisant, dégoûté, dégoûtant

Culpabilité (6): coupable, honteuse, blâmable, fâchée contre elle-même, dégoûtée de soi, insatisfaite de soi

Tristesse (5): triste, bleu, découragé, seul, solitaire

Échelles d'émotion positive de base

Jovialité (8):	joyeux, joyeux, ravi, joyeux, excité, enthousiaste, vif, énergique
Auto-assurance (6):	fier, fort, confiant, audacieux, audacieux, intrépide
Attention (4):	vigilant, attentif, concentré, déterminé

Autres états affectifs

Timidité (4):	timide, pudique, penaud, timide
Fatigue (4):	endormie, fatiguée, léthargique, somnolente
Sérénité (3):	calme, détendu, à l'aise
Surprise (3):	émerveillée, surprise, étonnée

Remarque:
Le nombre de termes comprenant chaque échelle est indiqué entre parenthèses. Pour marquer une échelle, additionnez les réponses aux éléments de cette échelle.

Appendix K: Permission for use requirement – Positive Affect and Negative Affect Scale – Extended (PANAS-X)

Fwd: Requesting for permission to use the PANAS in my dissertation

Ben Mirindi <bmirindi@gmail.com>

Thu 12/7/2017 5:14 PM

To:Benoit M. Mirindi <benoit.mirindi@waldenu.edu>;

2 attachments (2 MB)

French PANAS (MAPI).doc; DBW-LAC84_JapaneseStrucMood_JPSP.pdf;

---------- Forwarded message ----------
From: <la.clark@nd.edu>
Date: Mon, Dec 4, 2017 at 10:54 PM
Subject: Re: Requesting for permission to use the PANAS in my dissertation
To: Ben Mirindi <bmirindi@gmail.com>
Cc: David Watson <db.watson@nd.edu>, Karen Thomas <kthomas@apa.org>

Hello and thanks for your interest in using the PANAS in your dissertation research.

I am pleased to grant you permission to use the PANAS in your research. Please note that to use the PANAS, you need both our permission and the permission of the American Psychological Association (APA), which is the official copyright holder of the instrument. Because I am copying this email to APA, however, you do not have to request permission separately from APA; this single e-mail constitutes official approval from both parties.

We make the PANAS available without charge for non-commercial purposes. We do require that all versions of the PANAS include a full citation and copyright information. Thus, any copies, including electronic copies should state:

"From "Development and validation of brief measures of positive and negative affect: The PANAS scales," by D. Watson, L. A. Clark, and A. Tellegen, 1988, Journal of Personality and Social Psychology, 54, 1063-1070. Copyright © 1988 by the American Psychological Association. Reproduced with permission. No further reproduction or distribution is permitted without written permission from the American Psychological Association."

Also, this permission does not extend beyond you and your immediate research group. That is, others who wish to use the instrument must request permission for themselves.

Finally, please note that we do not authorize translations of the PANAS. This does not mean that you cannot translate the instrument. However, you should refer to any translation you make as being "based on the PANAS", rather than calling it the "Kituba PANAS" or the something similar that might suggest that it is an official authorized translation. I understand that French is the official of the Republic of Congo. The PANAS has been translated into French, and I've attached that translation.

The reason that we do not authorize translations is that we do not have the resources or expertise to evaluate translations, particularly of mood terms, which may vary considerably across languages. Thus, if you plan to assess mood in a language other than English using the original PANAS or French using the attached translation, we recommend that rather than direct translation, you follow a procedure such as that described in the attached article.

LAC

Lee Anna Clark, Ph.D.
Chair, Department of Psychology
114 Haggar Hall 574-631-4515 (tel.)
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St. Francis' for the 21st century: Please grant me
the serenity to accept the things I cannot change and
the courage to change the things I cannot accept.

On Dec 3, 2017, at 3:02 PM, Ben Mirindi <bmirindi@gmail.com> wrote:

Good Morning,

My name is Benoit Mirindi, and Doctoral (PhD) student of Public Health - Epidemiology at Walden University. I am working on a dissertation project titled: The impacts of violent sexual rapes against women in Eastern Democratic Republic of Congo. In this study, I am looking to establish any correlations between the various impacts of violent rapes and chronic pain and depression. I would like to request permission to use The PANAS instrument.

My target population includes the women survivors of violent sexual rape in Eastern Congo. I have received oral support from Dr. Denis Mukwege, Dr. of Panzi Hospital and founder of Panzi Foundation. I have also received moral support from other local NGOs encouraging my study initiative.

Your approval is critical because it will allow me to understand the positive and negative affects in order learn the anxiety and depression descriptors that these victims may be experiencing. I have no other aim for this study other than satisfying my doctoral requirements. The results from this study will add to the body of knowledge about the chronic pain and depression co-morbidity among the survivors of violent rape in armed conflict setting.

I pledge honesty, integrity and truthfulness as well as ethical use of the PANAS instrument.

Other instruments I am using include the DHS7 Module Fistula Questionnaire (2016) and Measuring Conflict Exposure in Micro-Level Survey to evaluate their violent rape-related physical damages, and the MOS Social Support Survey to evaluate how much they fill assisted or rejected by their own communities.

Would you kingly, please, grant me the authorization to use the PANAS (20 items) instrument for the purpose indicated above.

Your response and approval will be greatly appreciated.

Very respectfully,

Benoit Mirindi, MPH, MPA.
PhD candidate in Public Health - Epidemiology
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