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Psychological impacts of the April 15th armed conflict in Sudan: A cross-sectional study

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***Abstract*—** This study examines the psychological repercussions of the April 15th conflict in Sudan, addressing a gap in existing literature on severe mental health issues in post-conflict settings. It emphasises the impact beyond individual experiences, highlighting broader societal dynamics and the need for culturally tailored mental health interventions. This study used a quantitative approach through a cross-sectional design. This study analysed online survey responses from 134 participants (61.9% male, 32.1% female; Mean Age = 26.66, SD = 4.67). It employed the Arabic version of the Lovibond and Lovibond (1995) DASS-21 questionnaire. The findings reveal significant psychological impacts, with "extremely severe" levels of anxiety, depression, and stress. Underscoring the urgent need for comprehensive mental health strategies in post-conflict recovery efforts in Sudan.

Keywords: April 15th conflict, Cross-sectional study, DASS-21, Mental health interventions, Mental health, Post-conflict recovery, Psychological impacts,

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I. INTRODUCTION

AT the heart of Sudan, a storm gathered on April 15, 2023, when the Sudanese Army Forces (SAF), led by General Abdel Fattah Al-Burhan, bared its steel against the rebel group Rapid Support Forces (RSF), commanded by Dagalo-Hemedti. The acrimonious conflict that ravaged every part of the nation found rival factions among the military chiefs fighting one another in complete darkness during Ramadan (Makonye, 2023). The source of contention centered around integrating the RSF into the regular SAF, a crucial component of a political agreement striving to establish a new transitional civilian authority. However, the RSF staunchly refused to comply (Zaki et al., 2023). The conflict spread rapidly, with intense fighting in Khartoum and other states across the country, characterised by relentless infrastructure bombing, artillery shelling, and gunfire (Greco, 2023; see also Agbo et al., 2024). International mediation efforts, including the Jeddah Treaty of May 2023, failed to achieve a lasting peace, and the conflict continued with significant involvement from various rebel groups (Kohnert, 2023).

As of December 2023, the conflict had resulted in 18,000 deaths, over 33,000 injuries, and the displacement of more than 8.6 million people, making it the world's largest displacement crisis (Nichols & Michael, 2024; OCHA, 2024). This violence has significantly worsened existing humanitarian challenges, leading to acute food insecurity affecting 17.7 million people, with 4.9 million at emergency levels (FEWS NET, OCHA, 2024). The conflict has also caused a sharp rise in sexual violence, property crimes, and other forms of social disruption, further exacerbating the suffering of the Sudanese population (Sudanese Police Spokesman Office, 2024). The psychological consequences have been profound, with millions experiencing stress, depression, and anxiety because of the trauma from displacement, loss, and continuous exposure to violence (Grasser, 2022).

Given these extensive impacts, the ongoing conflict in Sudan has resulted in severe physical and psychological suffering for the affected population. This study examines the mental health consequences of this conflict, as the violence, displacement, and loss experienced by individuals have led to significant psychological distress. This research focuses on examining the psychological difficulties that have emerged since the conflict began on April 15, 2023, with a specific emphasis on mental health issues such as depression, anxiety, and stress.

II. LITERATURE REVIEW

The mental health impacts of conflict are profound, with depression, anxiety, and stress emerging as prevalent issues among affected populations. Continuous exposure to violence, loss, and displacement creates a psychological burden that significantly affects the well-being of individuals in these settings (Miller & Rasmussen, 2016; Keyes et al., 2014).

The prevalence of depression in conflict zones is notably higher compared to non-conflict areas, with symptoms manifesting as persistent sadness, fatigue, loss of interest in daily activities, and, in severe cases, suicidal thoughts (Fernando, 2014). These emotional states are further compounded by the disintegration of social structures and the absence of community support networks (Rozanov et al., 2018).

Research consistently identifies multiple factors contributing to the high rates of depression in conflict zones. Direct exposure to violence, chronic stress from living in an environment of perpetual insecurity, and grief associated with the loss of loved ones and displacement are primary contributors (Fernando, 2014; Keyes et al., 2014; see also Hobfoll, 1989). Economic hardship, disruption of social networks, and the lack of access to mental health services further exacerbate depressive

symptoms (Bilal et al., 2023). The physical manifestations of depression, such as changes in appetite and sleep disturbances, underscore the need for comprehensive approaches to treatment (Rozanov et al., 2018). Addressing depression in these settings requires multifaceted interventions that are sensitive to cultural contexts and tailored to the socio-economic realities of the affected populations (Getha-Taylor et al., 2020). Community-based support programmes and integrating mental health services into primary healthcare emerge as crucial strategies (Fernando, 2014).

Anxiety is another significant mental health issue in conflict zones, characterised by heightened worry, fear, restlessness, and panic attacks (Kappenman et al., 2021). The constant threat of violence, uncertainty about the future, and the daily challenges of survival contribute to elevated levels of anxiety (Lim et al., 2022). This condition often co-occurs with depression, creating a complex mental health landscape that complicates both the diagnosis and treatment (Rozanov et al., 2018). Women and children are particularly vulnerable to anxiety disorders in conflict zones, given their heightened exposure to traumatic events and the additional challenges related to gender-based violence and exploitation (Kappenman et al., 2021).

The literature highlights several factors that contribute to the high prevalence of anxiety in these settings. The pervasive sense of insecurity and unpredictability, coupled with exposure to traumatic events such as witnessing violence or losing family members, plays a critical role in the onset of anxiety (Lim et al., 2022). Disruption of daily routines, lack of access to basic needs such as food and shelter, and the breakdown of traditional coping mechanisms further exacerbate anxiety levels (Rozanov et al., 2018). Effective interventions for anxiety in conflict zones must address both the psychological and social dimensions of the disorder. Trauma-focused cognitive behavioural therapy and psychological first aid are recommended approaches (Kappenman et al., 2021). Additionally, building community resilience and training local healthcare providers to identify and manage anxiety disorders are essential components of a comprehensive intervention strategy (Fernando, 2014).

Stress, a universal response to extreme conditions, is particularly pronounced in conflict zones. Chronic stress leads to a range of mental and physical health issues, including heightened anxiety, emotional turmoil, and physical health problems such as cardiovascular disease and gastrointestinal disorders (Rozanov et al., 2018). The prevalence of stress-related disorders is high in these settings, where individuals face continuous exposure to traumatic events, threats to safety, and harsh living conditions (Bilal et al., 2023). Constant exposure to such conditions impairs individuals' coping and functioning ability (Fernando, 2014).

Several factors contribute to the elevated stress levels in conflict zones. Direct exposure to traumatic events, ongoing threats to safety, and the strain of living in overcrowded and unsanitary conditions are primary contributors (Keyes et al., 2014). The breakdown of social support networks and traditional coping mechanisms exacerbates stress levels, leaving individuals more vulnerable to the psychological impacts of conflict (Fernando, 2014). Interventions to reduce stress in these environments should focus on immediate relief and long-term support. Access to basic needs such as food, water, shelter, and healthcare is essential for reducing immediate stress levels (Kappenman et al., 2021). Psychological support, including counseling and support groups, helps individuals process their experiences and develop coping strategies (Lim et al., 2022). The restoration of social networks and the involvement of local leaders in stress reduction programmes are critical for ensuring the effectiveness and sustainability of these interventions (Henson et al., 2020).

Key studies provide valuable insights into the mental health impact of conflict on affected populations. Bilal et al. (2023) conducted research in Sudan examining the mental health impact of armed conflicts and civil unrest, revealing high incidences of depression, anxiety, PTSD, and insomnia. The study highlights the importance of tailored interventions that address the unique needs of different demographic groups. Significant associations between psychological conditions and variables such as conflict exposure, gender, age, and marital status underscore the need for comprehensive mental health services in conflict zones. Another significant contribution to the literature is the meta-analysis by Lim et al. (2022), which reviewed 67 studies on the mental health impacts of conflict on civilian and military populations. The analysis reveals higher incidences of depression and anxiety among civilians compared to military personnel, emphasising the unique vulnerabilities of non-combatants. This distinction underscores the need for targeted mental health interventions that address the specific challenges faced by civilians in conflict zones.

Additionally, Kurapov et al. (2023) conducted a first-wave study on stress, anxiety, and depression in Ukraine six months into the war. This study used a cross-sectional survey method to gather data from a representative sample of the Ukrainian population directly affected by the conflict. The findings revealed alarmingly high levels of stress, anxiety, and depression among the respondents, with significant portions of the population exhibiting symptoms severe enough to warrant clinical attention. The study provides crucial data on the mental health impact of ongoing conflict, underscoring the severe psychological toll on the affected populations and reinforcing the urgent need for effective mental health interventions in such settings. Moreover, Hameed, Sadiq, and Din (2019) conducted a study on the mental health of refugee populations, using a cross-sectional approach to assess the prevalence of mental health disorders. Their findings indicated that refugees are particularly vulnerable to conditions such as depression, anxiety, and PTSD, largely due to the compounded stressors of displacement, loss, and ongoing uncertainty. The study demonstrated that these psychological disorders are significantly more prevalent among refugees compared to non-displaced populations, highlighting the critical need for targeted mental health support for refugees during and after conflicts. This research aligns with findings from other studies, reinforcing the importance of comprehensive mental health services tailored to the needs of highly vulnerable groups in post-conflict recovery efforts.

Despite the extensive research on depression, anxiety, and stress in conflict zones, several gaps remain. The lack of longitudinal studies exploring the long-term psychological impact of living in conflict zones is a primary gap in the literature (Fernando, 2014). Most existing studies focus on the immediate or short-term effects of conflict, leaving a significant gap in understanding how these experiences affect individuals over time (Bilal et al., 2023). Additionally, research on the effectiveness of various intervention strategies in different cultural contexts is limited. While some interventions have shown efficacy in specific settings, their applicability and success in other cultural contexts remain unclear (Lim et al., 2022).

Future research should consider the unique experiences of subgroups such as women, children, and older people, often disproportionately affected by conflict (Kappenman et al., 2021). These groups face unique challenges and may require tailored interventions that address their needs (Fernando, 2014). Moreover, there is a need for more research on the mental health impact of conflict on displaced populations, including refugees and internally displaced persons (IDPs) (Rozanov et al., 2018). These populations often face additional challenges related to displacement, including loss of social support networks, economic hardship, and exposure to new forms of violence and exploitation (Bilal et al., 2023).

III. HYPOTHESES

1. Hypothesis 1: Exposure to the ongoing conflict in Sudan, which began on April 15, is hypothesised to be significantly associated with the development of psychological issues, specifically depression, anxiety, and stress.

2. Hypothesis 2: There is a significant difference between sexes in their psychological responses to the ongoing conflict in Sudan, with

depression, anxiety, and stress serving as dependent variables and gender as the independent variable.

IV. METHODS

Research design

This study used a cross-sectional research design to analyse the emotional effects of the ongoing conflict in Sudan, which began on April 15. This design allowed for data collection simultaneously, facilitating examining relationships between variables (Miller et al., 2020). A quantitative approach was employed, as it provides the necessary statistical methods to measure psychological outcomes such as depression, anxiety, and stress. SPSS (Version 29) was selected for its robust statistical capabilities, enabling the execution of descriptive statistics, t-tests, and regression analyses to explore the psychological impact of the conflict (Richard, 2022).

Research setting

The research was conducted online using the Qualtrics surveying platform to ensure accessibility and confidentiality, particularly given the sensitive nature of the study and the challenges of data collection in conflict zones. Anonymised survey links were distributed, and IP tracking was disabled to protect participants' privacy. This method allowed individuals from various regions affected by the conflict, including urban and rural areas, to participate. Qualtrics facilitated secure data handling and helped achieve a broad representation of experiences, which was crucial for maintaining the study's integrity (Vasileiou et al., 2018).

Sampling

One hundred thirty-four (134) participants were recruited using convenience sampling, representing diverse demographics from various states affected by the conflict. The sample included men and women directly exposed to the conflict, with varying ages, social classes, literacy levels, and socio-economic statuses. While the sample size may be modest according to Cochran's formula (1963), it was sufficient to capture the diverse experiences within the population. This approach ensured a broad representation of the community, allowing for a comprehensive understanding of the psychological impacts of the conflict across different affected regions in the country.

Data collection instruments

Data collection used the Arabic Translated Version of the Depression, Anxiety, and Stress Scale (DASS-21), adapted by Ali and Green (2019) from Lovibond and Lovibond (1995), chosen for its reliability with Cronbach's alpha values of 0.81 for depression, 0.89 for anxiety, and 0.78 for stress. The DASS-21, consisting of 21 items across three subscales, was complemented by a custom questionnaire to gather detailed information on conflict exposure, losses, psychological impacts, and help-seeking behaviours; this questionnaire was made as per the recommendations in Ranganathan and Cadduf (2023). The instruments were carefully prepared and tested for clarity and cultural relevance. Participants were recruited through anonymised links, with IP tracking disabled to ensure confidentiality. Data was collected via the Qualtrics platform, chosen for its secure and user-friendly interface, allowing for a geographically diverse sample. The collected data was monitored for completeness and securely stored for analysis.

Data analysis

Data analysis was performed using IBM SPSS (Version 29). Descriptive statistics provided an overview of key demographic characteristics and psychological states. T-tests were used to compare mean scores between groups, focusing on gender differences in psychological responses. Regression analysis was employed to explore relationships between conflict exposure and the development of depression, anxiety, and stress (Arkes, 2023). The DASS-21 subscales were computed, with raw scores adjusted to reflect the DASS-42 scale's comprehensive scoring system, ensuring accuracy in assessing psychological conditions (Makara-Studzińska et al., 2022).

Ethical considerations

The study adhered to ethical guidelines outlined by the British Psychological Society's (BPS) Human Research Ethics guidelines (2021). Participants were fully informed about the study's purpose, and informed consent was obtained before participating. Confidentiality and anonymity were rigorously maintained, with data securely stored and collected in groups to ensure participant privacy. The online setting further enhanced privacy protections. The study received ethical approval from an ethical research committee licensed by a Mental Health Institution in Sudan. Throughout the study, ethical principles of respect, integrity, and benevolence were upheld. Participants were provided with information on accessing emotional support and mental health resources. The principle of justice was also maintained by treating all participants fairly and equitably, ensuring the study's ethical integrity (Bitter et al., 2020).

V. RESULTS

The study's demographic analysis provided essential insights into the sample population. Of 134 respondents, 94% provided gender information, with 32.1% identifying as female (n = 43) and 61.9% as male (n = 83). The sample was skewed toward younger individuals, 44% under 30 and 72.4% under 40. Most (53.4%) were single, and nearly all participants (99.1%) had some college or university education. Employment data showed that 32.1% had good-paying jobs, while 29.1% were unemployed or had unsatisfactory salaries. Geographically, 51.5% of respondents were in Khartoum State at the onset of the conflict, while 3.7% were in River Nile State. The impact of the conflict was significant, with 34.3% reporting the loss of a friend or family member and 94.7% noting a negative impact on their family's life. Despite this, 77% did not seek psychological help, indicating potential barriers to accessing mental health services. Additionally, perspectives on the future of Sudan were mixed, with 52.2% expressing pessimism and 40.3% remaining optimistic.

Table 1: Demographic breakdown of the study participants

Demographic	n	%
Respondents Provided Gender	126	94
Female	43	32.1
Male	83	61.9
Non-disclosed	8	6
Younger than 30	59	44
Younger than 40	97	72.4
Single	71	53.4
College/University Education	133	99.1
Working with Good Pay	43	32.1
Unemployed/Unsatisfactory Salary	39	29.1
Residing in Khartoum State at the Onset of the Conflict	69	3.7
Residing in River Nile State at the Onset of the Conflict	5	51.5
Loss/Death of friend/Family Member due to the Conflict Events	46	34.3
Did Not Seek Psychological Help at All	103	77
Negative Impact on Daily and Familial Life due to the Conflict Events	127	94.7
Pessimistic about the Future of Sudan	70	52.2
Optimistic about the Future of Sudan	54	40.3
Total Respondents	**134**	**100**

Reliability

A reliability analysis of the study variables, involving 134 cases and using listwise deletion, yielded a Cronbach's alpha of 0.922, indicating strong internal consistency across the 31 items on the scale.

Table 2: Reliability analysis of study variables

Number of Cases	Method	Cases Eliminated	Cronbach's Alpha	Internal Consistency
134	Listwise Deletion	Cases lacking any values	0.922	Strong

The t-test results identified gender differences in psychological responses to the conflict. Men scored higher in depression-related symptoms like feeling disinterested and inadequate, while women

exhibited better management of stress-related symptoms such as relaxation and breathing. In anxiety, men scored higher in panic-related symptoms, while women showed better control over agitation.

Table 3: Gender differences in psychological responses

Variable	Gender	Findings	Implications
Depression	Men	Higher scores on feeling disinterested and inadequate	Men might be more prone to depression-related symptoms during conflict
	Women	Specific details not provided in the hypothesis.	Additional information needed to determine the impact on women
Anxiety	Men	Higher-scores- in panic	Men show higher panic levels in anxiety- symptoms
	Women	Better results in agitation	Women manage anxiety-related symptoms like agitation better
Stress	Men	Higher scores in panic	Men experience higher panic levels in stress-related symptoms
	Women	Better results in difficulty relaxing and breathing relaxing and breathing	Women handle certain stress-related aspects like relaxing and breathing better

Regression

The analysis of depression, anxiety, and stress using the DASS-21 scale revealed high levels of psychological distress among participants. The mean depression score was 29 (SD = 11.1), indicating an "Extremely Severe" category. Anxiety had a mean score of 25 (SD = 10.5), classified as severe, while stress had a mean score of 36.8 (SD = 11.68), also in the "Extremely Severe" category.

Table 4: Summary of DASS-21 Scores

Measure	Standard Deviation (SD)	Mean	Mean Range	Severity Category
Depression	11.1	29	0-42	Extremely Severe
Anxiety	10.5	25	0-42	Severe
Stress	11.68	36.8	0-42	Extremely severe

VI. DISCUSSION

Comparison with the Hypotheses

The primary objective of this study was to determine whether individuals directly affected by the Sudanese War would suffer psychological disorders. The data analysis supported the first hypothesis, showing significant levels of depression, anxiety, and stress among respondents. The secondary hypothesis, which predicted gender differences in psychological responses, was also supported. Men exhibited higher stress levels and greater symptoms of depression and anxiety, indicating substantial mental health impacts (Ssali & Theobald, 2016). These findings align with existing literature on the adverse effects of war on mental health, including studies by Miller and Rasmussen (2010), Murthy and Lakshminarayana (2006), and Forrest, Edwards, and Daraganova (2018). These studies similarly emphasise the critical need for post-war environments to prioritise psychological recovery, highlighting the importance of addressing mental health as a key component of rebuilding and rehabilitation efforts in conflict-affected regions.

The results challenge the Male Warrior Hypothesis by Van Vugt et al. (2007), which suggests that males are naturally better equipped to handle the psychological challenges of conflict (Southard, 2018). Alternatively, the Tend-and-Befriend theory proposed by Taylor et al. (2000) provides insights into female responses, suggesting evolutionary adaptations that predispose women to engage in nurturing behaviours and seek social support under stress. This theory explains the observed symptoms in females as a manifestation of an evolutionary drive for protection and survival through social bonding (Tucker et al., 2020). Additionally, Gender Role Theory posits that societal norms significantly influence stress responses, with women likely experiencing amplified psychological impacts due to expectations of caregiving and emotional support, especially when traditional support structures collapse (Mootz et al., 2017; Goldstein, 2001). Thus, a gender-sensitive approach is crucial for addressing the psychological distress caused by war, leveraging distinct experiences and coping strategies to provide effective support.

VII. LIMITATIONS

The study's cross-sectional design limits the ability to capture evolving psychological effects over time, which may skew the understanding of long-term consequences (Capili, 2021). While ethically necessary, exclusion criteria may introduce selection bias, affecting generalisability to certain demographic groups (Pannucci & Wilkins, 2011; Bipeta, 2019). The small sample size of 134 participants and the gender imbalance, with more males than females, could influence the observed differences in psychological responses and limit the findings' generalisability (Etz & Arroyo, 2015). Recognising these limitations is essential for maintaining the study's integrity and transparency (Vieira et al., 2019).

VIII. IMPLICATIONS

The implications for post-conflict mental health interventions emphasise the necessity for tailored, adaptable, and gender-sensitive support systems that address the complex psychological needs of individuals affected by conflict, considering diverse factors that influence resilience and recovery (Murray et al., 2014; Stewart et al., 2021). This approach aligns with the advocacy for resilience-building interventions incorporating age, gender, and cultural factors (Betancourt & Khan, 2008). Effective strategies include gender-sensitive counseling, emotional and social intelligence training to enhance stress management (Liu & Boyatzis, 2021), and developing culturally relevant support groups to foster community healing. Mobile mental health clinics are crucial for ensuring access to care in remote or underserved areas (Richards et al., 2019), while community-based trauma recovery programmes that engage local leaders can effectively build resilience (Gilmer et al., 2021). Additionally, mental health literacy campaigns are important for raising awareness, reducing stigma, and encouraging broader engagement with mental health resources. The broader implications of psychological distress extend beyond individual health, affecting community structure, social interactions, and economic activity (Cowden, 2021). Individuals experiencing high levels of anxiety and feelings of worthlessness may struggle to contribute to community rebuilding efforts, with gender differences in psychological reactions influenced by societal expectations (Burani & Nelson, 2020). The fear of stigmatisation further hinders individuals from seeking support (Goldstein, 2001), making culturally specific and targeted interventions crucial in post-conflict settings. Establishing community-based mental health support networks that combine formal and informal resources, including local leaders and religious figures, can build resilience and mitigate the long-term psychological impacts of war (Castillo et al., 2019; Gilster & Meier, 2016). Post-conflict programmes should include tailored psychoeducation and coping mechanisms that are accessible and inclusive, considering factors like literacy levels and language diversity (Martz, 2010). Integrating mental health into broader post-war reconstruction initiatives is essential for fostering peaceful growth and social cohesion, necessitating collaboration with health organisations for effective implementation (Singh et al., 2022; Kestel et al., 2022).

IX. CONCLUSION

This study highlights the significant psychological impact of the Sudanese conflict that began on April 15th, demonstrating that the aftermath of war extends deeply into the mental health of those affected.

The research reveals critical gender-specific differences in responses to depression, anxiety, and stress, emphasising the need for targeted, culturally sensitive mental health interventions. The findings show that both males and females suffer profoundly, challenging assumptions about gender resilience in conflict settings. These psychological effects do not only affect individuals but also have broader social implications, suggesting that mental health must be a key consideration in postwar reconstruction efforts.

The study's implications stress the urgency of implementing intervention programmes that address mental health stigma and empower communities to rebuild. Integrating mental health support into broader reconstruction initiatives is vital for creating resilient societies and sustaining long-term peace. This research provides valuable evidence-based insights for developing strategies to mitigate psychological distress in post-war environments, ultimately enhancing the well-being of conflict-affected populations. However, several limitations were encountered during the study. The cross-sectional design restricted the ability to capture the evolving psychological effects over time, and the small sample size, along with gender imbalance, may limit the generalisability of the findings.

Additionally, excluding certain demographic groups due to ethical considerations may have introduced selection bias. These limitations highlight the need for further longitudinal research with larger, more diverse samples to deepen the understanding of mental health outcomes in post-conflict settings. In summary, this study advocates for a holistic approach to mental health in post-war recovery, emphasising the importance of addressing the nuanced psychological needs of affected individuals within the broader context of societal reconstruction. Further research should explore long-term mental health outcomes and the effectiveness of different intervention strategies across diverse cultural settings.

X. CONFLICTS OF INTEREST

There are no conflicts of interest in this study

XI. DATA AVAILABILITY STATEMENT

The data utilised in this study are not publicly available due to confidentiality and restrictions imposed by the ethical committee overseeing the research. However, the DASS-21 assessment form is freely accessible online; the DASS-21 Arabic Version by Ali and Green is available at https://www2.psy.unsw.edu.au/dass/Arabic/Arabic%20DASS-21.pdf, and the original English version is available at; Depression, Anxiety, and Stress Scale (DASS-21) | dass21.me

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