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To cite this article: Dan Mwangye Bigirwa, Godfrey Zari Rukundo, Moses Muwanguzi, Alain Favina & Scholastic Ashaba (2025) Appetitive aggression and associated factors among military soldiers retiring from active service in Uganda, *European Journal of Psychotraumatology*, 16:1, 2493026, DOI: [10.1080/20008066.2025.2493026](https://doi.org/10.1080/20008066.2025.2493026)

To link to this article: <https://doi.org/10.1080/20008066.2025.2493026>



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Published online: 12 May 2025.



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## Appetitive aggression and associated factors among military soldiers retiring from active service in Uganda

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### ABSTRACT

**Background:** Appetitive aggression is a type of aggression that is characterized by a fascination with violence and a desire to inflict pain on the perceived enemy. This type of aggression has mainly been studied among former child soldiers and demobilized combatants. Information on appetitive aggression among retiring active service officers is limited. This study aimed to determine the prevalence of appetitive aggression and the associated factors among soldiers who are retiring from active service in Uganda.

**Methods:** A sample of 247 retiring military soldiers from the Uganda People's Defence Force (UPDF), who had assembled at Gaddafi Barracks in Jinja district in eastern Uganda in preparation for the retirement exercise, was randomly selected for this cross-sectional study. We assessed participants for appetitive aggression using the Appetitive Aggression Scale, and also collected information on alcohol and drug use, exposure to traumatic life events, post-traumatic stress disorder, childhood trauma, and depression. We ran logistic regression models to determine the factors associated with appetitive aggression among the study participants.

**Results:** Ninety-seven per cent ( $n = 239$ ) of the participants were male and the mean age was 46 years. The prevalence of appetitive aggression was 58%. Not being depressed ( $p = .040$ ) and experience of traumatic events ( $p = .001$ ) were associated with high odds of appetitive aggression.

**Conclusion:** The prevalence of appetitive aggression among the study participants was high. Having experienced traumatic events was associated with a greater odds of appetitive aggression, while having depression was protective against appetitive aggression. Interventions aimed at preventing appetitive aggression among soldiers should target addressing the trauma experienced during their line of duty.

### Agresión apetitiva y factores asociados en soldados militares retirados del servicio activo en Uganda

**Antecedentes:** La agresión apetitiva es un tipo de agresión que se caracteriza por la fascinación por la violencia y el deseo de producir dolor al supuesto enemigo. Este tipo de agresión se ha estudiado principalmente en ex-soldados niños y combatientes desmovilizados. La información sobre la agresión apetitiva en los oficiales retirados del servicio activo es limitada. Este estudio tuvo como objetivo determinar la prevalencia de la agresión apetitiva y los factores asociados en soldados que se retiran del servicio activo en Uganda.

**Métodos:** Se seleccionó aleatoriamente, para un estudio transversal, una muestra de 247 militares retirados de las Fuerzas de Defensa del Pueblo de Uganda (UPDF en sus siglas en inglés) que se habían reunido en el cuartel de Gadafi, en el distrito de Jinja al este de Uganda para prepararse para el ejercicio de retirada. Evaluamos la agresión apetitiva utilizando la escala de agresión apetitiva y también recopilamos información sobre el uso de alcohol y drogas, la exposición a eventos vitales traumáticos, trastorno de estrés postraumático, trauma en la infancia y depresión. Aplicamos modelos de regresión logística para determinar los factores asociados con la agresión apetitiva entre los participantes del estudio.

**Resultados:** Noventa y siete por ciento ( $n = 239$ ) de los participantes eran de sexo masculino y la edad media fue de 46 años. La prevalencia de agresión apetitiva fue del 58%. El no estar deprimido ( $p = .040$ ) y el haber experimentado eventos traumáticos ( $p = .001$ ) se asociaron con una alta probabilidad de agresión apetitiva.

**Conclusión:** La prevalencia de agresión apetitiva entre los participantes del estudio fue alta. El haber experimentado eventos traumáticos se asoció con mayor probabilidad de agresión apetitiva, mientras que tener depresión fue protector contra la agresión apetitiva. Las intervenciones orientadas a prevenir la agresión apetitiva en los soldados deberían abordar el trauma experimentado durante el cumplimiento del deber.

### ARTICLE HISTORY

Received 3 August 2024  
Revised 24 March 2025  
Accepted 8 April 2025

### KEYWORDS

Soldiers; appetitive aggression; traumatic events; depression; Uganda; sub-Saharan Africa

### PALABRAS CLAVE

Agresión apetitiva; soldados; depresión; Uganda; África subsahariana

### Highlights

- Soldiers retiring from active service in Uganda are at high risk of appetitive aggression.
- Experiencing traumatic events increases the risk of appetitive aggression among soldiers.
- Soldiers retiring from active service should be assessed for appetitive aggression, and therapeutic interventions, such as psychological support, peer support, and family involvement, should be adapted to manage those with appetitive aggression before their reintegration into the community.

## 1. Background

Soldiers around the world are subjected to a variety of severe forms of violence, including gang-related violence, emotional abuse, harassment, combat-related injuries, torture, and fatalities (Robjant et al., 2020). Exposure to violence, including organized violence, increases the risk of mental disorders such as trauma-related illnesses, depression, substance abuse, and appetitive aggression (Baez et al., 2019). When armed groups are exposed to high levels of violence during combat, their emotions change from fear to exhilaration and arousal, which can result in appetitive aggression (Hermenau et al., 2013). Appetitive aggression is a form of hostile behaviour that is driven by the purpose of gaining a social status, as well as the violent self-rewarding desire and pleasure of perpetrating pain through violence (Elbert et al., 2017; Weierstall & Elbert, 2011). Increased violent behaviour among ex-combatants of armed groups from paramilitary and guerrilla forces that may be appetitive in nature has been documented (Macmanus et al., 2015). In addition, interpersonal aggression and increased risk-taking tendencies that are appetitive in nature have been reported among US military soldiers returning from operations in Iraq and Afghanistan (Macmanus et al., 2015). Appetitive aggression has been linked to a high risk of violence among ex-combatants (Hecker et al., 2012), including self-committed violence, interpersonal violence, and domestic violence (Hecker et al., 2012; Weierstall, Haer, et al., 2013).

Appetitive aggression has been noted to be protective against post-traumatic stress among ex-combatants who have participated in various wars in Africa and beyond (Hecker, Hermenau, Maedl, Schauer, et al., 2013; Weierstall, Schalinski, et al., 2012; Weierstall, Castellanos, et al., 2013; Weierstall & Elbert, 2011). Studies among Rwandan genocide perpetrators and Ugandan child soldiers found that those who demonstrated a greater tendency towards appetitive aggression were resilient to the development of post-traumatic stress disorder (PTSD) (Weierstall et al., 2011; Weierstall, Huth, et al., 2012). Among German war II veterans, it was shown that those who experienced high appetitive aggression had fewer symptoms of PTSD (Weierstall, Huth, et al., 2012). The appetitive and captivating nature of violence precludes the absorption of cruel, traumatizing experiences into the fear network, hence the negative correlation between appetitive aggression and PTSD (Elbert et al., 2006; Hecker, Hermenau, Maedl, Schauer, et al., 2013). Combatants who exhibit appetitive aggression do not consider perpetrating violence to be traumatic and tend to cope positively with traumatic experiences (Hecker, Hermenau, Maedl, Hinkel, et al., 2013; Hecker, Hermenau, Maedl, Schauer, et al.,

2013). Moreover, the resilience to traumatic stress among those who experience appetitive aggression while committing atrocities during the war lasts a lifetime (Weierstall, Huth, et al., 2012).

Early exposure to violence and maltreatment throughout childhood are significant risk factors for violent behaviours among ex-soldiers, which, in turn, increase the likelihood of appetitive aggression (Augsburger et al., 2015). As a result, when socialized inside a military force, children raised in armed groups often learn behaviours that encourage harming others, raising the risk of appetitive aggression (Hecker et al., 2012). It has also been shown that exposure to life-threatening situations, such as horrific wartime events involving injuries or the murder of allies, and participation in violent acts are a significant predictor of appetitive aggression (Köbach, Nandi, Crombach, Bambonyé, Westner, et al., 2015; Weierstall, Huth, et al., 2012). The relationship between childhood trauma and appetitive aggression has been linked to the fact that insecure and violent environments breed violent behaviour and promote a cycle of violence (Crombach & Elbert, 2014; Elbert et al., 2006; Nandi et al., 2015). Self-perpetrated violence has been associated with appetitive aggression, a behaviour in which the perpetrator believes that violence is appetitive (Crombach & Elbert, 2014; Hecker et al., 2012; Nandi et al., 2015). Childhood maltreatment experiences have been linked to the association between self-committed violence and appetitive aggression (Nandi et al., 2015), since mistreatment of children usually takes place in hostile environments that promote aggressive behaviour (Schwartz et al., 1997).

The Ugandan military has been involved in various operations both domestically and in neighbouring countries, including a 13 year war insurgency in northern Uganda, and there have been reports of human rights violations by soldiers, including killings, rapes, and physical assault (D'Agoût, 2013). The military's role in maintaining security can sometimes lead to tensions and violence, especially in conflict-prone areas (Fasuan & Adetunberu, 2018). As such, some soldiers have exhibited aggressive behaviour after returning to the community. Therefore, this study aimed to determine the prevalence of appetitive aggression and the associated factors among soldiers retiring from active service in Uganda.

## 2. Methods

### 2.1. Study design

This was a descriptive cross-sectional study, which used a comprehensive questionnaire that had several sections, including sociodemographic characteristics, sex, age, rank, level of education, length of service in

the army, and marital status, and standardized tools of variables of interest. For this study, 247 soldiers retiring from active service were recruited between July and August 2023.

## 2.2. Study setting

The study was conducted in the Gaddafi military barracks in Jinja district, eastern Uganda, where soldiers retiring from the army in Uganda usually assemble for 1 month before being retired and integrated into the community. The barracks is home to over 4000 soldiers and each year receives several soldiers, ranging in number from 400 to 650, for retirement preparation. Gaddafi military barracks is located approximately 87 km east of Kampala, the capital city of Uganda (Fecitt, 2008) (Figure 1). It is the oldest military barracks in Uganda, established during colonial rule in Uganda. It was the home of the first battalion of the King's African Rifles, and the headquarters for the army during colonial rule and after independence up to 1964 (Fecitt, 2008).

## 2.3. Sample size determination

The sample size was determined using Yamane's formula for determining sample size (Yamane, 1973), and from the calculation the sample was estimated at 250 participants, as indicated below. The Yamane formula assumes a normal distribution (Yamane, 1973).

$$n = \frac{N}{1 + Ne^2} = \frac{667}{1 + 667(0.05)^2} = 250$$

where  $n$  is the sample size,  $N$  is the total population, and  $e$  is the margin of error (0.05).

The total sample size was 250 participants. The retiring soldiers are assumed to be normally distributed in terms of the parameters for interpretation of their experience and exposure to traumatic events.

## 2.4. Sampling procedure

The study used stratified random sampling. Soldiers in the barracks were divided into eight strata according to length of service, rank (officers and militants), and the position they held at the time of retiring (command and administration positions). The participants who held administrative positions at the time of retirement and had ever fought in combat were considered for the study, while those who had never fought were excluded. Those who held command posts at the time of retirement and met the inclusion criteria were also considered for the study. The sampling frame included everyone in the retiring group who met the inclusion criteria and excluded everyone who was not part of the retiring group.

## 2.5. Recruitment procedure

The study participants were retiring military soldiers from the Uganda People's Defence Force (UPDF) who had assembled at Gaddafi military barracks in Jinja district, eastern Uganda, in preparation for the retirement exercise. These had come from all military units of the UPDF. The UPDF is the armed force of Uganda according to the constitution of Uganda of 1995; it was previously known as the National Resistance Army and is composed of Land, Air, and Reserve forces. The UPDF is established and mandated to carry out functions such as preserving and defending the sovereignty and interior integrity of Uganda, cooperating with civilian authority in emergency situations in cases of natural disasters, fostering harmony and understanding between the defence forces and civilians, and engaging in productive activities for the development of Uganda. They are notified a year prior to the assembly time through their military established modes of communication, following the chain of command. All soldiers in the retirement group were given information about the study, and those who showed interest in participating were taken to a private room and assessed for their eligibility to participate in the study.

### 2.5.1. Inclusion criteria

We enrolled soldiers who had spent more than 10 years in the army, had ever been to at least one battle, and provided written informed consent to participate in the study. The 10 year mark was applied to avoid instances of soldiers retiring voluntarily and on medical grounds before serving in the army long enough to reach retirement age. Ten years and more was considered long enough for someone to have served in the army to avoid instances of those retiring on voluntary and medical grounds (Fecitt, 2008).

### 2.5.2. Exclusion criteria

We excluded soldiers who were intoxicated, had clear active symptoms of mental illness, such as mood swings, unusual behaviour, uncoordinated speech, disorientation, apathy, withdrawal, and increased sensitivity, or displayed signs of aggression at the time of the interview, bearing in mind that these symptoms would impair their ability to comprehend the contents of the consent form and the questionnaire, and to provide valid written informed consent. Semi-structured interviews were carried out in Gaddafi military barracks using research assistants. The research assistants were trained counselling psychologists who were working within the UPDF on permission from their user departments for training and participation. Before starting data collection, the research assistants were taken through a 1 day training course run by the principal investigator on how to administer the



The HSCL-25 has been validated for use in Uganda, with good psychometric properties demonstrated by a Cronbach's alpha of 0.91 (Ashaba et al., 2018). The HSCL-25 had a Cronbach's alpha of 0.92 in this study.

### 2.6.3. Life Events Checklist for DSM-5

The Life Events Checklist for DSM-5 (LEC-5) is a self-report measure intended to screen for likely traumatic events in a person's lifetime (Weathers, 2013). The LEC-5 assesses exposure to a variety of potentially traumatic events, which include natural disasters such as floods, fire, or explosion, transportation accidents, serious accidents at work or home, exposure to toxic substances, physical assault or assault with a weapon, sexual assault, combat exposure, captivity, life-threatening illness or injury, and serious injury (Weathers et al., 2013). The LEC-5 has been used in Kenya among adults with potential traumatic events (Kwobah et al., 2022). While the LEC-5 does not provide a total score, it helps to identify whether the person has experienced one or more traumatic events. This information can be used in combination with other assessments to determine whether the events meet the criteria for PTSD or other trauma-related conditions (Rzeszutek et al., 2018). The LEC-5 had a Cronbach's alpha of 0.84 in this study.

### 2.6.4. Alcohol Use Disorder Identification Test

Alcohol use disorder was assessed using the Alcohol Use Disorder Identification Test (AUDIT) questionnaire, which assesses alcohol use problems, alcohol use behaviours, and dependence (Saunders et al., 1993). It is a 10-item questionnaire scored on a five-point Likert scale ranging from 0 to 4, with options of never (= 0), monthly or less (= 1), 2–3 times a month (= 2), 2–4 times a week (= 3), and 4 or more times a week (= 5) (Babor et al., 2001; Reinert & Allen, 2007). The AUDIT is unique among alcohol-related screening instruments in that it is designed to measure a range of risk levels, from low-risk drinking to hazardous drinking and alcohol use disorders (De Meneses-Gaya et al., 2009; Reinert & Allen, 2007). Low-risk drinking denotes alcohol consumption in very small amounts, which is also known as safe drinking or social drinking, while hazardous drinking is a pattern of alcohol consumption that is associated with alcohol-related problems, although it does not meet the minimum criteria for alcohol use disorder (De Meneses-Gaya et al., 2009; De Silva et al., 2008). The AUDIT has been documented as a reliable and valid measure in identifying alcohol use disorder, hazardous consumption, and harmful alcohol use, and has also been found to be a valid indicator for the severity of alcohol dependence (Källmén et al., 2019). The audit had a Cronbach's alpha of 0.84 in this study.

### 2.6.5. Drug Abuse Screening Test

Drug abuse was assessed using the Drug Abuse Screening Test (DAST), which is a 10-item scale score with yes and no responses (Scherer et al., 2013). It is used to assess the use of drugs, not including alcohol or tobacco, in the past 12 months, and is easy to administer (Scherer et al., 2013; Yudko et al., 2007). The DAST is a biologically validated instrument that is easy to use and may have valuable implications as a research tool among both clinical and non-clinical populations (Scherer et al., 2013). The DAST has previously been used among university students in Uganda (Kaggwa et al., 2022). The DAST has been evaluated as having good psychometric properties, with a Cronbach's ranging from 0.74 to 0.94 across different studies (Shirinbayan et al., 2020; Yudko et al., 2007). The DAST had a Cronbach's alpha of 0.763 this study.

### 2.6.6. Childhood Trauma Questionnaire

Childhood trauma was assessed using the 28-item Childhood Trauma Questionnaire (CTQ). The CTQ consists of 28 items and five subscales that cover physical, emotional, and sexual abuse; and emotional and physical neglect (Bernstein, 1998). Items 10, 16, and 22 comprise the denial subscale. Each item is measured on a five-point Likert scale ranging from 0 (never true) to 3 (very often true) (Bernstein et al., 2003). The CTQ items are elicited in the context of 'When I was growing up', which is followed by the description of a traumatic event that they could have experienced. Sample items include: 'When I was growing up, I got hit so hard by someone in my family that I had to see a doctor or go to the hospital' and 'When I was growing up, people in my family said hurtful or insulting things to me'. The cut-off scores for different subscales are  $\geq 6$  for sexual abuse,  $\geq 8$  for physical abuse,  $\geq 9$  for emotional abuse,  $\geq 8$  for physical neglect, and  $\geq 10$  for emotional neglect (Fink et al., 1995). We dichotomized the subscale scores at the specified cut-offs, so that participants who scored above the cut-off were classified as having experienced abuse or neglect, while those who scored lower were classified as not having experienced abuse or neglect. The CTQ has been used among adolescents living with human immunodeficiency virus (HIV) in Uganda, where it had a Cronbach's alpha of 0.86 (Ashaba et al., 2021). The CTQ had a Cronbach's alpha of 0.72 in this study.

### 2.6.7. PTSD Checklist for DSM-5

The PTSD Checklist for DSM-5 (PCL-5) is a 20-item self-report measure that assesses the presence and severity of PTSD symptoms (Bovin et al., 2016; Wortmann et al., 2016). Items on the PCL-5 correspond with Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria for PTSD.

The PCL-5 is constructed on a five-point Likert scale with responses rated from 1 (not at all), through 2 (a little a bit), 3 (moderately), 4 (quite a bit), to 5 (extremely) (Blevins et al., 2015; Bovin et al., 2016). The score on the PCL-5 is produced by summing up all item scores, and a total score of 31–33 or higher suggests the presence of PTSD (Blevins et al., 2015; Forkus et al., 2023). The PCL-5 aligns with the DSM-5 criteria for PTSD and has shown strong validity and reliability across various settings (Forkus et al., 2023). The PCL-5 has been validated among university students in Rwanda, with good psychometric properties (Cronbach's  $\alpha = 0.85$ ) (Niyonsenga et al., 2021), and has also been used in eastern Uganda among landslide survivors, where it demonstrated a Cronbach's  $\alpha$  of 0.84 (Kabunga et al., 2022). The PCL-5 had a Cronbach's  $\alpha$  of 0.86 in this study.

## 2.7. Data analysis

Data were analysed using Stata version 14. Categorical variables were summarized as frequencies and percentages, while continuous variables were summarized as means and standard deviations. We ran logistic regression models to determine the factors associated with appetitive aggression. As a bivariate analysis, we ran a logistic regression model for each of the factors, with appetitive aggression as an outcome. This was followed by a multivariable regression analysis in which we included all of the variables with appetitive aggression as the outcome variable. For the level of significance, we considered a  $p$ -value of less than .05 and the corresponding confidence interval values.

## 2.8. Ethical considerations

We received ethical approval from the Mbarara University research ethics committee (MUST-2023-823), and the study was registered with and cleared by the Uganda National for Science and Technology (HS2949ES). Administrative clearance was sought from the Uganda chief of defence forces through joint staff human resources and the chief joint staff, as well as the head of the retirement exercise at Gaddafi military barracks in Jinja. Permission was sought from the office of the chief of defence forces through the joint staff human resources and the chief joint staff. Participants provided written informed consent before they were enrolled into the study. Each participant received 5000 Ugandan shillings as compensation for their time taken to participate in the study.

## 3. Results

### 3.1. Sample characteristics

Of the 247 participants in the study, 97% ( $n = 239$ ) were male, 47% ( $n = 115$ ) had attained primary

**Table 1.** Summary characteristics of the participants ( $N = 247$ ).

Characteristic	N or mean (SD)	%
Age (years), mean (SD)	46 (8.03)	
Sex		
Male	239	97
Female	8	3
Level of education		
Primary	115	47
Lower secondary	74	30
Upper secondary and above	58	23
Marital status		
Married	232	94
Single	15	6
Rank		
Commissioned officer	25	10
Senior non-commissioned officer	80	32
Junior non-commissioned officer	142	57
Length of service (years), mean (SD)	22 (8.36)	
Alcohol consumption behaviour		
Low risk	210	85
Moderate to hazardous drinking	37	15
Drug use behaviour		
Low-level use	235	95
Moderate to substantial use	8	3
Drug use problem	4	2
Life traumatic experiences		
Yes	53	21
No	194	79
Childhood trauma		
Yes	34	14
No	213	86
Post-traumatic stress disorder		
Yes	32	13
No	215	87
Depression		
Yes	45	18
No	202	82
Appetitive aggression		
Yes	144	58
No	103	42

education, and the majority [94% ( $n = 232$ )] were married. The mean age was 46 ( $SD = 8.03$ ) years, while the duration of service was 22 ( $SD = 8.36$ ) years. The prevalence of appetitive aggression was 58% ( $n = 144$ ) (Table 1).

### 3.2. Factors associated with appetitive aggression among study participants

From the bivariate regression analysis, the factors that were statistically significantly associated with appetitive aggression were not having PTSD [crude odds ratio (cOR) = 3.10, 95% confidence interval (CI) = 1.42–6.75;  $p = .004$ ], not being depressed (cOR = 2.0, 95% CI = 1.18–3.37;  $p = .010$ ), experience of life traumatic events (cOR = 3.96, 95% CI = 1.88–8.33;  $p < .001$ ), lower secondary education level (cOR = 0.42, 95% CI = 0.23–0.77;  $p = .005$ ), and upper secondary and above (cOR = 0.34, 95% CI = 0.18–0.66;  $p = .001$ ) (Table 2). In the multivariable regression analysis, factors that remained statistically significantly associated with appetitive aggression were not being depressed (aOR = 1.94, 95% CI = 1.02–3.67;  $p = .040$ ) and having experienced life traumatic events (OR = 4.01, 95% CI = 1.79–8.99;  $p = .001$ ) (Table 2).

**Table 2.** Factors associated with appetitive aggression among the study participants.

Characteristic	Bivariate analysis		Multivariate analysis	
	cOR (95% CI)	<i>p</i>	aOR (95% CI)	<i>p</i>
Sex				
Female	Ref		Ref	
Male	1.41 (0.35–5.79)	.630	1.58 (0.22–11.56)	.652
Age	1.03 (1.00–1.07)	.049	1.02 (0.97–1.08)	.416
Length of service	1.02 (0.99–1.06)	.126	0.99 (0.94–1.04)	.737
Post-traumatic stress disorder				
Yes	Ref		Ref	
No	3.10 (1.42–6.75)	.004	2.42 (0.96–6.10)	.061
Level of education				
Primary	Ref		Ref	
Lower secondary	0.42 (0.23–0.77)	.005	0.59 (0.30–1.16)	.125
Upper secondary and above	0.34 (0.18–0.66)	.001	0.51 (0.24–1.11)	.090
Marital status				
Single	Ref		Ref	
Married	1.65 (0.58–4.70)	.350	0.86 (0.21–3.35)	.822
Rank				
Commissioned officer	Ref		Ref	
Senior non-commissioned officer	1.63 (0.66–4.01)	.292	1.28 (0.48–3.37)	.621
Junior non-commissioned officer	1.57 (0.67–3.68)	.301	1.29 (0.48–3.46)	.608
Alcohol consumption behaviour				
Low risk	Ref		Ref	
Moderate to hazardous drinking	0.82 (0.40–1.65)	.570	1.24 (0.54–2.87)	.615
Drug use behaviour				
Low levels	Ref		Ref	
Optimal substantial	0.72 (0.17–2.93)	.64	0.80 (0.15–4.19)	.793
Drug use problem	2.15 (0.22–20.94)	.505	1.73 (0.14–20.89)	.665
Depression				
Yes	Ref		Ref	
No	0.5 (0.3–0.85)	.010	0.52 (0.27–0.98)	.040
Experience of trauma incidents				
No	Ref		Ref	
Yes	3.96 (1.88–8.33)	<.001	4.01 (1.79–8.99)	.001
Childhood trauma				
No	Ref		Ref	
Yes	1.18 (0.56–2.49)	.659	1.36 (0.56–3.28)	.493

Note: cOR = crude odds ratio; aOR = adjusted odds ratio; CI = confidence interval.

### 3.3. Traumatic events associated with appetitive aggression among study participants

From the bivariate analysis, the factors that were statistically significantly associated with appetitive aggression were sexual assault [odds ratio (OR) = 1.8, 95% CI = 1.08–3.01;  $p = .024$ ], captivity (OR = 1.89, 95% CI = 1.12–3.17;  $p = .016$ ), sudden violent death (OR = 1.87, 95% CI = 1.05–3.34;  $p = .035$ ), and serious injury, harm, or death caused to someone (OR = 3.31, 95% CI = 1.90–5.76;  $p < .001$ ) (Table 3). In the multivariable regression analysis, serious injury, harm, or death caused to someone else was the only traumatic event that remained significantly associated with appetitive depression (OR = 3.26, 95% CI = 1.71–6.19;  $p < .001$ ).

## 4. Discussion

Our study found a prevalence of appetitive aggression of 58%, and also showed that having experienced traumatic events was associated with appetitive aggression, whereas having no depression was protective against appetitive aggression. Of note is that this is the first study in Uganda to estimate the prevalence of appetitive aggression among soldiers, and more specifically among soldiers retiring from military service. These

findings may contribute to the understanding of the challenges faced by Ugandan soldiers, who have been engaged in wars and battles ranging from internal insurgencies to cross-border operations such as peace-keeping missions, where they experience traumatic events. This may inform the development of interventions related to the assessment of exposure of life traumatic events and its management among soldiers in military service.

The prevalence of appetitive aggression in our study is comparable to that reported among ex-combatants in Burundi, who reported a prevalence of 37%, and the 29% prevalence that was reported among military personnel deployed in Iraq and Afghanistan (Köbach, Nandi, Crombach, Bambonyé, Westner, et al., 2015; Macmanus et al., 2015). Similarly, appetitive aggression was found to be high among former paramilitary and guerrilla fighters in Colombia (Weierstall, Castellanos, et al., 2013). This aggression was linked to a reduced risk of PTSD among those who were demobilized collectively (Weierstall, Castellanos, et al., 2013). Moreover, soldiers tend to use appetitive aggression as an adaptive mechanism for survival in a violent environment owing to its association with a reduction in the risks of combat-related psychological trauma (Weierstall, Huth, et al., 2012). In addition, soldiers are forced to perpetrate violence

**Table 3.** Traumatic events associated with appetitive regression among the study participants ( $n = 247$ ).

Traumatic event	Bivariate analysis		Multivariable analysis	
	OR (95% CI)	<i>p</i>	aOR (95% CI)	<i>p</i>
Natural disaster (e.g. flood, hurricane, tornado, earthquake)	1.69 (0.83–3.44)	.148	1.29 (0.54–3.05)	.568
Fire or explosion	2.15 (1.08–4.27)	.029	1.3 (0.54–3.15)	.56
Transportation accident (e.g. car accident, boat accident, train wreck, plane crash)	1.48 (0.73–3.01)	.276	1.03 (0.42–2.56)	.943
Serious accidents at work, at home, or during recreational activity	1.47 (0.84–2.58)	.181	0.96 (0.46–2.02)	.914
Exposure to toxic substances (e.g. dangerous chemicals, radiation)	1.25(0.75–2.07)	.396	0.98 (0.53–1.79)	.942
Physical assault (e.g. being attacked, hit, slapped, kicked, beaten up)	1.32 (0.74–2.35)	.350	0.84(0.41–1.74)	.636
Assault with a weapon (e.g. being shot, stabbed, threatened with a knife, gun, bomb)	1.79 (0.99–3.20)	.051	1.33 (0.65–2.72)	.438
Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)	1.80 (1.08–3.01)	.024	1.50 (0.73–3.10)	.275
Other unwanted or uncomfortable sexual experience	1.49 (0.90–2.49)	.124	0.87(0.43–1.76)	.688
Combat or exposure to a warzone (in the military or as a civilian)	2.17 (0.99–4.78)	.053	2.26 (0.91–5.62)	.078
Captivity (e.g. being kidnapped, abducted, held hostage, prisoner of war)	1.89 (1.12–3.17)	.016	1.62 (0.83–3.17)	.157
Life-threatening illness or injury	1.14 (0.63–2.05)	.673	0.73 (0.32–1.69)	.462
Severe human suffering	1.49 (0.83–2.68)	.185	0.78 (0.32–1.94)	.598
Sudden violent death (e.g. homicide, suicide)	1.87 (1.05–3.34)	.035	1.26 (0.51–3.15)	.616
Sudden accidental death	1.18 (0.63–2.21)	.612	0.48 (0.19–1.21)	.118
Serious injury, harm, or death you caused to someone else	3.31 (1.90–5.76)	<.001	3.26 (1.71–6.19)	<.001

Note: OR = odds ratio; aOR = adjusted odds ratio; CI = confidence interval.

against their opponents, which they eventually find appealing and exciting, hence appetitive aggression (Flanagan et al., 2014; Hecker et al., 2012).

This study found that having experienced traumatic events was associated with appetitive aggression and, more specifically, traumatic events related to causing serious injury, harm, or death to others. This finding is in agreement with previous research indicating that individuals who perpetrate violence and find it appetitive in nature adapt easily in hostile environments (Köbach, Schaal, and Elbert, 2015; Weierstall, Hinsberger, et al., 2013). The total number of perpetrated types of violent acts is a major predictor of appetitive aggression (Köbach, Nandi, Crombach, Bambonyé, Westner, et al., 2015; Köbach, Schaal, & Elbert, 2015). The appetitive perception of violence suggests that when perpetrators commit atrocities, they experience an appetitive arousal rather than an unpleasant one, where cues that are usually associated with fear have become appealing (Weierstall, Hinsberger, et al., 2013). As such, perpetrated acts of violence are appealing, rather than traumatic (Elbert et al., 2010; Macnair, 2002). An association between individual violent acts and appetitive aggression has been found among combatants and ex-combatants (Crombach et al., 2013; Hecker et al., 2012; Nandi et al., 2015; Sommer et al., 2017). It has also been shown that ex-combatants who experience a high number of traumatic events are at a high risk of appetitive aggression (Augsburger et al., 2015; Köbach, Nandi, Crombach, Bambonyé, and Elbert, 2015). Other research has found out that the attraction to violence (appetitive aggression) can be a way to reconcile the traumatic experiences, but it can also perpetuate a cycle of violence and trauma (Angkaw et al., 2013; Bhardwaj et al., 2019).

In addition, our study showed that having no depression increased the risk of appetitive aggression. This differs from what has been documented in

previous studies, indicating that depression was positively associated with violence (Koebach et al., 2021; Robjant et al., 2019; Van Voorhees et al., 2024). Depression impairs cognitive functions, including decision making and impulse control, which reduces the likelihood of engaging in impulsive aggressive acts driven by the thrill of violence (Cartreine, 2016). Furthermore, depression can cause emotional numbing and impair an individual's ability to engage in aggressive behaviours (Weierstall, Huth, et al., 2012). Other depression-related factors that may explain why depression may be protective against appetitive aggression include social isolation, which inhibits a person's ability to participate in aggressive behaviour (Weierstall, Huth, et al., 2012).

When interpreting our findings, the following limitations should be considered. This study was limited to soldiers retiring from active service in Uganda, which may limit the generalizability of the findings to all soldiers in Uganda. This could have caused challenges in the interpretation of our findings. Moreover, the study was cross-sectional in nature, which limits our ability to determine the cause-and-effect relationships. The study population sample consisted mainly of males, and hence may not represent the experiences of females serving in the army, since it has been documented that females are more affected by combat experiences than males (Kelber et al., 2021). Finally, the Appetitive Aggression Scale has only been used among former child soldiers in Uganda, and not in any adult populations, and this could have affected the interpretation of our findings.

## 5. Conclusion

Soldiers retiring from active service in Uganda, especially those who have experienced traumatic events, are at risk of developing appetitive aggression. Pre-retirement training is needed, focusing on mental

health, hostility, thoughts of aggression, and irritability, to enable the soldiers to recognize early warning signs and seek care. Appetitive aggression screening should be integrated into routine mental health assessments during the retirement process. Education and awareness programmes should be developed and implemented in the UPDF to inform retiring military personnel about the potential impact of appetitive aggression and the importance of seeking help.

### Acknowledgements

The authors thank the retiring soldiers who participated in this study and the Army leadership who approved the study. We are also grateful to our motivated research assistants, Major Abel Kansime, Major Anthony Byaruhanga, Major Jackson Karuhanga, Lieutenant Derrick Tumusiime, and Private Nassazi, who collected the data, as well as Mr Mukundane Benon, a lecturer of Kiswahili at Kyambogo University Uganda, who translated the research tools into Kiswahili language, without forgetting Dr Herbert Elivis Ainamani, a senior lecturer at Kabale University, who acquired the Appetitive Aggression Tool for us.

### Disclosure statement

No potential conflict of interest was reported by the authors.

### Funding

This study received no external funding. The study was entirely funded by the first author; however, Dr Scholastic Ashaba acknowledges salary support from the Fogarty International Center of the US National Institutes of Health [grant number K43TW011929-03].

### Data availability statement

The datasets generated and/or analysed during the current study are not publicly available because of research ethics board restrictions, but are available from the corresponding author upon reasonable request.

### Author contributions

Conceptualization: DMB, SA, and GZR. Writing the first draft: DMB and SA. Review and editing: SA, MM, AF, and GZR. Supervision: SA and GZR.

### Ethics approval and consent to participate

Clearance to conduct research was obtained from Mbarara University Research Ethics Committee (MUST-REC) and Uganda National Council for Science and Technology (UNSCT). To ensure comprehension and full awareness of the content, we collected informed consent from the participants. Before obtaining consent, the interview, content, procedures, risks, right to withdraw, and confidentiality were explained.

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