Combat-related mental injuries and evidence-based psychotherapy for former members of armed groups

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<th>Full Form</th>
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<tbody>
<tr>
<td>AAS</td>
<td>Appetitive Aggression Scale</td>
</tr>
<tr>
<td>AFAS</td>
<td>Appetitive and Facilitative Aggression Scale</td>
</tr>
<tr>
<td>DDR</td>
<td>Disarmament, Demobilization, &amp; Reintegration</td>
</tr>
<tr>
<td>CNDP</td>
<td>Congrès National pour la Défense du Peuple</td>
</tr>
<tr>
<td>DDRRRR</td>
<td>Disarmament, Demobilization, Reintegration, Repatriation, Resettlement</td>
</tr>
<tr>
<td>DRC</td>
<td>Democratic Republic of Congo</td>
</tr>
<tr>
<td>DS 1/2</td>
<td>Dissemination Stage 1/2</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
<tr>
<td>FDLR</td>
<td>Forces Démocratiques de Libération du Rwanda</td>
</tr>
<tr>
<td>FORNET</td>
<td>Narrative Exposure Therapy for Forensic Offender Rehabilitation</td>
</tr>
<tr>
<td>LC/HC</td>
<td>Low-intensity Conflict/High-intensity Conflict</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low- and Middle Income Country</td>
</tr>
<tr>
<td>M23</td>
<td>Movement Mars 23</td>
</tr>
<tr>
<td>MONUSCO</td>
<td>Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo</td>
</tr>
<tr>
<td>NET</td>
<td>Narrative Exposure Therapy</td>
</tr>
<tr>
<td>OBB</td>
<td>Out-Of-Bag</td>
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<tr>
<td>PA</td>
<td>Perpetrated Acts</td>
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<tr>
<td>PHQ</td>
<td>Patient Health Questionnaire</td>
</tr>
<tr>
<td>PSS-I</td>
<td>PTSD Symptom Scale - Interview</td>
</tr>
<tr>
<td>PTSD</td>
<td>Posttraumatic Stress Disorder</td>
</tr>
<tr>
<td>RF-CI</td>
<td>Conditional Inference Random Forest</td>
</tr>
<tr>
<td>Spec</td>
<td>Specific</td>
</tr>
<tr>
<td>TAU</td>
<td>Treatment-As-Usual</td>
</tr>
<tr>
<td>TE-exp</td>
<td>Traumatic Events - experienced</td>
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<tr>
<td>TE-wit</td>
<td>Traumatic Events - witnessed</td>
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<tr>
<td>Tot</td>
<td>Total</td>
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<tr>
<td>TCUDS</td>
<td>Texas Christian University Drug Screen</td>
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Summary

In post-war societies, ex-combatants are at a heightened risk of becoming violent. Increased rates of criminality and family violence, are common in this population. Many ex-combatants are also tempted to rejoin armed groups and with it, they pose a serious risk of destabilization at all levels of society, encompassing dysfunction within the family, instability in the community, and even collectively undermining the political stability of the country. In fact, it has been historically very difficult to bring civil wars successfully to an end in the past decades. One reason why ex-combatants re-engage in violence is an active attraction to and enjoyment of violent excesses as well as anxiety-driven defensiveness. Evidence-based psychotherapeutic approaches covering these combat-related problems are badly needed, yet up until now have not been developed. The lack of intervention strategies is matched by a concurrent lack of adequately trained mental health personnel in these countries. The present thesis addresses these problems by studying the impact of combat-related mental injuries and trialing the effectiveness and dissemination of an intervention, called Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET), in a sample of Congolese ex-combatants in their demobilization process.

The first article provides a clinical overview of the sample of Congolese ex-combatants and provides insight into the impact of particular sorts of combat-experiences and their sequelae. Enhanced trauma-related symptoms, together with an appetite for aggression were widespread. Furthermore, trauma-related symptoms were higher in the high-intensity conflict setting. Random forest regression embedded in a conditional inference framework revealed that perpetrated violent acts are not necessarily stressful, but rather exciting. In fact, the exertion (and the witnessing) of violent acts that particularly implicated salient cues of hunting (e.g., blood, suffering of the victim, etc.) had the strongest association, with appetitive aggression and the number of lifetime perpetrated violent acts as its most important predictor. Moreover, the number of perpetrated violent acts did not significantly affect posttraumatic stress. The second article replicates the latter findings in a larger sample with Burundian ex-combatants.

In 2013, the DSM-5 was published with modifications to the PTSD diagnostic criteria set out in the preceding volume, the DSM-IV. The third article shows high concordance of the two diagnostic standards. Furthermore, perpetrated acts did not significantly predict the posttraumatic stress severity level assessed with DSM-5, supporting the finding of the previous studies.

Prior research suggested that joining an armed group at younger ages predicted higher levels of appetitive aggression in ex-combatants. The fourth article refines this picture by showing that a particular period of development around the ages of 16 to 17 years is associated with higher levels of appetitive aggression.
The final research article describes a clinical trial testing the effectiveness and dissemination of Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET) implemented in the United Nations’ demobilization program in Goma, the regional capital of the DRC. FORNET dissolves rigid victim-perpetrator archetypes and addresses posttraumatic stress as well as tendencies towards aggression. The results showed that FORNET, compared to treatment-as-usual, effectively reduced posttraumatic stress. However, the level of appetitive aggression decreased in both conditions. Beneficial effects were also found for depression severity and drug dependence. Follow-up assessments one year after the intervention suggested further treatment gains in the long term. Equal effects were found when FORNET was conducted by first- vs. second-generation counselors, who were trained and supervised by formerly trained and experienced peer counselors. Moreover, we found that FORNET can be effectively implemented in the early demobilization process and is effective in settings with ongoing conflict.

In sum, the present thesis provides further insight into the relation between combat-related experience and mental health problems, with a focus on appetitive aggression and posttraumatic stress. The findings highlight the devastating effects of combat exposure on the combatants’ mental health and the increasing appetite for violence, especially in those recruited in adolescence. This thesis helps to improve the understanding of why it is so difficult to reintegrate ex-combatants into civil society. The use of FORNET in a clinical trial provides evidence for the reversibility of the combat-related mental injuries and shows a beneficial impact on reintegration for ex-combatants who received therapy. It is likely that successful transitions of war-afflicted countries to stable states require work at an individual level. A demonstrably effective and easily implemented intervention such as FORNET offers one such possibility.
Zusammenfassung


Im letzten Jahr erschien eine neue Auflage des DSM (englisch: Diagnostic and Statistical Manual for Mental Disorders; deutsch: Diagnostischer und statistischer Leitfaden psychischer Störungen), hierbei wurden auch die diagnostischen Kriterien für PTSD modifiziert. Der dritte Artikel untersucht die Übereinstimmung dieser beiden Standards bei kongolesischen ehemaligen (para)militärischen Kombattanten. Des Weiteren wird dargestellt, dass Gewaltdelikte bei der Vorhersage von PTSD keinen signifikanten Beitrag leisten, auch wenn die Störung nach DSM-5 diagnostiziert wird.
Frühere Analysen zu appetitiver Aggression ergaben, dass ehemalige Kombattanten, die bereits als Kind rekrutiert wurden, besonders anfällig dafür sind, ein appetitives Bedürfnis nach Gewalt zu entwickeln. Der vierte Artikel weist daraufhin, dass einstige kongolesische Kombattanten, die bereits mit 16 und 17 Jahren rekrutiert waren, die höchsten Werte für diese Charaktereigenschaft aufweisen. Verschiedene Erklärungen und Implikationen werden diskutiert.


Record of achievement

The research and the articles outlined in the present thesis were realized in collaboration with a number of colleagues. In the following, my independent contributions are listed per article.

Article 1: Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress.

Anke Köbach, Susanne Schaal, Thomas Elbert (Published in Frontiers in Psychology, January 5th, 2015)

My contributions
- participated in the design of the study
- carried out a substantial part of the interviewer training
- carried out inter-rater interviews
- supervised clinical interviews
- conducted the statistical analysis
- drafted the manuscript

Article 2: Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress: a replication paper

Anke Köbach, Corina Nandi, Anselm Crombach, Manassé Bambonye, Britta Westner Thomas Elbert (in submission)

My contributions
- conducted the statistical analysis
- drafted the manuscript

Article 3: Posttraumatic Stress Disorder according to DSM-5 and DSM-IV diagnostic criteria: a comparison in a sample of Congolese ex-combatants


My contributions
- carried out a substantial part of the interviewer training
- carried out inter-rater interviews
- supervised clinical interviews
- revised the manuscript

**Article 4: Sensitive periods for developing a robust trait of appetitive aggressive**

Anke Köbach, Thomas Elbert (in submission)

**My contributions**
- participated in the design of the study
- carried out a substantial part of the interviewer training
- supervised clinical interviews
- carried out inter-rater interviews
- conducted the statistical analysis
- drafted the manuscript

**Article 5: Effectiveness and dissemination of FORNET**

Anke Köbach, Susanne Schaal, Tobias Hecker, Thomas Elbert (in submission)

**My contributions**
- participated in the design of the study
- carried out a substantial part of the interviewer training
- supervised clinical interviews
- coordinated logistics and the collaboration with partners in the field
- contributed to the conduction of the initial FORNET training
- supervised FORNET interventions
- carried out a substantial part of the train-the-trainer FORNET training
- supervised FORNET trainers
- carried out inter-rater interviews
- conducted the statistical analysis
- drafted the manuscript
Part I

Background
1 Introduction

War, torture, massacre, rampage, mass killing, genocide, hooliganism, domestic violence, abuse or criminality: aggression has always been an existential part of the lives of human beings (Walker, 2001). In civil war situations, the occurrence of extreme forms of violence like cutting off body parts (ears or breasts), cannibalism, immolation, rape, etc. are not isolated atrocities, but rather routine and even institutionally sanctioned elements of warfare (Eck & Hultman, 2007; Elbert et al., 2013).

Combatants returning to civil society after the end of war often have difficulties re-adjusting to civil life. In order to obtain a better understanding of the effects of combat upon a soldier’s mental state, the present thesis will investigate the association of different forms of violence exposure with aggression and trauma-related symptoms. Secondly, an intervention designed to help soldiers overcome mental injuries developed in the aftermath of combat will be evaluated. Narrative Exposure Therapy for Forensic Offender’s Rehabilitation (FORNET) was examined in a dissemination trial with Congolese ex-combatants in their demobilization process. The overall project aims to provide both a picture of the dynamics of ex-combatants' mental health, as well as illustrating a practical way to implement evidence-based treatments in post-conflict settings.

1.1 War and the difficult transition to peace

In 2013, there were 33 ongoing armed conflicts, causing an estimated 40,000 battle-related deaths per year (Themner & Wallensteen, 2014). Instead of geopolitical interests, these wars are mostly driven by ethnic tensions and characterized as having blurred lines between state and non-state, public and private, external and internal, economic and political and even war and peace. In political science, these wars are commonly referred to as the "new wars" (Kaldor, 1999; for a "defense" see Kaldor, 2013). The transition from armed conflict to stability poses major challenges for peace advocates. In fact, out of 140 civil wars since 1945, only 18% ended with a settlement by 1999; and even then the risk of renewed outbreaks remained high (Glassmyer & Sambanis, 2008). One of the major sources of instability are the former combatants, who combine high levels of organization, practical experience, and military know-how with a preference for resolving problems violently (Humphreys &
Weinstein, 2007). Pro-Russian militias in the Ukraine or the M23, who invaded large parts of North Kivu in the eastern DRC are only two very recent examples where ex-combatants play/ed major roles in an escalating conflict. A transition from politically drawn fighting to criminal (Alden, 2002; Gear, 2002; Smyth, 2004) and family (Miller, Wolf, Reardon, et al., 2013) violence has been reported in various settings (e.g., South Africa, Angola, North Ireland, USA, Mozambique).

In response to the risk of former combatants re-engaging in violence, Disarmament, Demobilization and Reintegration (DDR) programs with the aim of facilitating the political, economic and social reintegration of ex-combatants have been developed by the United Nations (UN). In these programs, ex-combatants hand over their weapons and are given the formal status of civilian (the two D’s). Usually, DDR also includes a reintegration part, consisting of educational programs and/or economic support (R). The first DDR program was instituted in 1989 in Central America. Since then, the number of such programs has increased quickly and they are now accepted as an essential part of many ongoing peace missions (Knight & Özerdem, 2004; UNDPKO, 2010). Research concerning the impact of DDR frequently focuses on lessons-learnt or mechanisms of such programs (e.g., Söderström, 2013). Recent investigations analyzing disaggregated data provide valuable new insights on how to approach combatants in DDR in order to minimize the risk of re-engagement in (political) violence (Humphreys & Weinstein, 2007; Nilsson, 2008). Currently, the UN runs 14 DDR programs around the world (Banholzer, 2014), one of these is in the DRC.

The Democratic Republic of Congo (DRC)

After a history of war and corruption, the DRC – a vast country with immense economic resources – is now struggling to recover from one of the most brutal wars of the recent decades (see BBC country profile). The DRC was subject to one of the most brutal colonial occupations on historical record by the Belgian King Leopold II (1877-1908) and the Belgian parliament (1908-1960). Following this, Colonel Joseph Desire Mobutu (later Mobutu Sese Seko) established a three-decade long authoritarian regime (1965 - 1997; Zaire since 1971). The eastern parts of the DRC in particular were subject to intertribal conflicts throughout history (Richard, 2013). In the 1990s, the conflict escalated with the Rwandan genocide. A huge wave of refugees including Hutu genocidaires, migrated into the Kivu regions. In reaction, Rwandan and Ugandan armies (with support from Angola, Burundi, and Tanzania) entered the eastern DRC launching the First Congo War (1996 - 1998), immediately followed by the Second Congo War, also known as Africa’s Great War (1998 - 2002). These wars caused one of the most severe human disasters of this century (Stearns, 2011). Though fighting continues today (Elbert et al., 2013), the signing of the Lusaka Peace Accord in 1999 brought the conflict formally to an end. The same year a UN mission (MONUC, since 2010
MONUSCO, Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo) was deployed to the DRC. DDR of Congolese armed groups, and the Disarmament, Demobilization, Repatriation, Reintegration, and Resettlement (DDRRR) of foreign armed groups had been implemented as a core component of the peace mission in 2001 (UNDPKO, 2010). Today DDR/RR in the eastern DRC has grown into the most expensive and long-lasting mission of the UN, the outcome of which has been mixed (Allen, 2011; Richard, 2013).

Presently, combatants who wish to officially demobilize join the DDR facilities closest to their base where they hand over their arms. Afterwards, they are brought to one of the larger, centralized DDR camps, either in Goma (North Kivu), or Bukavu (South Kivu), where they exchange their uniforms for civilian clothing and receive official demobilization documents. For Congolese ex-combatants, there were no further services at the time of the data collection (July 2012 - October 2013); non-Congolese ex-combatants, mainly Rwandans, were returned to their country of origin, where they continued the reintegration process. In 2013, DDR/RR processed 1,595 adult combatants and 464 child soldiers. In total, 1,050 weapons and 42,373 rounds of ammunitions were recovered and destroyed. The majority of ex-combatants demobilized from FDLR (Forces Démocratiques de Libération du Rwanda), M23 (Movement Mars 23) and various Mai-Mai groups, that are a kind of local paramilitary (pseudo-)defense networks (MONUSCO, 2014).

Accepting the settlement, leaving the battlefield, and returning home is a major life change for combatants. Difficulties associated with this transition include going back into a competitive labor market, in which they usually find themselves disadvantaged in terms of specific education and experience (Blattman & Annan, 2010; Savoca & Rosenheck, 2000). Furthermore, there is a major change in their social systems, as the martial social structures from which they derived their self-esteem and confidence do no longer exist. In regard to civil wars like the one in the eastern DRC, the security vacuum may facilitate self-defense provision including networking with (para)military forces, sustaining weaponry, etc. In addition to such fundamental, and often difficult role changes (Knight & Özerdem, 2004; Smyth, 2004), former combatants suffer from persistent mental injuries stemming from extremely stressful and traumatic events, or violent acts. The following section will describe the effects of combat exposure on mental health, which may facilitate gang building, criminality, and re-enlistment.
1.2 Combat exposure and the combatants’ mental health

1.2.1 Posttraumatic Stress Disorder (PTSD)

The current definition of Posttraumatic Stress Disorder (PTSD) in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders – the DSM-5 (APA, 2013) specifies the syndrome as a psychiatric disorder caused by an external traumatic stressor (Criterion A) and consists of four symptom clusters: intrusions (Criterion B), avoidance (Criterion C), negative alterations in cognition and mood (Criterion D) and alterations in arousal and reactivity (Criterion E). In addition, the diagnosis includes the duration (Criterion F) of the symptoms, the functional significance (Criterion G) they cause in daily life, as well as the absence of exclusion conditions (Criterion H). This definition has undergone several revisions with each new edition of the DSM, Chapter 4 gives a detailed outline on the changes from DSM-IV to DSM-5 and assesses the impact on prevalence and diagnostic assessment in a sample with Congolese ex-combatants.

In contrast to other DSM diagnoses, the occurrence of an external traumatic stressor is required to develop PTSD. The peritraumatic response (also known as defense cascade; see Figure 1.1; Schauer & Elbert, 2011) follows a course of physiological reactions that start with an immediate sympathetic response (freeze) and may peak at a sympathetic fright reaction, or a parasympathetic shutdown (faint). If PTSD symptoms develop in the aftermath of the traumatic stressor, they frequently mirror the dominant peritraumatic response (Schauer & Elbert, 2011).

Theoretical model for developing PTSD  Prior investigations revealed that traumatic stress cumulatively increases the risk of PTSD development (building block effect; Kolassa & Elbert, 2007; Neuner, Schauer, Catani, Ruf, & Elbert, 2006; Schauer, Neuner, & Karunakara, 2003). Trauma survivors with PTSD suffer from overwhelming intrusive trauma recollections, but at the same time, often fail to chronologically recall the respective events, thus PTSD is also known as a disorder of pathological memory (Brewin, Gregory, Lipton, & Burgess, 2010; Elbert & Schauer, 2002; Wilker & Kolassa, 2013). Accordingly, it is hypothesized that PTSD symptoms underlie a strong, but fragmented associative collection of traumatic cues gathered at different points in time. Due to the stress-related down-regulation of context-generating neural activation, the orientation of such cues in time and space is no longer possible (Elbert, Rockstroh, Kolassa, Schauer, & Neuner, 2006; Elbert & Schauer, 2002; Foa & Kozak, 1986). The representations of accumulated traumatic events will be stored in two distinct, disconnected memory components, which are referred to in the following as hot/implicit and
Adapted from Admon et al. (2013), Figure 1.1: The defense cascade. 1. **Freeze**: Recognizing the threat, the organism enters the first phase of attentive immobility; 2. **Fight** or 3. **Flight**: Depending on previous experiences, opportunities to escape, as well as the relative strength of the opponent, the subject decides under an extreme activation of the sympathetic path whether either **fight** or **flight** is appropriate. 4. **Fright**: The failure of **fight** or **flight** will initiate the **fright** reaction, a tonic, and unresponsive immobility. 5. **Flag**: Confronting ongoing aggression in which the subject has no chance to defeat the offender (e.g., torture or rape) the body turns from hyper-functioning (**fright** reaction) to hypo-functioning (**shut-down** reaction). The activation of the para-sympathetic path and its associated systems become dominant. 6. **Faint**: The final reaction is **fainting**. Information (sensory, physical, emotional, cognitive, place, time, happening) is not processed by the brain nor is it stored in the memory.

cold/explicit (Elbert & Schauer, 2002; cf. Brewin et al., 2010). In consequence, intrusive memories of several traumatic experiences in PTSD patients appear to re-occur at present and thus, the cycle of "intrusions" – "avoidance" – "alteration of mood and cognition" – "hypervigilance" begins. The so-called fear network (the neural representation of traumatic cues; see Figure 1.2) is shaped by memory processes such as fear conditioning, long-term potentiation and consolidation/reconsolidation (for a review see Johnson, MacGuire, Lazarus, & Palmer, 2012).

Recent neurological studies found alterations in brain structure, function, and connectivity in regions involved in fear memory formation including the amygdala, the hippocampus, insula, mPFC, and the ACC (for a review see Admon, Milad, & Hendler, 2013). These are, however, not only modified by past experience, but also from (epi)genetic processes. Adapted from Admon et al. (2013), Figure 1.3 presents a causal model in regard to the neural manifestations in PTSD.
PTSD in military settings  In military contexts, research is primarily focused on PTSD (for a review see Crämer, Wade, Fletcher, & Forbes, 2011). Due to its high dependence on the contextual factors and methodological variations between the studies, prevalence rates of PTSD in military personnel differ substantially: in US military the PTSD rate is up to 17% after combat duty in Afghanistan and Iraq (Hoge et al., 2004), in Vietnam veterans 15% and 31% fulfill the criteria of current and lifetime PTSD, respectively (Dohrenwend et al., 2006); in the German national army and the UK military the rate is lower with 3% (Wittchen et al., 2013) and 5% (Iversen et al., 2009). Odenwald et al. (2007) report a PTSD rate of 5% in Somali combatants, while 14% was reported in a sample of imprisoned genocide perpetrators in Rwanda (Schaal, Weierstall, Dusingizemungu, & Elbert, 2012).

In addition to the clinical suffering, patients have higher rates of disability, lower quality of life and worse physical health (Mendelowicz & Stein, 2000; Stecker, Fortney, Owen, McGovern, & Williams, 2010; Thomas et al., 2010). Former combatants in civilian settings also tend to adopt more violent conflict resolution strategies (Vinck, Pham, Stover, & Weinstein, 2007). Longitudinal studies demonstrated that PTSD symptoms in military personnel are relatively stable or even increase over time (Milliken, Auchterlonie, & Hoge, 2007). Compared to other populations, (former) members of (para)military groups suffering from PTSD are more likely to show prominent symptoms of anger and aggression (Morland, Love, Mackintosh, Greene, & Rosen, 2012) and higher rates of delayed disease onset (one third of diagnosed PTSD in military samples is delayed; Andrews et al., 2007; Horesh, Solomon, Keinan, & Ein-Dor, 2013). Furthermore, high comorbidity with substance use problems, other anxiety disorders, suicidality, and depression was reported (Heltemes, Clouser, MacGregor, Norman, & Galarneau, 2014; Odenwald et al., 2007; Pietrzak et al., 2010; Jakupcak, Cook, Fontana, Rosenheck, & McFall, 2009).
Figure 1.3: A causal model accounting for neural abnormalities in PTSD (adapted from Admon et al., 2013). The model postulates that genetic and environmental factors, as well as the interaction between them (broken black line), may lead certain individuals to display abnormal structure and hyperfunction of the amygdala (Amy) and dorsal anterior cingulated cortex (dACC). The model further suggests that such predisposition makes individuals prone to express heightened fear, manifested as PTSD hyperarousal symptoms. Following exposure to traumatic stress, a subset of those predisposedly vulnerable individuals may acquire additional neural abnormalities in the form of reduced ventromedial prefrontal cortex (vmPFC) volume, and reduced connectivity with the hippocampus (HC). These acquired abnormalities may contribute to impaired fear inhibition capability, thus yielding PTSD symptoms of avoidance and re-experiencing. Taken together, the model suggests that the summation of both predisposing and acquired neural abnormalities, as well as of their potential interactions (broken curved line), results in the full symptomatic phenomenon that entails clinical diagnosis of PTSD. Finally, the model recognizes the contribution of additional brain regions as potential mediators (broken gray lines). Accordingly, hypofunction of the nucleus accumbens (Nacc), and dorsomedial prefrontal cortex (dmPFC), as well as hyperfunction of the insula, may mediate PTSD through their suggested roles in reward processing, emotional regulation, and interoception, respectively.
1.2.2 Other mental health problems in former combatants

Drug use problems In addition to classical symptoms of posttraumatic stress, prior investigations demonstrated enhanced substance misuse and dependence in (para)military populations (Fear et al., 2010; Federman, Bray, & Kroutil, 2000). In a sample of UK military personnel, Iversen et al. (2009) found alcohol problems in 18% of the investigated individuals; Hoge et al. (2004) reported up to 35% prevalence of alcohol misuse in returning US veterans from Iraq and Afghanistan. Substance abuse is generally linked to mental health problems (Heltemes et al., 2014; Odenwald et al., 2009) and combat exposure (Sareen, Cox, & Afifi, 2007; Wilk et al., 2010), especially in younger soldiers (Jacobson et al., 2008; Jakupcak et al., 2010). Drug use is often a way of coping with posttraumatic stress (Chilcoat & Breslau, 1998). In countries affected by civil wars, like the eastern DRC or Somalia, the consumption of alcohol and other drugs may be even higher (Hecker & Haer, 2014) and facilitate the exertion of violence especially during combat (Hecker & Haer, 2014). Prior research also demonstrates a link between alcohol misuse and a higher risk of intimate partner violence in military samples (Bell, 2006; Miller, Wolf, Reardon, et al., 2013; Schmaling et al., 2006). Further negative consequences that affect the individual and their social system are highly prevalent; these include more physical complaints, suicidal ideation, difficulties sleeping, and poor treatment outcomes (Heltemes et al., 2014).

Depression Moreover, Thomas et al. (2010) reported a heightened risk of depression in the context of military service. Nevertheless, depression frequently co-occurs with other mental disorders (Hellmuth, Stappenbeck, Hoerster, & Jakupcak, 2012) and thus, may not be causally associated with combat-exposure (Breslau, Davisa, Petersonb, & Schultz, 2000).

Suicidal ideation Finally, an increase of suicide cases had been observed in active U.S. army soldiers since 2004. With it, growing attention has been given to suicidal ideation in the aftermath of combat. Nock et al. (2013) provide a review of literature including risk and protective factors, mechanisms, and preventive methods. Further research is required, particularly in post-conflict settings.

1.2.3 Aggression

Besides psychiatric disorders specified in the DSM, (para)military samples present with tendencies towards violent outbursts (Morland et al., 2012; Walker, 2010; Elbert et al., 2013). Aggression is commonly defined as overt behavior that has the intention of inflicting physical harm (Anderson & Bushman, 2002). The concept covers two different subtypes: impulsive-reactive and controlled-instrumental (Anderson & Bushman, 2002; Elbert, Weierstall,
Schauer, 2010; Nell, 2006; Vitiello & Stoff, 1997). Reactive aggression refers to all aggressive behavior that is provoked by an external trigger. In contrast, instrumental aggression is exerted to achieve a certain goal and – if the behavior was successful – is followed by a positive outcome (Vitiello & Stoff, 1997). Appetitive aggression is a subcategory of the latter; it is exerted to gain a positive feeling and thus, is intrinsically motivated. For the trait of appetitive aggression, cues associated with violent acts are perceived appealingly rather than as traumatic (Elbert et al., 2010). The enjoyment of violence in men had been postulated in psychological research before; for instance, Nell (2006) described "the emotional state of the warrior in combat" as "that of predators and hunters, with high arousal, positive affect, and heightened libido (...)". In Grossman (1996) a need for aggression is defined as "combat addiction", which develops from preceding "combat highs" where the combatant was "float[ing] around, laughing, joking, having a great time, totally oblivious to the dangers around" him. Recently, Moran, Weierstall, and Elbert (2014) demonstrated distinct neural circuitry for appetitive vs. reactive aggression.

**Theoretical model for developing appetitive aggression** Elbert et al. (2010) framed the etiological concept of appetitive aggression as an analogue to the development of the theory of distinct neural representations in PTSD: as perpetrated violent acts, and thus combat highs (the hotspot or peak of the violent act), accumulate, the memory develops a strong but fragmented associative collection of cues (interoceptive, sensory, cognitive, emotional) gathered at different points in time. As with traumatic events, context-related neural structures are assumed to be less active in combat highs, and thus implicit/hot and explicit/cold information will be represented in distinct memory structures. In contrast to the fear network, the so-called hunting network contains a positive valence that may be caused by the initiation of neural reward circuits. The cycle of positive combat high "intrusions" – "approach" – "alteration of mood and cognition" (positive) – "hypervigilance" begins, as an antidote to posttraumatic stress "intrusions" – "avoidance" – "alteration of mood and cognition" (negative) – "hypervigilance" (cf. Weierstall & Elbert, 2012; Hecker, Hermenau, Mädl, Schauer, & Elbert, 2013). Figure 1.4 illustrates the hunting network.

Violence – regardless whether witnessed, experienced or perpetrated – shares a considerable number of cues (e.g., blood, suffering, screaming, knife, weapon, or heart beat), which may be associated with both trauma and/or perpetration. Therefore, the hunting and the fear networks are linked – they do not however merge due to their opposing valence. According to the context and the current brain state, external stimuli can trigger one or the other network, and thus the corresponding cognitions, emotions, interoception, behavior and/or sensory perception (see Figure 1.5). The line between posttraumatic stress and appetitive aggression blurs with each additional ambivalent cue that is associated with
traumatic stress and combat high.

**Figure 1.5:** Interplay of the fear and hunting network. A positive excitement (A) or fear (B) dominates ambivalent or shared cues of combat. With each additional cue that is shared by the two networks the distinction of traumatic stress and combat high becomes blurred.

Due to the potential domination of shared cues by the hunting network, appetitive aggression may have a preventive effect on posttraumatic stress. This had been demonstrated in various studies (e.g., Weierstall, Schaal, Schalinski, Dusingizemungu, & Elbert, 2011, later studies replicating the effect are illustrated in Table 1.1). This antagonistic effect seems to be constrained to patients with low to moderate PTSD symptom severity. After a certain threshold of traumatic events, even people with high appetitive aggression will succumb to PTSD (Weierstall, Castellanos, Neuner, & Elbert, 2013).

During the last five years, the concept has been validated in various countries, including Germany, South Africa, DRC, Burundi, Uganda, Rwanda, and Colombia. Table 1.1 at the end of this part of the thesis lists the studies and their major conclusions. In sum, the
major findings demonstrate that (1) heightened levels of appetitive aggression are common in former combatants/veterans, even years after their demobilization, (2) a building block effect for appetitive aggression, i.e., the more types of violent acts are committed, the higher the level of appetitive aggression (see also the building block effect for posttraumatic stress; Schauer et al., 2003), (3) a heightened level of appetitive aggression has a protective impact on posttraumatic stress – up to a certain threshold of PTSD symptom severity, and (4), higher ranks in the armed group and other military incentives seem to be associated with a stronger tendency towards violence; thus, appetitive aggression is an adaptive mechanism in humans living in hostile conditions.

The appetitive perception of violence may have saved one’s life at war, however in civilian context becomes highly destructive. Appetitive aggression may facilitate violence at an internal-personal, family, community and political level. Thus, psychotherapeutic interventions addressing pathological neural networks in order to reduce PTSD and appetitive aggression are necessary for the successful reintegration of former combatants.

### 1.3 Re-modeling pathological neural networks by narrative exposure

Given the pathological memory formation accounting for PTSD and appetitive aggression, psychotherapeutic treatments should facilitate the contextualization of implicit memory contents and use habituation to reduce the fear reaction. Therefore, exposure in sensu, an evidence-based tool of cognitive therapy, has been recommended as a front-line treatment for PTSD (Difede, Olden, & Cukor, 2014), also in military samples (Steenkamp & Litz, 2013). One of these exposure-based interventions is Narrative Exposure Therapy (NET; Schauer, Neuner, & Elbert, 2011, 2005).

### 1.3.1 Narrative Exposure Therapy

Over the last decade, Schauer, Neuner, & Elbert (2005, 2011) have developed NET as a short-term intervention aimed at reducing PTSD symptoms resulting from exposure to multiple traumatic events. NET is a combination of classical exposure in sensu with testimony therapy (Cienfuegos & Monelli, 1983), and comprises 8-12 individual sessions of approximately 90 minutes. The intervention is manualized, brief, disseminable, culturally sensitive, and has proved applicable and effective in a variety of settings (Catani et al., 2009; Ertl, Pfeiffer, Schauer, Elbert, & Neuner, 2011; Neuner, Catani, et al., 2008; Robjant & Fazel, 2010).
Throughout the NET sessions, the client constructs a detailed chronological narration of their own biography. The first session is comprised of two parts: psychoeducation and the lifeline exercise. The latter aims at gaining an overview of the central events of the client’s life story. In the exercise, the client situates stones and flowers along a rope beginning at birth and ending at the present day with an outlook to the future; stones represent negative/traumatic events (e.g., accident, natural disaster, abuse, etc.) and flowers major positive events (e.g., wedding, graduation, etc.). In the subsequent exposure sessions, the most traumatic experiences are re-lived (emotional, sensory, cognitive, interoceptive) in order to achieve habituation of the fear reactions as well as a transformation of the generally fragmented report of traumatic events into a coherent narrative. To this end, the therapist records the event, and at the beginning of the next session, the narration is read to the patient and corrected for potential discrepancies. In the last session, the participant receives a written report of their biography, which is read to them before both the therapist and the client sign the testimony.

Over the last decade, the efficacy of NET in reducing PTSD symptoms has consistently been demonstrated in numerous clinical trials in high-, low-, and middle-income countries over a wide variety of populations (children, adolescents, adults, women, men, refugees, child soldiers; for a review see Robjant & Fazel, 2010).

1.3.2 Narrative Exposure Therapy for Forensic Offender Rehabilitation

For military samples, the effect of these interventions seems to be diminished. Steenkamp and Litz (2013) report mainly moderate effects in their review of clinical trials with US military personnel and Stenmark, Guzey, Elbert, and Holen (2014) demonstrated that the status of combatant reduced the efficacy of NET in a refugee sample. Furthermore, appetitive forms of aggression are not addressed in either of these interventions.

In response to these shortcomings, Elbert, Hermenau, Hecker, Weierstall, and Schauer (2012) upgraded NET to address the pathological formation of both the fear and hunting network. Furthermore, FORNET addresses the often difficult transition from combatant to civilian by means of Interpersonal Therapy in a group setting (G-IPT); G-IPT had been shown to effectively improve functioning in Uganda (Bolton et al., 2007) and Rwanda (Schaal, Elbert, & Neuner, 2009).

Major differences between NET and FORNET include (1) the number of exposure sessions: 5 instead of 8-12 sessions; (2) an additional symbol for the lifeline: a stick representing active involvement in violent acts (e.g., combat, rape, massacre, etc.) in an attempt to avoid emotional valence or moral judgment being associated with such events;
(3) a mandatory exposure in sensu to the first killing/injury, first rape/sexual assault and other major perpetrated act(s) (if present in the lifeline). After the narration of these events, particular focus is given to the inhibitory threshold the client overcame to harm the person(s) and the diminution of this threshold in subsequent acts. Concluding the narration, the client is encouraged to articulate current thoughts and feelings about the event; (4) no written narration; and (5) the 2 final group sessions (1.5 h) that consist of two therapists and 4-5 clients. Focusing on the role change from combatant to civilian, the clients are encouraged to discuss positive and negative aspects of their roles as combatant vs. civilian and finally to frame their future hopes and wishes.

Evidence  Up until this point there have been two clinical trials of FORNET: Hermenau, Hecker, Mädl, Schauer, and Elbert (2013) found FORNET to reduce PTSD symptoms and closeness to military life in a sample with former Congolese child soldiers of a reintegration center in Goma, North Kivu, eastern DRC; Crombach and Elbert (2014b) demonstrated that former street kids in Burundi who received FORNET committed fewer violent acts compared to those in a waiting list control condition.

1.3.3 Beyond (FOR)NET

There are various other treatments applied in humanitarian and/or military settings. For instance, McMullen, O’Callaghan, Shannon, Black, and Eakin (2013) conducted a clinical trial with former child soldiers in the eastern DRC using group trauma-focused cognitive behavioral therapy (tf-CBT); the intervention significantly reduced PTSD, psychosocial distress, depression/anxiety, conduct problems and increased prosocial behavior. Individual cognitive processing therapy (CPT) had been effectively applied in an open trial with US war veterans (Chard, Schumm, Owens, & Cottingham, 2010), was however less effective in a group setting (Alvarez et al., 2011). In military settings, various interventions that also make use of technology have emerged over the last decade (for a review see Zinzow, Britt, McFadden, Burnette, & Gillispie, 2012). In refugee settings, trauma-focused approaches (e.g., prolonged exposure, NET, tf-CBT, testimony therapy) have been favorable over multimodal interventions (constituting of psychosocial support, physiotherapy, medication, psychotherapy, general counseling, etc.) in a review of psychological treatment of PTSD (Nickerson, Bryant, Silove, & Steel, 2011). Nevertheless, there is a need to develop evidence-based front-line approaches to meet the particular needs of patients in resource-poor settings. Thereby, interventions employed in the field need to be empirically tested; up until now, the high standards and guidelines of clinical trials were often not addressed as rigorously as it is common in high-income settings. (Tol et al., 2011). (FOR)NET has the outstanding advantage of being highly manualized, culturally sensitive, and therefore perfectly tailored.
1 Introduction

for interventions in post-conflict regions.

1.3.4 Psychotherapeutic interventions and DDR

Posttraumatic stress symptoms have gained increasing attention over the last years in DDR programs. Schulhofer-Wohl and Sambanis (2010) included "trauma healing" in their suggested outcome variables to measure successful implementation of DDR and also Berdal and Ucko (2013) emphasized the "omnipresence of trauma in the post-conflict societies". Nevertheless, DDR programs only occasionally include psychotherapeutic interventions (for review see Mädl, 2010); these mainly target vulnerable groups (that do usually not include adult ex-combatants), and scientific evidence for these interventions is low (Nickerson et al., 2011; Tol et al., 2011).

Literature regarding the development of appropriate mental health services in military settings is burgeoning. However, the treatment of adult (ex-)combatants in post-conflict settings, and low- and middle-income countries (LMIC) in general, is still neglected. One of the obstacles in providing mental health care in these regions is the lack of adequately trained personnel.

1.4 Dissemination

The treatment gap in post-conflict and LMICs regions is appallingly high (Saxena, Thornicroft, Knapp, & Whiteford, 2007; World Health Organization, WHO, 2011). In DRC, there are 3.3 mental health professionals (including psychiatrists, nurses, psychologists, social workers and occupational psychologists) per 1 million people (WHO, 2011). Even with the most conservative estimates of mental disorder of 15-20% (National Health Institute, NIH, 2012), a single mental health professional would be responsible for about 60 000 clients! The scarcity of adequately trained counselors is a major obstacle in the provision of effective mental health care in the DRC, but also in other LMIC and post-conflict regions in general. A key strategy to narrow the treatment gap is to scale up evidence-based interventions using local personnel and to shift tasks from clinical experts to specifically trained counselors (Jacob, Neuner, Maedl, Schaal, & Elbert, 2014; Saxena et al., 2007). A recent meta-analysis assessed the quality of evidence in regard to such dissemination endeavors; three studies meeting the requirements were included: Dybdahl (2001); Neuner, Catani, et al. (2008); Yeomans, Forman, Herbert, and Yuen (2010). The evidence for PTSD interventions addressing adults conducted by non-specialist health workers was considered "low" (Van Ginneken et al., 2013).
In three prior clinical trials, findings revealed that local counselors could effectively conduct NET after a 3-week workshop and supervision by clinical experts (Neuner, Catani, et al., 2008; Schaal et al., 2009). In a recently published study with a sample of female Rwandan genocide survivors, Jacob et al. (2014) demonstrated the effectiveness of NET conducted in a "train-the-trainer" study; local counselors were trained and supervised by formerly trained and by then experienced local counselors in a second dissemination stage.

1.5 Scope of the thesis

The present thesis aims to find ways of improving mental health care for former members of (para)military groups in post-conflict regions (and LMICs), which is at present deficient. Firstly, by gaining a better understanding of the fundamental mental health consequences that arise in the aftermath of combat and secondly testing a practical intervention adapted to treat mental health problems under the specific circumstances in post-conflict regions. The patients in this project were a group of adult Congolese ex-combatants at an early stage of their demobilization process. The following specific questions were posed:

1. How prevalent are trauma-related symptoms and appetitive aggression in Congolese ex-combatants? To what extent will PTSD rates, as defined by the DSM-IV, change as a result of the new criteria of the DSM-5?

2. What are the predictors and correlates of appetitive aggression, in contrast to those of posttraumatic stress?
   a) What types of experiences predict appetitive aggression and posttraumatic stress?
   b) How robust are these predictors?
   c) How does the current intensity of conflict impact the reported symptom severity of trauma-related disorders?
   d) Are there sensitive periods for the developing appetitive aggression? Thus, is there a linkage between particular years of age(s) of recruitment and appetitive aggression?

3. Can FORNET be effectively implemented into organizational structures like the DDR program in Goma and disseminated into a second generation of local counselors?
### Table 1.1: Summary of studies published on appetitive aggression

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Sample</th>
<th>Major findings</th>
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</thead>
<tbody>
<tr>
<td>Elbert et al.</td>
<td>2010</td>
<td>Fascination violence: on mind and brain of man hunters</td>
<td>n/a</td>
<td>Theoretical introduction of the concept.</td>
</tr>
<tr>
<td>Weierstall and Elbert</td>
<td>2011</td>
<td>The Appetitive Aggression Scale – development of an instrument for the assessment of human’s attraction to violence</td>
<td>Multiple</td>
<td>Validation of the AAS with different populations from Rwanda, Uganda, Germany, and DRC.</td>
</tr>
<tr>
<td>Weierstall et al.</td>
<td>2011</td>
<td>The thrill of being violent as an antidote to posttraumatic stress disorder in Rwandese genocide perpetrators</td>
<td>269 genocide perpetrators, Rwandan prison</td>
<td>Building block; appetitive aggression protects against the development of posttraumatic stress.</td>
</tr>
<tr>
<td>Weierstall, Huth, et al.</td>
<td>2012</td>
<td>Appetitive aggression as a resilience factor against trauma disorders: appetitive aggression and PTSD in German World War II veterans.</td>
<td>51 mal WWII veterans, Germany</td>
<td>Appetitive aggression protects against the development of posttraumatic stress, even year after combat duty.</td>
</tr>
<tr>
<td>Weierstall, Schalinski, et al.</td>
<td>2012</td>
<td>When combat prevents PTSD symptoms – results from a survey with former child soldiers in Northern Uganda.</td>
<td>42 former child soldiers, northern Uganda</td>
<td>Former abductees show higher levels of appetitive aggression; building block; appetitive aggression protects against the development of PTSD in formerly abducted child soldiers.</td>
</tr>
<tr>
<td>Hecker et al.</td>
<td>2012</td>
<td>Appetitive aggression in former combatants – derived from the ongoing conflict in DR Congo.</td>
<td>200 former combatants with combat experience, DRC</td>
<td>Building block; further, voluntary recruitment, and joined as child predicted higher levels of appetitive aggression</td>
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<td>Author, Year</td>
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<tr>
<td>Weierstall, Castellanos, et al. 2013</td>
<td>Relations among appetitive aggression, posttraumatic stress and motives for demobilization: a study in former Colombian combatants</td>
<td>252 former combatants, Colombia</td>
<td>Appetitive aggression and posttraumatic stress is similarly present for individually vs. collectively demobilized; appetitive aggression protects against the development of PTSD in (a) those who demobilized collectively, but not in those who demobilized individually and (b) up to certain trauma load.</td>
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<td>Weierstall, Haer, et al. 2013</td>
<td>Becoming cruel: Appetitive aggression released by detrimental socialization in former Congolese soldiers</td>
<td>95 former combatants, DRC</td>
<td>The younger combatants are recruited, the higher their level of appetitive aggression; building block. Higher levels of appetitive aggression and tendencies to act out violence are associated with better psychosocial functioning and fewer concerns about the future; reactive aggression is associated with lower psychosocial functioning.</td>
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<td>Weierstall, Hinsberger, et al. 2013</td>
<td>Appetitive aggression and adaptation to a violent environment among youth offenders</td>
<td>69 male youth offenders from Cape Town</td>
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<td>Crombach et al. 2013</td>
<td>Social status and the desire to resort to violence: using the example of Uganda’s former child soldiers</td>
<td>83 former child soldiers, Uganda</td>
<td>Building block; a military rank was associated with higher levels of appetitive aggression.</td>
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<tr>
<td>Author</td>
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<tr>
<td>Hecker, Hermenau, Mädl, Schauer, and Elbert</td>
<td>2013</td>
<td>Aggression inoculates against PTSD symptom severity – insights from armed groups in the eastern DR Congo.</td>
<td>105 former combatants, DRC</td>
<td>Appetitive aggression protects against the development of posttraumatic stress up to a certain trauma load.</td>
</tr>
<tr>
<td>Hecker, Hermenau, Mädl, Hinkel, et al.</td>
<td>2013</td>
<td>Does perpetrating violence damage mental health? Differences between forcibly recruited and voluntary combatants in DR Congo</td>
<td>97 forcibly and 105 voluntarily recruited combatants, DRC</td>
<td>Voluntary recruitment is associated with a higher number of perpetrated violent acts and higher levels of appetitive aggression.</td>
</tr>
<tr>
<td>Hermenau, Hecker, Mädl, et al.</td>
<td>2013</td>
<td>Growing up in armed groups: trauma and aggression among child soldiers in DR Congo</td>
<td>126 former child soldiers with combat experience, DRC</td>
<td>Building block; further, voluntary recruitment, and military rank were associated with higher levels of appetitive aggression.</td>
</tr>
<tr>
<td>Haer et al.</td>
<td>2013</td>
<td>Analyzing the microfoundations of human violence in the DRC - intrinsic and extrinsic rewards and the prediction of appetitive aggression</td>
<td>95 former combatants, DRC</td>
<td>Building block; closeness to fellows in non-abductees and receiving money for abductedees predicted higher levels of appetitive aggression.</td>
</tr>
<tr>
<td>Giebel et al.</td>
<td>2013</td>
<td>Female attraction to appetitive-aggressive men is modulated by women's menstrual cycle and men's vulnerability to traumatic stress</td>
<td>1212 female</td>
<td>Women prefer men with high levels of appetitive aggression as short-term mate, especially in their fertile window of the menstrual cycle.</td>
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</tbody>
</table>
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<tr>
<td>Crombach and Elbert</td>
<td>2014a</td>
<td>The benefits of aggressive traits: a study with current and former street children in Burundi</td>
<td>112 children and youths, Burundi</td>
<td>Lower posttraumatic stress was associated with higher levels of appetitive aggression; higher levels of appetitive aggression were associated with a higher risk of displaying violent acts.</td>
</tr>
<tr>
<td>Weierstall et al.</td>
<td>2014</td>
<td>Testosterone reactivity and identification with a perpetrator or a victim in a story are associated with attraction to violence-related cues</td>
<td>145 university students (75 women)</td>
<td>Testosterone moderates attraction to cruel and violent cues in men.</td>
</tr>
<tr>
<td>Schaal et al.</td>
<td>2014</td>
<td>Posttraumatic Stress Disorder and appetitive aggression in Rwandan genocide perpetrators</td>
<td>200 genocide perpetrators, Rwanda</td>
<td>Building block; higher levels of appetitive aggression were associated with low levels of positive and high levels of negative religious coping.</td>
</tr>
<tr>
<td>Nandi et al.</td>
<td>In sub</td>
<td>Predictors of posttraumatic stress and appetitive aggression in active soldiers and former combatants</td>
<td>556 active soldiers and 392 former combatants, Burundi</td>
<td>The combination of childhood maltreatment and more perpetrated violent acts predicted higher levels of appetitive aggression.</td>
</tr>
<tr>
<td>Nandi et al.</td>
<td>In sub</td>
<td>Coping with the burden of armed conflicts – appetitive aggression and its relation to posttraumatic stress in Burundian ex-combatants</td>
<td>392 ex-combatants, Burundi</td>
<td>Appetitive aggression protected form developing posttraumatic stress up to a certain trauma load.</td>
</tr>
</tbody>
</table>

...continued...
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Sample</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran et al.</td>
<td>In sub</td>
<td>Differences in brain circuitry for appetitive and reactive aggression as revealed by realistic auditory scripts</td>
<td>50 students, Germany</td>
<td>Left frontal activity for reactive and appetitive auditory aggression induction; lower neurooscillatory activity in right parietal/temporal regions (associated with theory of mind and empathy) appetitive vs. reactive auditory aggression induction.</td>
</tr>
<tr>
<td>Köbach, Schaal and Elbert</td>
<td>In sub</td>
<td>Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress</td>
<td>95 former combatants, DRC</td>
<td>Building block; better prediction by violent acts with predatory cues.</td>
</tr>
<tr>
<td>Köbach, Nandi et al.</td>
<td>In sub</td>
<td>Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress: a replication study</td>
<td>367 former combatants, Burundi</td>
<td>Replication: building block; better prediction by violent acts with predatory cues.</td>
</tr>
<tr>
<td>Schaal et al.</td>
<td>In sub</td>
<td>Posttraumatic Stress Disorder according to DSM-5 and DSM-IV diagnostic criteria: A comparison in a sample of Congolese ex-combatants</td>
<td>95 former combatants, DRC</td>
<td>Perpetrated events are rarely figured as worst event; the total score of perpetrated events did not predict posttraumatic stress.</td>
</tr>
<tr>
<td>Köbach and Elbert</td>
<td>In sub</td>
<td>Sensitive periods for developing a robust trait of appetitive aggressive</td>
<td>95 former combatants, DRC</td>
<td>Sensitive periods of appetitive aggression are at 16 and 17 years of age.</td>
</tr>
</tbody>
</table>

...continued...
### Table 1.1: Summary of studies published on appetitive aggression

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
<th>Sample</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meyer-Parlapanis et al.</td>
<td>In prep</td>
<td>Battle and the sexes: appetitive aggression in Burundian combatants and civilians</td>
<td>30 active combatants and 40 civilians, Burundi</td>
<td>As in male combatants, (matched) female combatants likewise present with appetitive aggression.</td>
</tr>
<tr>
<td>Sommer et al.</td>
<td>In prep</td>
<td>Working title: The influence of social acknowledgment on appetitive aggression and posttraumatic stress</td>
<td>295 young offenders from two South African townships</td>
<td>PTSD and appetitive aggression are associated with lower acceptance inside the community and the family.</td>
</tr>
<tr>
<td>Hermenau, Hecker, Schaal, et al.</td>
<td>2013</td>
<td>Addressing posttraumatic stress and aggression by means of Narrative Exposure: a randomized controlled trial with ex-combatants in the eastern DRC</td>
<td>30 former child soldiers, DRC</td>
<td>FORNET reduced posttraumatic stress and closeness to other combatants.</td>
</tr>
<tr>
<td>Crombach and Elbert</td>
<td>2014b</td>
<td>Controlling offensive behavior using Narrative Exposure Therapy: a randomized controlled trial of former street children</td>
<td>32 street kids, Burundi</td>
<td>FORNET reduced the number of recent offenses and physical health complaints.</td>
</tr>
<tr>
<td>Köbach, Schaal, Hecker and Elbert</td>
<td>In sub E</td>
<td>Effectiveness and dissemination of FORNET</td>
<td>98 ex-combatants, DRC</td>
<td>FORNET reduced posttraumatic stress and depression severity and Drug Dependence at a clinical level as well as facilitated reintegration.</td>
</tr>
</tbody>
</table>

Note: 1 see Chapter 2, 2 see Chapter 3, 3 see Chapter 4, 4 see Chapter 5, 5 see Chapter 6; building block = the more perpetrated violent acts, the higher the level of appetitive aggression; please note that samples of different studies may overlap.
Part II

Research Articles
2 Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress

2.1 Abstract

Former members of armed groups in the eastern Democratic Republic of Congo (DRC) had typically witnessed, experienced and perpetrated extreme forms of violence. Enhanced trauma-related symptoms have been shown in prior research. Lashing out in self-defense is part of this constellation of symptoms, as a typical response to threat. This is termed reactive aggression. Another potential response is appetitive aggression, in which the perpetration of excessive violence is perceived as pleasurable (combat high). What roles do these forms of aggressive behavior play in modern warfare and how are they related to posttraumatic stress symptoms?

To answer this question, we sought to determine predictors for appetitive aggressive and trauma-related mental illness, and investigated the frequency of psychopathological symptoms for high- and low-intensity conflict demobilization settings. To this end, we interviewed 213 former members of (para)military groups in the eastern DRC in regard to their combat exposure, posttraumatic stress, appetitive aggression, depression, suicidality, and drug dependence.

Random forest regression embedded in a conditional inference framework revealed that perpetrated violent acts are not necessarily stressful. In fact, the exertion of violent acts that typically implicated salient cues of hunting (e.g., blood, suffering of the victim, etc.) had the strongest association with an appetite for aggression. Furthermore, the number of lifetime perpetrated violent acts was the most important predictor of appetitive aggression. However, the number of perpetrated violent acts did not significantly affect posttraumatic stress. Greater intensity of conflict was associated with more severe posttraumatic stress and depression.
Psychotherapeutic interventions that address appetitive aggression in addition to trauma-related mental illness, including drug dependence are therefore indispensable for a successful reintegration of those who fought in the current civil wars.

**Keywords:** ex-combatant, soldier, demobilization, DDR, DRC, aggression, PTSD, violence.

### 2.2 Introduction

Exposure to combat has consistently been associated with heightened risks for posttraumatic stress disorder (PTSD) and other trauma-related symptoms, including substance use disorders and depression (Heltemes et al., 2014; Hoge et al., 2004; Odenwald et al., 2009; Priebe et al., 2013; Schaal et al., 2012; Dohrenwend et al., 2006; Thomas et al., 2010). It has been argued that trauma symptoms in veterans are particularly prominent among those who have participated in killing (Maguen et al., 2009, 2010, 2011; MacNair, 2002; Van Winkle & Safer, 2011).

In addition to psychiatric disorders, a growing body of research reports elevated aggressive behaviors within military populations (Morland et al., 2012). Prior investigations have shown that violent outbursts (e.g., intimate partner violence; for a review, see Jones, 2012) are often associated with hypervigilance and/or impulsiveness – symptoms typically related to PTSD (MacManus, Dean, & Jones, 2013; Morland et al., 2012). Moreover, there is growing evidence that active members of armed groups and ex-combatants may find violent acts appealing (Elbert et al., 2013; Hecker et al., 2012; Hecker, Hermenau, Mädl, Hinkel, et al., 2013; Weierstall et al., 2011; Weierstall, Schalinski, et al., 2012; Weierstall, Castellanos, et al., 2013; Haer et al., 2013; Elbert et al., 2010). In fact, aggressive behavior is usually a mixture of the following forms (Vitiello & Stoff, 1997): reactive aggression describes an impulsive, affective and uncontrolled (automatic) violent behavior provoked by a perceived or real threat. Predatory aggression is a controlled action pursued to achieve a certain goal (Anderson & Bushman, 2002; Nell, 2006). Appetitive aggression is motivated by intrinsic reward and thus describes the human potential to perceive perpetrated violence as fascinating and exciting (Elbert et al., 2010). Previous studies have revealed a positive relationship between the number of acts of violence an individual has perpetrated and appetitive aggression (Weierstall, Haer, et al., 2013; Weierstall & Elbert, 2011). Furthermore, a protective effect of appetitive aggression on posttraumatic stress symptoms has been noted in several war scenarios (Weierstall et al., 2011; Weierstall, Schalinski, et al., 2012; Weierstall, Castellanos, et al., 2013; Hecker, Hermenau, Mädl, Hinkel, et al., 2013). In addition to elevated interpersonal aggression, an increased propensity towards risk-taking has been reported among US army soldiers returning from Operation Iraqi Freedom (OIF;
Combat exposure includes various forms of witnessed and experienced traumatic events as well as perpetrated violent acts that can be both traumatic and exciting or rewarding, respectively (Elbert et al., 2010; MacNair, 2002). To our knowledge, there is as yet no research on the contribution of particular traumatic events and perpetrated acts to either posttraumatic stress or appetitive aggression. The high number of predictors, and/or the exclusion of potential confounding variables would lead to weak statistical models with low external validity if parametric statistics were to be used. Also relatively large clinical samples would be required and in many cases the models are not in accord with the theoretical basis of clinical psychology, which deals with abnormal behavior (i.e., behavior that is not typically found in the population and thus not normally distributed). Random forest with conditional inference trees (Hothorn, Hornik, & Zeileis, 2006; Strobl, Malley, & Tutz, 2009) is a flexible and attractive alternative. The non-parametric machine learning technique typically analyzes data sets with many predictors providing rankings according to their importance in regard to the factor. In the analysis we applied the method to examine the relation of different critical events/acts with appetitive aggression and posttraumatic stress, respectively.

In most post-conflict regions, the transition from war to peace is troubled with occasional fighting. The access to data concerning potentially varying levels of trauma-related symptoms associated with the intensity of armed conflict is important to mental health care providers in these regions and therefore, will also be addressed in this article.

We investigated demobilizing members of armed groups in North Kivu, where numerous foreign and local armed groups have been sustaining an extremely cruel armed conflict for two decades. Fear and violence are used not only to control territory and resources, but are also carried out in a seemingly self-perpetuating manner. Rape, torture and killing as well as atrocities such as cutting off ears, lips or breasts are frequent (Eck & Hultman, 2007). Soldiers witness, experience and commit extreme forms of violence in their everyday lives. To stabilize the region, MONUSCO (Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo) facilitates the demobilization of armed rebels. The mandate allows active soldiers to give up their weapons and uniforms and return to their home villages as civilians.

The data assessment took place during two differing phases regarding the intensity of the conflict in the eastern DRC (LC phase = low-intensity conflict and HC phase = high-intensity conflict). In November 2012, the security and political situation in the DRC seriously deteriorated after a period of stability. At the peak of its territorial extension, the (at the time) most influential non-governmental armed group, the M23 (Movement Mars 23), captured the regional capital of Goma. Atrocities and insecurity increased until November 2013, when the M23 was defeated in a collaborative counterstrike of the national army and
the Forced Intervention Brigade of MONUSCO.

2.3 Methods and materials

2.3.1 Participants

All Congolese ex-combatants who joined the MONUSCO Disarmament, Demobilization and Reintegration (DDR) program during the study period and who were older than 18 years were interviewed. A total of 118 interviews were conducted during the LC phase, and 95 interviews were conducted during the HC phase. Table 2.1 shows the basic sociodemographic characteristics of the sample. The majority of participants belonged to the Hutu (49.3%, n = 105), Nande (20.2%, n = 43) or Hunde (12.7%, n = 27) ethnic groups. They had served as combatants for between one month and 24 years (M = 51.56, SD = 51.29), often for different armed groups (two or more different armed groups: 41.8%, n = 103). About two-thirds (65.4%, n = 140) reported that they had been forcibly recruited at least once, whereas 59.2% (n = 126) reported having voluntarily joined an armed group at least once. The mean age of first recruitment was 17.90 years (SD = 6.05, range: 4-35). More than two-thirds (67.5%, n = 143) of the ex-combatants were recruited for the first time before the age of 18 years. Participants had fought for as many as five armed groups (M = 1.84, SD = 1.08) and reported having demobilized from various local Mai-Mai groups (39.9%, n = 85), armed groups from Rwanda (i.e., Forces Démocratique pour la Libération du Rwanda, FDLR; 22.1%, n = 47), the Patriots Résistants Congolais (Pareco; 5.2%, n = 11) and the M23/CNDP (Movement 23/Congrès National pour la Defense du Peuple; 30.0%, n = 64). 2.8% (n = 6) of participants reported that they had fought for other armed groups. The participants did not significantly differ in their sociodemographic characteristics according to their group affiliation.

2.3.2 Procedure

Interviews were conducted individually at a secluded place in the MONUSCO demobilization camp as part of the respective DDR program. Interviews lasted between 1.5 and 2.5 hours. Participants gave their informed consent in writing or (if illiterate) verbally. All of the subjects who were approached agreed to participate. There was no financial compensation offered. All ex-combatants who arrived at the camp during the following time periods were interviewed and included in the analysis: July 23rd to 29th, August 7th to 17th and August 30th to September 15th, 2012 (LC phase); February 2nd to 11th, February 27th to March 13th and March 26th to April 5th, 2013 (HC phase). The ethical commission
Table 2.1: Sociodemographic data, exposure to violence, and mental health of combatants who demobilized in the low- and high- conflict intensity phases (LC and HC)

<table>
<thead>
<tr>
<th></th>
<th>LC phase</th>
<th></th>
<th>HC phase</th>
<th></th>
<th>t(211)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M \pm SD$</td>
<td>[CI]</td>
<td>$M \pm SD$</td>
<td>[CI]</td>
<td></td>
</tr>
<tr>
<td><strong>Sociodemographic data</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of education</td>
<td>4.24 ±4.17</td>
<td>[3.48-5.00]</td>
<td>5.00 ±3.92</td>
<td>[4.20-5.80]</td>
<td>-1.36</td>
</tr>
<tr>
<td>Months spent in the AG</td>
<td>46.92 ±47.33</td>
<td>[38.21-55.62]</td>
<td>57.23 ±55.47</td>
<td>[45.93-68.53]</td>
<td>-1.46</td>
</tr>
<tr>
<td><strong>Exposure to violence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifetime traumatic events (wit.)</td>
<td>5.53 ±2.04</td>
<td>[5.16-5.91]</td>
<td>6.38 ±1.32</td>
<td>[6.11-6.65]</td>
<td>-3.49***</td>
</tr>
<tr>
<td>Lifetime traumatic events (exp.)</td>
<td>4.34 ±2.19</td>
<td>[3.94-4.74]</td>
<td>5.66 ±1.85</td>
<td>[5.29-6.04]</td>
<td>-4.69***</td>
</tr>
<tr>
<td>Lifetime perpetrated violence</td>
<td>2.91 ±2.38</td>
<td>[2.47-3.34]</td>
<td>4.44 ±1.80</td>
<td>[4.08-4.81]</td>
<td>-5.20***</td>
</tr>
<tr>
<td><strong>Mental health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitative Aggression (AFAS)</td>
<td>4.00 ±6.70</td>
<td>[2.78-5.22]</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Appetitive Aggression (AFAS)</td>
<td>2.95 ±6.03</td>
<td>[1.85-4.05]</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Appetitive Aggression (AAS)</td>
<td>-</td>
<td>-</td>
<td>21.91 ±14.80</td>
<td>[18.89-24.92]</td>
<td>-</td>
</tr>
<tr>
<td>PHQ-9 total score</td>
<td>5.10 ±5.19</td>
<td>[4.16-6.05]</td>
<td>7.40 ±5.33</td>
<td>[6.31-8.49]</td>
<td>-3.17**</td>
</tr>
<tr>
<td>TCUDS II total score</td>
<td>2.59 ±2.93</td>
<td>[2.06-3.13]</td>
<td>2.54 ±3.05</td>
<td>[1.92-3.16]</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Note. *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$; 1$n = 116$, 1a$t(209)$; 2$n = 117$, 2a$t(210)$; LC phase: $n = 118$; HC phase: $n = 95$; wit.=witnessed; exp.=experienced; AG = armed group; PSS-I=PTSD Symptom Scale-Interview; AFAS=Appetitive and Facilitative Aggression Scale; AAS=Appetitive Aggression Scale; PHQ-9=Patient Health Questionnaire-9, a measure for depressive symptoms; TCUDS II=Texas Christian University Drug Screen II.
Table 2.2: Lifetime exposure to violence (witnessed, experienced, and perpetrated)

<table>
<thead>
<tr>
<th></th>
<th>LC phase</th>
<th>HC phase</th>
<th>Chi²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Witnessed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you ever witnessed dead bodies?</td>
<td>89.8 (106)</td>
<td>97.9 (93)</td>
<td>5.57*</td>
</tr>
<tr>
<td>Have you ever witnessed someone being physically assaulted (e.g., slapped)?</td>
<td>86.4 (102)</td>
<td>95.8 (91)</td>
<td>5.41*</td>
</tr>
<tr>
<td>Have you ever seen someone being killed (or killing him/herself)?</td>
<td>81.4 (96)</td>
<td>91.6 (87)</td>
<td>4.55*</td>
</tr>
<tr>
<td>Have you ever witnessed someone being physically assaulted with a weapon?</td>
<td>76.3 (90)</td>
<td>95.8 (91)</td>
<td>15.7***</td>
</tr>
<tr>
<td>Has a close friend/family member ever had a life-threatening illness or injury?</td>
<td>71.2 (84)</td>
<td>87.4 (83)</td>
<td>8.14**</td>
</tr>
<tr>
<td>Experienced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you ever been assaulted with a weapon (e.g., shot, stabbed)?</td>
<td>73.7 (87)</td>
<td>91.6 (87)</td>
<td>11.21**</td>
</tr>
<tr>
<td>Have you ever been physically assaulted (e.g., slapped, kicked, beaten up)?</td>
<td>61.0 (72)</td>
<td>84.2 (80)</td>
<td>13.85***</td>
</tr>
<tr>
<td>Have you ever suffered from a life-threatening illness or injury?</td>
<td>67.8 (80)</td>
<td>74.7 (71)</td>
<td>1.23</td>
</tr>
<tr>
<td>Have you ever experienced a life-threatening explosion?</td>
<td>52.2 (62)</td>
<td>77.9 (74)</td>
<td>14.66</td>
</tr>
<tr>
<td>Have you ever been threatened to be killed by your commander/superior?</td>
<td>56.8 (67)</td>
<td>66.3 (63)</td>
<td>2.01</td>
</tr>
<tr>
<td>Self-committed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you ever stolen food to survive?</td>
<td>72.0 (85)</td>
<td>74.7 (71)</td>
<td>0.2</td>
</tr>
<tr>
<td>Have you ever you ever killed someone?</td>
<td>53.4 (63)</td>
<td>92.6 (88)</td>
<td>39.28***</td>
</tr>
<tr>
<td>Have you ever physically assaulted someone with a weapon (e.g., shot, slapped)?</td>
<td>38.1 (45)</td>
<td>86.3 (82)</td>
<td>50.75***</td>
</tr>
<tr>
<td>Have you ever physically assaulted someone (e.g., slapped, kicked, beaten up)?</td>
<td>39.8 (47)</td>
<td>70.5 (67)</td>
<td>19.93***</td>
</tr>
<tr>
<td>Have you ever attacked a village or settlement?</td>
<td>39.8 (47)</td>
<td>70.5 (67)</td>
<td>19.93***</td>
</tr>
</tbody>
</table>

Note. * p ≤ .05, ** p ≤ .01, *** p ≤ .001; LC phase: n = 118; HC phase: n = 95.
of the University of Konstanz approved the study. The questionnaires used in the study were translated into Kiswahili and back by independent groups of translators from Goma. The interviews were conducted by a group of local interviewers (one psychologist, four psychology students and one translator). These interviewers were trained during an intensive ten-day session in the basic theoretical concepts underlying the research and in sensitive and empathic interviewing techniques. The interviewers received follow-up training in October 2012 (3 days) and in February 2013 (7 days). Throughout the data collection periods, interviewers were closely supervised by clinical experts and received extensive feedback. All of the diagnostic instruments described in the following section were administered as clinical interviews.

2.3.3 Measures

Sociodemographic information was obtained from each participant and included age, ethnicity, educational background and details regarding the participant’s military career.

Exposure to violence A 31-item event checklist adapted from previous studies of similar populations (Hecker et al. 2013; Hecker et al. 2012) was administered to assess lifetime exposure to different types of potentially traumatic events (experienced and witnessed) and perpetrated violent acts (war and non-war related). The total number of types of witnessed (possible range: 0-10) and experienced (possible range: 0-12) traumatic events and the number of types of perpetrated violent acts (possible range: 0-9) was calculated. Reliability measures showed that the applied event checklist had good consistency (Cronbach’s $\alpha = 0.87$) and high inter-rater reliability (Cohen’s $\kappa = 0.89$).

Posttraumatic stress Participants’ diagnostic status and PTSD symptom severity were assessed using the PTSD Symptom Scale-Interview (PSS-I; Foa & Tolin, 2000). The PSS-I assesses the 17 DSM-IV (APA, 2000) symptom criteria for PTSD and assesses symptom intensity during the previous month. Each item is rated on a four-point scale ranging from 0 (not at all/only once) to 3 (five or more times per week/almost always). PTSD severity was calculated by summing all of the symptom scores (possible scores range from 0-51). Internal consistency and inter-rater reliability revealed excellent values (Cronbach’s $\alpha = 0.89$; intraclass correlation coefficient, ICC = 0.98).

Appetitive aggression Appetitive aggression was assessed using the Appetitive and Facilitative Aggression Scale (AFAS; LC phase) and the Appetitive Aggression Scale (AAS, Weierstall & Elbert, 2011; HC phase). The AAS has been shown to have excellent psychometric properties but does not assess reactive aggression. The 30-item AFAS assesses
current appetitive and reactive ("facilitative") aggression during the four weeks prior to testing. Subjects rate statements on a five-point frequency scale ranging from 0 (never) to 4 (more than two times a week). Items include the following: "Was it fun for you to fight?"; "Did you look at violent imagery and find that you needed to see even more violent pictures to maintain your fascination?"; "Did you feel relieved after you screamed at someone?". The AFAS scores for reactive, appetitive and total aggression are calculated by adding the item scores (possible scores range from 0-60 for both reactive and appetitive aggression and from 0-120 for the total AFAS score). The psychometric properties for the total score were excellent (Cronbach’s $\alpha = 0.94$ and ICC = 0.89). The AAS consists of only 15 items, which are rated by respondents on a five-point scale ranging from 0 (I totally disagree) to 4 (I totally agree). The items solicit information about participants’ appetitive perception of violence (e.g., "Is it exciting for if you make an opponent really suffer?"; "Once fighting has started, do you get carried away by the violence?"). The AAS has been successfully implemented (e.g., Hecker et al., 2012; Weierstall, Schalinski, et al., 2012) and validated (Weierstall & Elbert, 2011) in comparable East African samples. The AAS score is calculated by adding the scores of the 15 items (possible scores range from 0-60). Psychometric property measures indicated excellent internal consistency (Cronbach’s $\alpha = 0.91$) and high inter-rater reliability (ICC = 0.96) in this study.

**Depression** Diagnostic status and depression symptom severity were determined using the Patient Health Questionnaire-9 (PHQ-9; Kroenke & Spitzer, 2002). The nine items correspond to the DSM-IV symptom criteria for major depression and assess the participants’ feelings two weeks prior to testing. Each item is rated on a four-point scale ranging from 0 (not at all) to 3 (nearly every day). Following recommendations in the literature, cut-off values of 5, 10, 15, and 20 represent the respective thresholds for mild, moderate, moderately severe and severe depression (Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004; Kroenke, Spitzer, Williams, & Löwe, 2010). In this sample, the Cronbach’s $\alpha$ coefficient was .84, and the ICC indicated excellent inter-rater reliability (ICC = 0.96).

**Drug dependence** Drug Dependence was diagnosed according to DSM-IV symptom criteria using the Texas Christian University Drug Screen II (TCUDS II; K. Knight, Simpson, Janis, & Morey, 2002, a standardized 9-item tool that assesses (yes/no) each criterion according to the participant’s behavior in the past 12 months. The severity of drug dependence was calculated by summing up all of the items (possible range: 0-9). In evaluations, the instrument has demonstrated stability across racial and ethnic subgroups (Simpson, Joe, Knight, Rowan-Szal, & Gray, 2012). Its psychometric properties are very strong (Cronbach’s $\alpha = 0.90$, Cohen’s $\kappa = 0.90$).
2.3.4 Analysis

The descriptive data are presented as frequencies (%), means and standard deviations. Group differences were analyzed using independent sample $t$-tests for continuous variables and $\chi^2$-tests for categorical variables. Fisher’s Exact test was applied in cases of cell frequencies less than five. The reported statistical tests are two-tailed. Inter-rater interviews ($N = 44$) were conducted throughout the assessment process. Following Hallgren (2012), we computed intraclass correlation coefficients (ICC; two-way, mixed; absolute agreement) for ordinal data and Cohen’s $\kappa$ for nominal data using SPSS Version 21.

To consider complex interactions of the applied predictors (as suggested in recent research on appetitive aggression; Weierstall, Schalinski, et al., 2012; Hecker, Hermenau, Mädli, Hinkel, et al., 2013) as well as to overcome limitations in sample size, nonlinearity and homoscedasticity required for robust parametric analysis, we used a particular form of classical random forest (Breiman, 2001) embedded in a conditional inference framework (hereafter "conditional inference random forests" or RF-CI; Hothorn, Hornik, & Zeileis, 2006). Unlike the classical random forest, the RF-CI does not display a bias towards predictors with many categories in the variable selection process (Strobl, Boulesteix, Kneib, Augustin, & Zeileis, 2008). Following the principles of ensemble methods, a certain number of trees (ntree) are aggregated to compose the random forest. Each tree is built using binary splits of the previously subsampled data (subsampling rate = 63.2%; Strobl, 2008; Strobl, Hothorn, & Zeileis, 2009). The splitting variable is chosen according to the strength of the association between the covariates and the outcome (Hothorn, Hornik, & Zeileis, 2006; Strobl, Malley, & Tutz, 2009) from a set of randomly preselected predictors ($p$, mtry, $p/3$; Grömping, 2009). Next, the importance of each predictor variable is ranked based on the ensemble of trees (conditional variable importance, cvi; Strobl et al., 2008). To visualize the results, we built single trees from the whole data set. These are, however, less robust (e.g., biased by outliers) and should not be interpreted without considering the results of the whole ensemble. The goodness of fit can be assessed using the out-of-bag data (OOB). The results are used to calculate a Pseudo-$R^2$ from the mean squared error (MSE) and the total sum of squares (SST; $OOB-R^2 = 1 - \text{MSE}/\text{SST}$; Grömping, 2009).

To explore the relationship between appetitive aggression, posttraumatic stress and traumatic events/violent acts, we computed four separate RF-CI models using the data from the HC phase to assure comparability ($n = 95$). In the first two models, we regressed specific events/acts on appetitive aggression and posttraumatic stress levels and, in the remaining two models, on the number of traumatic events, separating witnessed and experienced traumatic stressors and violent acts.

The random forest analysis was conducted using R (version 2.15.0). The implementation we used was cforest (Hothorn, Bühlmann, Dudoit, Molinaro, & van der Laan, 2006) from
the R package party (Strobl, Hothorn, & Zeileis, 2009) with unbiased variable selection (Hothorn, Bühlmann, et al., 2006; Hothorn, Hornik, & Zeileis, 2006). Details, including code and results for the four RF-CI models, can be accessed in the Supplemental Material.

2.4 Results

2.4.1 Exposure to violence

Combatants were exposed to a broad range of life-threatening experiences and reported having perpetrated various violent acts. This was particularly true among those who demobilized during the HC phase. These details are shown in Table 2.1 and Table 2.2 lists the five most frequently reported experiences for each category.

2.4.2 Mental health and appetitive aggression

Table 2.1 summarizes the severity of PTSD, appetitive aggression, depression, and substance dependence for high (HC phase) and low (LC phase) conflict intensity.

**PTSD** A total of 32.7% (n = 70) of the participants fulfilled the diagnostic criteria for PTSD. The rate for current PTSD of ex-combatants interviewed during the HC phase was 44.2% (n = 42) compared to 23.5% (n = 28) for ex-combatants demobilizing during the LC phase, \( \chi^2(1, N = 213) = 10.27, p = .002 \). Figure 2.1 illustrates that conflict intensity boosts PTSD symptoms in ex-combatants with middle to high trauma load (<12 events), in addition to the sole effect of the higher number of traumatic events ex-combatants in the HC phase had experienced. The number of year(s) since the worst events did not differ between the two phases (\( M_{LC} = 2.87, SD_{LC} = 3.41; M_{HC} = 2.78, SD_{HC} = 4.07; t(208) = .22, p = .83 \)).

**Major Depression, Drug Dependence and Suicidality** Participants who demobilized in the high conflict setting (HC phase) suffered more from mild (HC: 29.5%; LC: 20.2%), moderate (HC: 23.2%; LC: 17.6%), and moderate to severe (HC: 12.3%; LC: 4.2%) depression than did those who demobilized during the LC phase, \( \chi^2(4, N = 213) = 12.47, p = .009 \). The DSM-IV diagnostic criteria for Drug Dependence were met by 41.6% (n = 89) of the total sample. There was no significant difference in the rate of Drug Dependence between the LC (42.0%, n = 50) and HC (41.1%, n = 39) phases, \( \chi^2(1, N = 213) = 0.02, p = .89 \). More than half of the participants who fulfilled the diagnostic criteria for PTSD also suffered from Drug Dependence (60.0%, n = 42). Low-level suicidal ideation were present
Figure 2.1: The logarithmic least square fitted conditional mean (smoothed with 95% CI) of the PSS-I total score and the number of lifetime traumatic events by low (LC) and high (HC) conflict phase in approximately a quarter of the participants (LC phase: 26.3%, \( n = 31 \); HC phase: 25.3%, \( n = 24 \)). Between 5-10% reported a moderate (LC phase: 2.2%, \( n = 3 \); HC phase: 5.3%, \( n = 5 \)) to high (LC phase: 5.9%, \( n = 7 \); HC phase: 9.5%, \( n = 9 \)) suicide risk, \( \chi^2(3, N = 213) = 2.20, p = .54 \).

**Appetitive aggression** Table 2.1 reports the level of appetitive (and facilitative) aggression for the LC and HC phases. In the HC phase, the AAS items reveal high levels of appetitive aggression: about 73.7% (\( n = 70 \)) confirm that having defeated a strong opponent made the fight more pleasurable in comparison to the defeat of a weak opponent, and half of the respondents agreed that, while fighting, they had stopped caring about being killed (48.4%, \( n = 46 \)). About half of the respondents also stated that it had been exciting to make the opponent really suffer (48.4%, \( n = 46 \)), that the desire to kill had taken control over them (46.3%, \( n = 44 \)) and that they had felt powerful when they went to fight (44.2%, \( n = 42 \)). For about a third of participants in the HC phase, it had been fun to prepare for fighting (34.7%, \( n = 33 \)), they had experienced getting carried away by the violence (30.5%, \( n = \))
and seeing the victims' blood had made the fighting even more enjoyable (29.5%, \( n = 28 \)). About a quarter had experienced the "thirst" to fight (23.2%, \( n = 22 \)), reported a habituation to cruelty (23.2%, \( n = 22 \)) and said that they had enjoyed listening to other people telling stories of how they killed (23.2%, \( n = 22 \)). About a fifth (18.9%, \( n = 18 \)) had enjoyed inciting their comrades to fight. A small group stated that they had harmed others just because they wanted to (9.5%, \( n = 9 \)), that fighting is the only thing they had wanted to do in life (7.4%, \( n = 7 \)), and that attacking humans had been sexually arousing (5.3%, \( n = 5 \)).

### 2.4.3 Prediction of appetitive aggression and posttraumatic stress by lifetime events and perpetrated acts

#### Specific events (witnessed, experienced, and perpetrated)

The five incidents that best predicted the AAS score were as follows: "mutilating another person" (\( cvi = 16.44 \)), "witnessing a massacre" (\( cvi = 9.06 \)), "attacking villages/settlements" (\( cvi = 8.30 \)), "assaulting someone physically" (\( cvi = 7.51 \)), "participating in a massacre" (\( cvi = 6.52 \)) and "witnessing a sexual assault" (\( cvi = 4.79 \)). These factors explained 33% of the variance in the OBB data. After building a single tree from the whole data set, "mutilating another person" and "attacking villages/settlements" emerged as the variables with the highest impact on participants' level of appetitive aggression (see Figure 2.2 A).

The five most important predictors for posttraumatic stress were as follows: "witnessing a massacre" (\( cvi = 7.19 \)), "participating in a massacre" (\( cvi = 5.67 \)), "stealing food to survive" (\( cvi = 2.10 \)), "witnessing a sexual assault" (\( cvi = 1.71 \)) and "being threatened by the commander" (\( cvi = 1.15 \)). The model explained 27% of the variance in the OBB data. The Supplemental Material (available in the appendix) contains the conditional variable importance of each specific event to the prediction of the AAS and PSS-I scores.

#### Number of lifetime events/acts (witnessed, experienced, and perpetrated)

Perpetrated violent acts had the highest predictive value for the AAS score (\( cvi = 87.57 \)), compared to experienced (\( cvi = 3.72 \)) and witnessed (\( cvi = 3.67 \)) traumatic events. Experienced (\( cvi = 10.33 \)) and witnessed (\( cvi = 9.25 \)) traumatic events had the highest impact on participants' PSS-I score. The importance of the number of lifetime perpetrated violent acts in predicting the PSS-I score was \( cvi = 1.97 \). The OBB-\( R^2 \) explained 33% of the variance for posttraumatic stress and 44% for appetitive aggression.

By comparing the variance explained (OBB-\( R^2 \)) by specific events to the number of traumatic events/violent acts regressed on PSS-I and AAS scores, better model fits were obtained for the accumulated lifetime events/acts. The total scores of lifetime expe-
Figure 2.2: Single trees for predicting AAS and PSS-I scores by specific events/acts. Regression trees with asymmetric interactions for the appetitive aggression level (AAS score; A) and PTSD severity (PSS-I score; B) predicted by 31 items. (A) Significant partitioning is primarily achieved by the item "Have you ever mutilated someone?" For those who answered this question in the negative, "Have you ever attacked a village or settlement?" provides further significant partitioning. The box plots present the means, quartiles and ranges for the AAS scores in each group. Those having mutilated someone scored highest on the AAS, whereas those having neither mutilated someone nor attacked a village or settlement had the lowest AAS scores. Ex-combatants who did not mutilate someone but had attacked a village or settlement show the widest range. (B) The PSS-I score is first split by the item "Have you ever witnessed a massacre (=deliberate killing of a group of civilians)?" and partitions best for those who answered the item "Have you ever stolen food to survive?" in the negative.
rienced/witnessed events and perpetrated violent acts explained an additional 7% of the variance for the PSS-I score and an additional 11% for the AAS score, compared to the variance explanations of specific events.

2.5 Discussion

The main goal of the present study was to examine the association between traumatic and perpetrated events and appetitive aggression in a sample of demobilizing combatants. Random forest with conditional inference trees was applied to regress specific events (experienced, witnessed, and perpetrated) as well as the sum of these events on the appetitive aggression level and posttraumatic stress. The results primarily revealed that certain specific events and the total number of traumatic events/violent acts predicted both appetitive aggression and posttraumatic stress. The models that used the total scores of events/acts as predictors showed better fits for the two outcome variables. The number of perpetrated violent acts was the best predictor of appetitive aggression, while experienced traumatic events was the best predictor of posttraumatic stress.

Additionally, we compared the occurrence of trauma-related symptoms in phases of low-(LC phase) and high-intensity (HC phase) conflict. As expected, PTSD severity increased in the HC phase. Importantly, the actual increase in fighting may not be the causal mechanism behind the observed differences. However, the observation is relevant for practical reasons, helping aid workers meet the needs of former combatants and allowing local institutions to prepare for the varying severity of the trauma-related problems (including PTSD and subclinical depression) that arise with heightened conflict intensity.

Heightened levels of aggression have been found in military personnel exposed to torture, rape, killing and other atrocities (Morland et al., 2012; MacManus et al., 2013; Weierstall & Elbert, 2011; Hecker et al., 2012). In these cases, reactive aggressive behavior can be explained by the hypervigilance symptoms of (combat-related) PTSD (Morland et al., 2012). No attempt has yet been made to account for reports of combat high or to etiologically explain enhanced appetitive aggression that considers violence appealing and intrinsically motivating. Such an explanation, however, would be necessary to design interventions that help ex-combatants to reintegrate into society. The present study examined the extent to which experienced and witnessed traumatic events and perpetrated violent acts impact appetitive aggression. RF-CIs for predicting appetitive aggression was first conducted on specific events and then on the total number of event types experienced during one’s lifetime. In accordance with Weierstall et al. (2011), we found that experiencing a greater number of perpetrated violent acts was associated with higher levels of appetitive aggression. In fact, the accumulation of perpetrated violent acts was found to be the most important
predictor of perceiving self-committed atrocities as appealing. Of much less significance was the number of witnessed and experienced traumatic events. By comparing the explained variances (specific and cumulative events), a better fit to the number of events was found. The result suggests a strong incident-symptom relationship for appetitive aggression that is analogous to the building block effect for PTSD (Neuner, Schauer, Klaschik, Karunakara, & Elbert, 2004; Kolassa & Elbert, 2007). Regarding the single tree built to predict the level of appetitive aggression, "mutilating another person" and "attacking a village/settlement" – both acts of violence – emerged as items with a major impact. The elements of these acts, such as blood, the suffering of the victim, screams and the pursuit of the victim, strongly resemble the idea of hunting (Elbert et al., 2010).

A major cleft in the literature exists with regard on how to treat violent perpetrators. Is perpetration, as suggested by proponents of the Perpetration-Induced-Traumatic-Stress-concept (PITS; MacNair, 2002), itself a potentially traumatizing event that thus puts the perpetrator at increased risk for developing PTSD (Komarovskaya et al., 2011; Maguen et al., 2011, 2010, 2009)? Or can violence at times be appealing and may heightened levels of aggression even protect perpetrators from developing symptoms of posttraumatic stress (Weierstall & Elbert, 2011; Weierstall, Schalinski, et al., 2012; Weierstall, Huth, et al., 2012; Weierstall, Castellanos, et al., 2013; Hecker, Hermenau, Mädl, Hinkel, et al., 2013)? The present data analyses suggest that perpetrating violent acts does not significantly affect posttraumatic stress. By contrast, experienced and witnessed traumatic events have a well-known substantial impact on posttraumatic stress. As seen in the single tree (presented in the Appendix), the number of perpetrated violent acts does not, however, significantly contribute to the prediction of posttraumatic stress. Of the specific events analyzed, "witnessing a massacre" was the most significant predictor of posttraumatic stress, followed by "participating in a massacre". However, "having killed another person" was not predictive of posttraumatic stress in our sample. In conclusion, these results demonstrate that the perpetration of violent acts is not necessarily traumatic and that, instead, the extent of exposure to varying traumatic stressors plays a crucial role in the development of PTSD.

The result can be explained by bipolar neural networks. The fear network – the associative mnemonic representation of stimuli constituting traumatic events' is a well-established etiological model for PTSD (Brewin et al., 2010; Elbert et al., 2011). Further, Elbert et al. (2010) postulate a second network incorporating stimuli that constitute perpetrated violent acts – the so-called hunting network. Both, traumatic stress and combat high require a high degree of arousal. The major difference between the two incidents is their valence: traumatic stress is perceived as fearful and aversive and combat high is perceived as appealing, lust-evoking and exciting. However, they often consist of similar cues. For instance, blood, screaming, gunfire, etc. may occur in traumatic events and/or perpetrated acts. The opposing valence of these bipolar networks prevents their fusion (Elbert et al.,
Hence, shared cues may fluidly be dominated either by the positive pole and thus incorporated into the hunting network or by a negative valence, which is associated with the fear network. Depending on the perceived valence, a particular cue (e.g., blood) will trigger a specific emotional state and consequently prime either approach or avoidance behavior patterns (Elbert et al., 2010; Weierstall & Elbert, 2012).

In this study, we applied random forest regression to investigate the association of appetitive aggression and posttraumatic stress with various traumatic event types and self-committed violent acts. This non-parametric method has remarkable potential for the statistical approach of common problems in clinical psychology. In our case, the ensemble method resolved the high number of specific events/acts applied as predictors and the violation of assumptions for linear regression. RF-CI provided new insight into the role of specific incidents in the development of appetitive aggression and posttraumatic stress without a priori exclusion of variables. Furthermore, random forest makes it possible to compare the impact of specific events/acts with the total number of these experiences, though not with a statistical significance measure. The results revealed that the model provided a better fit when posttraumatic stress was predicted by the total number of events/acts (not by specific events) as assumed by the building block effect (the more events, the higher the PTSD severity; Kolassa & Elbert 2007; Schauer et al. 2003). This finding contributes to the confirmation of a polytraumatic approach to PTSD therapy, as realized, for example, in Narrative Exposure Therapy (NET; Schauer et al., 2011).

The results further indicated that PTSD severity differs according to the level of ongoing conflict intensity. Approximately 24% of respondents in the LC phase were diagnosed with PTSD, whereas a sizable 44% of respondents in the HC phase fulfilled the DSM-IV’s PTSD criteria. Observing the association of the number of witnessed and experienced events according to the LC vs. HC phase reveals that conflict intensity increases PTSD symptoms especially for those who exhibit a moderate to high trauma load (<12 traumatic event types). Moreover, depression symptom severity is also higher in the HC phase. By contrast, Drug Dependence (41.6%, n = 89) is common among former combatants irrespective of the ongoing conflict intensity.

The reported levels of appetitive aggression in the present study (HC phase) correspond with previous investigations of ex-combatants in the eastern DRC (Hecker et al. 2011, M = 24.1, SD = 7.1 and Weierstall et al. 2011, M = 21.5, SD = 8.1) and in other countries (Colombia: Weierstall, Castellanos, et al. 2013, M = 30.8, SD = 7.9). Although they had recently decided to demobilize, approximately half of the participants confirmed that it was exciting for them to make their opponent suffer and that hunting or killing could take control of them. A minority even stated that fighting is the most important part in their lives. In contrast to a psychopathological behavior, acts of appetitive aggression have been described advantageous to survive in a hostile environment (Weierstall, Haer, et al., 2013; Crombach
et al., 2013). It is important to note that this is still highly prevalent (at least) during the demobilization process before the former fighters return into civil society.

In sum, trauma symptoms and heightened levels of aggression are common among demobilizing combatants, and psychotherapeutic interventions are therefore of major importance for a successful reintegration process. Elbert et al. (2012) developed Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET) to reduce symptoms of PTSD and appetitive aggression. In a randomized controlled trial conducted on a sample of former child soldiers in DRC, Hermenau, Hecker, Schaal, et al. (2013) observed that FORNET successfully decreased PTSD symptoms and facilitated reintegration by decreasing closeness to military life. Crombach & Elbert’s (2014) results demonstrated that FORNET reduces the number of criminal acts committed by former street children in Burundi.

The present study has several limitations. Although all of the former combatants demobilizing through DDR in Goma during a given period were included in the study, our sample is not necessarily representative. First, not everyone who leaves an armed group demobilizes in a formalized way passing through MONUSCO. As they may be afraid of consequences, combatants with higher levels of appetitive aggression may leave or escape from their group and continue life either in their former context or at any other place. Second, different groups may demobilize in different ways during a given period. Owing to the cross-sectional and retrospective nature of the design, drawing conclusions about the causal or temporal relationships between the variables should be done cautiously.

### 2.6 Conclusion

To interrupt the cycle of violence and establish peace in war-torn countries, we need to understand how cruel scenarios affect the behavior and mental health of survivors. The results of this study showed that the number of perpetrated acts, and especially the act of mutilating someone, is linked to the rewarding-based processing of potentially traumatic stressors. However, witnessing a massacre seems to be the most devastating to one’s mental health. These effects may especially induce those who actively participated in atrocities to return to war (Hermenau, Hecker, Schaal, et al., 2013). To reduce re-recruitment, delinquency or domestic violence after demobilization, psychotherapeutic interventions that address both appetitive aggression and traumatic stress may be required during the reintegration process.

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3 Violent offending promotes appetitive aggression rather than posttraumatic stress – a replication study with Burundian ex-combatants

3.1 Abstract

Research has identified appetitive aggression, i.e., the perception of committed, violent acts as appealing, exciting and fascinating, as a common phenomenon within populations living in precarious and violent circumstances. Investigating demobilized soldiers in the Democratic Republic of Congo demonstrated that violent offending is associated with appetitive aggression but not necessarily with symptoms of traumatic stress.

In the present study we sought to replicate these results in a sample of demobilized soldiers from Burundi. As with the Congolese ex-combatants, random forest regression revealed that the number of lifetime perpetrated violent acts was the most important predictor of appetitive aggression and that the number of lifetime experienced traumatic events is the main predictor for posttraumatic stress. Moreover, the association of violent acts/appetitive aggression and traumatic events/posttraumatic stress remains strong even years after demobilization.

Psychotherapeutic interventions that address tendencies towards aggression in addition to trauma-related mental illness are indispensable for a successful reintegration of those who fought in armed conflicts and to achieve a successful transition to peace.

Keywords: ex-combatant, soldier, demobilization, DDR, DRC, aggression, PTSD, violence.
3.2 Introduction

Combatants who fight in the current civil wars are exposed to numerous forms of extreme violence. They often witness, experience and also perpetrate acts like killing, torture, rape, and other violent attacks. The exposure to combat has consistently been associated with heightened risks for posttraumatic stress disorder (PTSD) and other trauma-related disorders (Dohrenwend et al., 2006; Hoge, Auchterlonie, & Milliken, 2006; Odenwald et al., 2009; Priebe et al., 2013; Schaal et al., 2012). Frequently, it has been argued that trauma symptoms in veterans are particularly prominent among those who have participated in killing (Komarovskaya et al., 2011; MacNair, 2002; Maguen et al., 2009, 2010; Van Winkle & Safer, 2011). Moreover, heightened levels of aggression have been found in military personnel exposed to combat (Hecker et al., 2012; Morland et al., 2012). For instance, about 17% of military personnel in Great Britain have a criminal record (MacManus et al., 2013). In some cases, violent outbursts may be explained by the hypervigilance symptoms of PTSD (Morland et al., 2012). However, perpetrating violent acts might also be related to appetitive aggression, i.e., experiencing violence as appealing and fascinating (Elbert et al., 2010). In an attempt to account for reports of combat high and its etiology, one of our earlier studies assessed recently demobilized Congolese ex-combatants and found perpetrated violent acts with salient cues of hunting (e.g., attacking a village or settlement, participating in a massacre, etc.) to be the most important predictors for appetitive aggression compared to other specific events or acts. Furthermore, we found evidence that violent offending was significantly associated with appetitive aggression, but only weakly predictive for symptoms of posttraumatic stress (Köbach et al., in sub). Nevertheless, neither events of traumatic stress nor acts of perpetration were totally negligible for the level of appetitive aggression or posttraumatic stress.

Focusing on the overlap between victimization and perpetration, we sought to replicate the results in an independent sample. To examine the association of violent acts and traumatic events with appetitive aggression and posttraumatic stress, we analyzed data from formally demobilized Burundian ex-combatants. A priori hypotheses were the following:
(1) Specific types of traumatic events and perpetrated acts (specTE/PA) and the total number of types of traumatic events, witnessed (totTE-wit), experienced (totTE-exp) and perpetrated (totPA), predict the level of appetitive aggression and posttraumatic stress.
(2) The total number of perpetrated types of violent acts (totPA) is the best predictor for appetitive aggression, while the total number of self-experienced traumatic event types (totTE-exp) is the best predictor for posttraumatic stress.
3.3 Methods

3.3.1 Participants and procedure

We interviewed 392 male Burundian ex-combatants, who were contacted through an official national veteran association. A total of 24 participants had to be excluded due to missing data and one because of invalid answers; the final sample (N=367) had an average age of 36 years (SD=8.5, range: 19-62) and reported 7 years (SD=3.0, range: 0-17) of formal education. On average, they had been recruited by the age of 19 years (SD=4.2, range: 6-39), had spent 12 years (SD=7.3, range: 0-35) in a (para)military group and had been demobilized 5.5 years (SD=2.0, range: 0-14) before we conducted the interviews.

The ethical review boards of the Universities of Konstanz, Germany and of the University Lumière of Bujumbura, Burundi approved this study. Participation was voluntary and participants had to sign an informed consent prior to the interview. In case of illiteracy, oral informed consents were collected. Fulfilling the highest and most secure data encryption standards, a new electronic data coding and storage procedure using tablet-PCs (iPad) ensured confidentiality. Participants received compensation equivalent to 5€ to cover transportation expenses.

Interviews were conducted at the campus of the University Lumière in Bujumbura and took on average 1.5 hours. Five clinical psychologists from the University of Konstanz, one clinical psychologist and six advanced students of clinical psychology from the University Lumière interviewed the participants. Interviews were carried out in Kirundi. Non-local interviewers conducted the interviews with the help of five interpreters. Before the application of the interview, all questionnaires had been translated into Kirundi using blind, back and forth translations and were intensively discussed with local experts to guarantee a precise interpretation. All interviewer and interpreters had been trained in the concepts of mental disorders and forms of aggressive behavior prior to the data collection and received continuous supervision to ensure data quality.

3.3.2 Measures

All instruments were applied as a semi-structured interview. In the first part of the interview, socio-demographic information was collected including age, former (para)military affiliation, age of recruitment and the years spent in armed groups.

**Exposure to violence** We assessed exposure to distinct types of violent and potentially traumatic events with a dichotomous (yes/no) checklist of 31 items (9 lifetime self-experienced
potentially traumatic events, 7 potentially traumatic childhood experiences, 9 lifetime witnessed potentially traumatic events, 6 lifetime perpetrated violent acts; (Nandi & Crombach, in sub). Aiming for consistency with the original study (Köbach, Schaal, & Elbert, 2014), we excluded 5 events that had not been assessed in DRC (deprived of food during childhood, social exclusion during childhood, neglect during childhood, loss of caregiver during childhood, witnessing suicide). By summing up the remaining items (26 in total), we calculated the total number of witnessed traumatic event types (totTE-wit; possible range: 0-8) and experienced traumatic event types (totTE-exp; possible range: 0-12), and the number of types of perpetrated violent act (totPA; possible range: 0-6). Furthermore, we used each of the 26 specific traumatic events and perpetrated acts (specTE/PA) as predictors. Figure 1 provides an overview of the events included in the analysis of data assessed in Burundi and DRC and their incidence rates.

**Posttraumatic stress** Symptoms of PTSD were investigated using the PTSD Symptom Scale – Interview (PSS-I, Foa, Riggs, Dancu, & Rothbaum, 1993; Foa & Tolin, 2000). The PSS-I is a semi-structured interview, which consists of 17 items corresponding to the diagnostic criteria of the DSM-IV and referring to the last four weeks. The instrument has proven validity in comparable East-African samples (Ertl et al., 2010). In the present study Cronbach’s α was .93.

**Appetitive aggression** To assess appetitive aggression we used the Appetitive Aggression Scale (AAS; Weierstall & Elbert, 2011), a semi-structured interview that has also been used and validated in other comparable populations. The AAS consists of 15 items referring to a positive perception of violence, measuring the concept of appetitive aggression (e.g., "Is it exciting for you if you make an opponent really suffer?" or "Once fighting has started do you get carried away by the violence?"). In the present study Cronbach’s α was .89.

### 3.3.3 Analysis

We used random forest regression with conditional inference trees (RF-CI), a non-parametric machine learning technique, as used in Köbach et al. (2015). RF-CI provides a ranking of variables according to their importance for the outcome prediction (conditional variable importance, cvi) and a pseudo or OBB-\(R^2\), an indicator for the explanation of variance (OBB, out-of-bag; Strobl, Malley, & Tutz, 2009). Four models are presented in this study: (1) the AAS sum score predicted by specTE and specPA (RF-CI:1, spec-model\text{AAS}), (2) the AAS sum score predicted by totTE-exp, totTE-wit, and totPA (RF-CI:2, tot-model\text{AAS}). (3) The PSS-I sum score predicted by specTE and specPA (RF-CI:3, spec-model\text{PSS-I}), (4) PSS-I sum score predicted by the total number of totTE-exp, totTE-wit, and totPA (RF-CI:4,
Furthermore, Brandt et al. (2014) recently published a "replication recipe" including crucial criteria for replication attempts, which provide an efficient and standardized way to present the importance of a replication, the methods, and the results. Table 3.1 at the end of this chapter presents the "36-question guide of the Replication Recipe" applied for the present replication.

3.4 Results

3.4.1 Exposure to violence

The participants were exposed to a high range of experienced (M=6.1, SD=2.0, range: 0-12) and witnessed (M=6.8, SD=1.0, range: 2-8) traumatic event types, and perpetrated violent acts (M=3.4, SD=1.4, range: 0-6). Only 16 (4.4 %) participants reported having committed none of the perpetrated violent acts. Everyone had witnessed at least two traumatic event types, and only one participant reported not having experienced any of the traumatic events. The high variance of combat exposure is also reflected in the levels of appetitive aggression (M=28.5, SD=14.6, range: 0-58) and posttraumatic stress (M=13.7, SD=11.2, range: 0-42).

3.4.2 Specific traumatic events and perpetrated acts (RF-CI:1 and RF-CI:3)

Figure 1 illustrates the cvi for the AAS and PSS-I sum scores in comparison with the original study. The OBB-R^2 explained 36% of variance for the AAS and 30% for the PSS-I sum score (in the Congolese sample of the original study, 33% of the variance was explained for the AAS and 27% for the PSS-I sum score).

3.4.3 Total scores of events and acts (RF-CI:2 and RF-CI:4)

The pattern of the cvi-values of the total scores was similar in Burundian ex-combatants, compared to Congolese ex-combatants. TotPA had the highest predictive value for the AAS sum score (cvi_{Burundi} = 28, cvi_{DRC} = 88), compared to totTE-exp (cvi_{Burundi} = 13, cvi_{DRC} = 4) and totTE-wit (cvi_{Burundi} = 5, cvi_{DRC} = 4). TotTE-exp (cvi_{Burundi} = 24, cvi_{DRC} = 10) had the highest impact on participants’ PSS-I sum scores; totTE-wit had a lesser impact (cvi_{Burundi} ≤ 1, cvi_{DRC} = 8). Essentially, the importance of the totPA in predicting the PSS-I sum score was negligible in both studies: cvi_{Burundi} = 1 and cvi_{DRC} = 2. The OBB-R^2 explained 36% of
Figure 3.1: Lifetime exposure to violence (%) and cvis for the AAS and PSS-I sum scores resulting from ex-combatants in Burundi vs. DRC. The figure shows similar patterns of prevalence rates as well as the predictor’s importances in predicting AAS and PSS-I for Burundian and Congolese ex-combatants. The cvis reveal violent acts with salient cues of hunting (e.g., participating in a massacre) to be most predictive for the AAS score. The prediction of PSS-I by participation in a massacre and stolen food to survive was not replicated. Abbr.: specTE-exp = specific traumatic events – experienced, specTE-wit = specific traumatic events – witnessed, specPA = specific perpetrated acts, n.a. (red) = not assessed in Burundi, n.a. (black) = not assessed in DRC.
the variance for the AAS sum score (RF-CI:2) and 24% for the PSS-I sum score (RF-CI:4); (in the Congolese sample, 44% of the variance was explained for the AAS and 34% for the PSS-I sum score).

### 3.5 Discussion

In this article, we successfully replicated the major findings presented in a previous study with Congolese ex-combatants. With a larger sample of Burundian ex-combatants, we showed that specific types of traumatic events and violent acts, as well as the total number of these incidents, predicted appetitive aggression and posttraumatic stress. Moreover, the total number of perpetrated violent acts (totPA) was the best predictor for the level of appetitive aggression, while the total number of experienced traumatic event types (totTE-exp) was the best predictor for posttraumatic stress. Furthermore, we found that specific event types and violent acts with salient cues of violence had the strongest impact on the level of appetitive aggression in both samples, which thereby seems to be a robust finding.

The findings in this article strengthen the evidence that perpetrated violent acts can be perceived as appealing (Elbert et al., 2010), and not necessarily as traumatic (MacNair, 2002). Importantly, the line between traumatic stress and combat high is blurred: neither the level of appetitive aggression nor posttraumatic stress seems to be entirely independent from perpetrated or experienced violence. Elbert et al. (2010) suggested a bipolar representation of interconnected, highly associative neural networks incorporating cues from traumatic events (fear) and perpetrated acts (pleasure); the opposing valence of these networks prevents them from merging. Cues associated with combat high AND traumatic stress situations (e.g., blood, weapons, etc.) may be occupied by the positive pole and in consequence hinder posttraumatic stress, as demonstrated in earlier studies (e.g., Weierstall, Schalinski, et al., 2012). For psychotherapeutic interventions – especially with individuals previously involved in violent conflicts – it is imperative to abandon the dichotomous victim-perpetrator archetype. The symptoms of posttraumatic stress and heightened levels of aggression can be better addressed and treated when all forms of exposure to violence, experienced and perpetrated, are taken into consideration. Such an attempt has been made in Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET; Crombach & Elbert, 2014b; Hermenau, Hecker, Schaal, et al., 2013; Elbert et al., 2012; Köbach et al., in sub). In 5-7 sessions, the therapist and the client intensively reflected on the most poignant incidents of violence (exposure in sensu) and framed crucial, transitory changes from combatant to civilian if necessary. FORNET successfully reduced posttraumatic stress (Hermenau et al., 2013; Köbach et al., in sub) and the number of violent offenses (Crombach & Elbert, 2014). Further research is required.
Furthermore, this study replicated the results that "participation in a massacre", "having mutilated someone", and "having witnessed a massacre" – events/acts with very salient and predatory cues of violence (e.g., blood, screaming, suffering, etc.) – are the best predictors for the level of appetitive aggression. In the present study, this was the case even years after demobilization! These events may deserve particular focus in psychotherapy.

The discrepancy in the time difference since demobilization in the current sample (6 years) in comparison to the Congolese sample in which the participants were interviewed during the demobilization process, suggests that the associations between perpetrated acts and appetitive aggression as well as traumatic events and posttraumatic stress remain stable over time; in fact, the results are astonishingly similar, especially for single specific event types/acts (see Figure 3.1).

This replication article has limitations. First, the earlier finding that the total number of lifetime traumatic event types and violent acts would predict the level of appetitive aggression and posttraumatic stress better than specific event types was not replicated (comparison of RF-CI:1/2 and RF-CI:3/4). Further, the models were not exactly the same as were used in the original study, owed to the slightly varying event lists.

3.6 Conclusion

In conclusion, we demonstrated that the perpetration of violent acts during war continuously shapes a perpetrator’s perception of and affiliation for violence. To create stable communities, secure family environments and healthy minds, evidence-based mental health care needs to abandon simplistic victim-perpetrator dichotomies and develop interventions that take the whole range of combat-related complications into account.

3.7 Acknowledgments

We sincerely thank our Burundian partners, especially the University Lumière of Bujumbura, for their excellent research cooperation. We express our gratitude to the former combatants who participated in this study, the students of the University Lumière and our translators. We thank the Institute of Databases and Information Systems of University Ulm (Manfred Reichert and staff) for enabling electronic data collection. We are grateful to James Moran and Danie Meyer-Parlapanis who supported the interviews and provided valued suggestions in regard to writing. The VolkswagenStiftung and the Deutsche Forschungsgesellschaft funded this research.

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Table 3.1: "36-question guide to the Replication Recipe" (Brandt et al., 2014)

The Nature of the Effect

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Verbal description of the effect I am trying to replicate:</td>
<td>(a) Cumulative lifetime perpetrated acts of violence are associated with higher levels of appetitive aggression. (b) Particular events that incorporate salient cues of violence have higher predictive importance. The appealing aspect of violence is often neglected although it has an immense impact on (post-war) societies and the development of peaceful and stable communities. The prevalence as well as the predictors for appetitive aggression are robust in different populations of combatants and as future research may show also in certain non-combatant violent offenders.</td>
</tr>
<tr>
<td>2</td>
<td>It is important to replicate this effect because?</td>
<td>n/a; As in the original study we used RF-CI. Outcome measures can be drawn from Figure 1 in the article.</td>
</tr>
<tr>
<td>3</td>
<td>The effect size of the effect I am trying to replicate is:</td>
<td>n/a</td>
</tr>
<tr>
<td>4</td>
<td>The confidence interval of the original effect is:</td>
<td>n/a</td>
</tr>
<tr>
<td>5</td>
<td>The sample size of the original effect is:</td>
<td>N=95</td>
</tr>
<tr>
<td>6</td>
<td>Where was the original study conducted? (e.g., lab, in the field, online)</td>
<td>In the field</td>
</tr>
<tr>
<td>7</td>
<td>What country/region was the original study conducted in?</td>
<td>Democratic Republic of Congo, North Kivu, Goma.</td>
</tr>
<tr>
<td>8</td>
<td>What kind of sample did the original study use? (e.g., student, Mturk, representative)</td>
<td>A convenience sample of demobilizing, male, adult, Congolese combatants.</td>
</tr>
<tr>
<td>9</td>
<td>Was the original study conducted with paper-and pencil surveys, on a computer, or something else?</td>
<td>The original study was conducted with paper-and pencil. The replication study was conducted with iPads.</td>
</tr>
</tbody>
</table>
### Designing the study

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Are the original materials for the study available from the author?</td>
<td>On demand.</td>
</tr>
<tr>
<td></td>
<td>I know that assumptions (e.g., about the meaning of the stimuli) in the original study will also hold in my replication because:</td>
<td>Yes.</td>
</tr>
<tr>
<td>12</td>
<td>Location of the experimenter during data collection:</td>
<td>On site.</td>
</tr>
<tr>
<td>13</td>
<td>Experimenter knowledge of participant experimental condition:</td>
<td>Interviewers did not know the hypothesis.</td>
</tr>
<tr>
<td>14</td>
<td>Experimenter knowledge of overall hypotheses:</td>
<td>Interviewers did not know the hypothesis.</td>
</tr>
<tr>
<td>15</td>
<td>My target sample size is:</td>
<td>Former members of (para)military groups.</td>
</tr>
<tr>
<td>16</td>
<td>The rationale for my sample size is:</td>
<td>Interview capacity, time, availability of ex-combatants.</td>
</tr>
</tbody>
</table>

### Documenting Differences between the Original and Replication Study

For each part of the study indicate whether the replication study is *Exact*, *Close*, or *Conceptually Different* compared to the original study. Then, justify the rating.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>The similarities/differences in the instructions are:</td>
<td>[Exact]</td>
</tr>
<tr>
<td>18</td>
<td>The similarities/differences in the measures are:</td>
<td>[Close]: few events/acts were not asked in the replication study and vice versa. Outcome was measured by exactly the same instruments.</td>
</tr>
<tr>
<td>19</td>
<td>The similarities/differences in the stimuli are:</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Table 3.1: "36-question guide to the Replication Recipe" (Brandt et al., 2014)

<table>
<thead>
<tr>
<th></th>
<th>The similarities/differences in the procedure are:</th>
<th>[Close]; iPads were used documenting the answers in the replication study. The Interview setting was the same, but in different countries.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>The similarities/differences in the location (e.g., lab vs. online; alone vs. in groups) are:</td>
<td>[Exact]</td>
</tr>
<tr>
<td>21</td>
<td>The similarities/differences in remuneration are:</td>
<td>[Exact]; transport money was paid in the replication study; in the original study ex-combatants were on site and thus no transport necessary.</td>
</tr>
<tr>
<td>22</td>
<td>The similarities/differences between participant populations are:</td>
<td>[Close]; similarity: ex-combatants in both studies fought in one or more African civil wars with similar kinds of events and living conditions; differences: ex-combatants in DRC have been in their demobilization process, while those in Burundi had been demobilized on average 6 years ago.</td>
</tr>
<tr>
<td>23</td>
<td>What differences between the original study and your study might be expected to influence the size and/or direction of the effect? I have taken the following steps to test whether the differences listed in #24 will influence the outcome of my replication attempt:</td>
<td>In the replication study participants had been demobilized for a longer period of time.</td>
</tr>
<tr>
<td>24</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

Analysis and Replication Evaluation
### Table 3.1: "36-question guide to the Replication Recipe" (Brandt et al., 2014)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 My exclusion criteria are (e.g., handling outliers, removing</td>
<td>Participants with missing(s) in the event list, PSS-I or AAS as well as participants who gave invalid answers were excluded from the analysis.</td>
</tr>
<tr>
<td>participants from analysis):</td>
<td>continued...</td>
</tr>
<tr>
<td>27 My analysis plan is (just if it differences from the original):</td>
<td>n/a</td>
</tr>
<tr>
<td>28 A successful replication is defined as:</td>
<td>(a) Similar pattern of variable importance (cvis) and (b) similar variance explanation values.</td>
</tr>
<tr>
<td>29 The finalized materials, procedures, analysis plan, etc. of the</td>
<td>In the main article</td>
</tr>
<tr>
<td>replication are registered here:</td>
<td></td>
</tr>
<tr>
<td>30 The effect size of the replication is:</td>
<td>n/a</td>
</tr>
<tr>
<td>31 The confidence interval of the replication effect size is:</td>
<td>n/a</td>
</tr>
<tr>
<td>32 The replication effect size [is/is not] (circle one) significantly</td>
<td>n/a; the crucial values are similar.</td>
</tr>
<tr>
<td>different from the original effect size?</td>
<td></td>
</tr>
<tr>
<td>I judge the replication to be a(n) [success/informative failure to</td>
<td>Success; OBB-$R^2$ as well as the pattern of variance importance (cvis) were similar.</td>
</tr>
<tr>
<td>replicate/practical failure to replicate/inconclusive] (circle one)</td>
<td></td>
</tr>
<tr>
<td>because:</td>
<td></td>
</tr>
</tbody>
</table>
**Table 3.1: "36-question guide to the Replication Recipe" (Brandt et al., 2014)**

<table>
<thead>
<tr>
<th></th>
<th>Interested experts can obtain my data and syntax here: On demand; a file with the R code is published in the supplemental online material of the two studies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>All of the analyses were reported in the report or are available here:</td>
</tr>
<tr>
<td>35</td>
<td>The limitations of my replication study are:</td>
</tr>
<tr>
<td>36</td>
<td>Few events were not asked in the replication study and vice versa.</td>
</tr>
</tbody>
</table>
4 Posttraumatic Stress Disorder according to DSM-5 and DSM-IV diagnostic criteria: a comparison in a sample of Congolese ex-combatants

4.1 Abstract

Compared to DSM-IV, the criteria for diagnosing Posttraumatic Stress Disorder (PTSD) have been modified in DSM-5. The first aim of this study was to examine how these modifications impact the rates of PTSD in a sample of Congolese ex-combatants. The second goal of this study was to investigate whether PTSD symptoms were associated with perpetrator-related acts or victim-related traumatic events. A total of 95 male ex-combatants in the eastern Democratic Republic of Congo were interviewed. Both the DSM-IV and the DSM-5 PTSD symptom criteria were assessed. The DSM-5 symptom criteria produced a PTSD rate of 50% \( (n = 47) \), while the DSM-IV symptom criteria were met by 44% \( (n = 42) \). If the DSM-5 would be set as the current "gold standard", then DSM-IV would have produced more false negatives (8%) than false positives (3%). A minority of participants (19%, \( n = 18 \)) indicated a perpetrator-related event as their most stressful experience. Results of a regression analysis \( (R^2 = 0.40) \) showed that, after accounting for the number of types of traumatic events, perpetrated violent acts were not associated with the symptom severity of PTSD. A potential fascinating and excited perception of the perpetrated violent acts might contribute to this finding.

Keywords: PTSD, DSM-5, DSM-IV, DR Congo, ex-combatants, violence.
4.2 Introduction

The Diagnostic and Statistical Manual for Mental Disorders, fifth edition (DSM-5; APA, 2013) introduced several changes of the diagnostic criteria for posttraumatic stress disorder (PTSD) compared to DSM-IV (APA, 2000). Major modifications include: (a) the elimination of Criterion A2 (the subjective reaction to the traumatic event); (b) the revision of the description of the DSM-IV symptoms; (c) the addition of three new symptoms; and (d) the replacement of the DSM-IV three-symptom cluster structure (B, C, D) with a four-symptom cluster structure (B, C, D, E). Table 4.1 provides an overview of the DSM-IV and DSM-5 PTSD symptoms.

To date, few studies have examined the impact of the introduced changes on rates of PTSD diagnosis (e.g., Elhai et al., 2012; Miller, Wolf, Kilpatrick, et al., 2013). It therefore remains largely unclear how the new DSM-5 PTSD criteria will affect the likelihood of a diagnosis and thus the prevalence estimates of PTSD. The goal of the present study was to compare the DSM-IV and the DSM-5 PTSD diagnostic algorithms in a sample of Congolese ex-combatants.

For more than two decades, the eastern Democratic Republic of Congo (DRC) has been affected by an ongoing cycle of war, violence and insecurity. Mutual fighting amongst various local armed groups persists within the eastern part of the DRC, particularly the Kivu regions (Stearns, 2012b). By 2012, the security and political situation in North Kivu considerably deteriorated and violence increased. Heavy fighting between the Congolese army and the M23 (Movement Mars 23), a paramilitary group consisting primarily of former CNDP (Congrès National pour la Défense du Peuple) rebels, erupted (Stearns, 2012a). The detrimental mental health effects of exposure to violence are not only common for civilian victims, but also for soldiers and combatants. Combatants have often been perpetrators, although at the same time they have also been victims. Both may have mental health consequences and may lead to posttraumatic stress disorder (PTSD). Some authors have argued that the engagement in intense violence against others may be considered as a potentially traumatic event, which may also cause trauma-related symptoms (MacNair, 2002; Staub, 2006). Particularly the killing of someone during combat has been described as a risk factor for the development of PTSD (Maguen et al., 2009, 2010, 2011; Van Winkle & Safer, 2011). According to Pollock (1999), the perpetration of violent acts may be traumatizing to a perpetrator if the episodes of aggression violates the offender’s schema-based assumptions. However, most studies have not investigated whether the trauma-related symptoms of those who engaged in violence were related to self-perpetrated or self-experienced events. A recent study of Rwandan perpetrators found that only few indicated a perpetrated event as the index trauma to which their PTSD symptomatology referred (Schaal et al., 2014).

The main goals of the present study were to compare rates of PTSD diagnosed according
to the DSM-IV and DSM-5 symptom criteria in a sample of Congolese ex-combatants and to examine if PTSD symptom severity is associated with perpetrated violent acts while controlling for general traumatic events. We hypothesized that, after accounting for traumatic event types, perpetrated violent acts would be associated with more severe symptoms of PTSD (Schaal et al., 2014).

4.3 Method

4.3.1 Participants and procedure

Eligible participants were ex-combatants who joined at the demobilization camp of the United Nations in Goma, DRC. This demobilization camp is a transition camp for combatants who leave an armed group active in the province of North Kivu. Participants stay only between 20 and 72 hours in the demobilization camp before being sent to other places.

In total, 95 male Congolese ex-combatants were interviewed. All ex-combatants who were approached agreed to participate and completed the diagnostic interview. The participants’ mean age was 24.36 years ($SD = 6.46$, range: 16-46 years). They had served as combatants for an average of 4.77 years ($SD = 4.62$, range: 0.08-24.08 years) and indicated that they had fought for an average of 1.82 armed groups during their life ($SD = 1.01$, range: 1-5). 65.3% ($n = 62$) reported that they had been forcibly recruited at least once, whereas 57.9% ($n = 55$) reported having voluntarily joined an armed group at least once.

The study was conducted in Goma, the capital of the province of North Kivu in the eastern DRC between February and April 2013. Before the data assessment started, the study was approved by the University of Konstanz Ethical Review Board and the United Nations’ mission in the DRC (MONUSCO; Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo). All ex-combatants who arrived at the demobilization camp during the following assessment periods were interviewed: February 2nd until 11th, February 27th until March 13th and March 26th until April 5th, 2013. After their arrival at the camp, participants were approached and fully informed of the study’s procedure and aims, including voluntary participation. All participants provided us their signed written informed consent. Diagnostic interviews were carried out by a group of local interviewers (four local psychology students from the University of Goma and one translator). All local interviewers had already received extensive training in conducting structured diagnostic interviews during summer 2012 and had already conducted diagnostic interviews in previous investigations. The training covered basic theoretical concepts as well as sensitive and empathic interviewing techniques. Prior to the data collection, the interviewers received a 7-day follow-up training that focused on the assessment of the DSM-5 PTSD diagnostic
4 PTSD according to DSM-IV and DSM-5 diagnostic criteria

The various structured interviews and the questions referring to the DSM-5 symptom criteria were translated into Kiswahili and blind-reverse translated by independent groups of translators. During the whole phase of data collection, interviewers were closely supervised by clinical experts and received extensive feedback. Interviews lasted between 1.5 and 2.5 hours and were carried out individually at a private place at the demobilization camp. No financial compensation was given to the participants.

4.3.2 Measures

Interviewers obtained socio-demographic data from each respondent.

The interviewers measured potentially traumatic events using a 22-item event checklist, which assessed the lifetime exposure to different potentially traumatic event types (traumatic event list; possible range: 0-22; Cronbach’s $\alpha = .70$; possible range of experienced traumatic event types: 0-12; possible range of witnessed traumatic event types: 0-10). This checklist was a version of a previously published checklist (Neuner et al., 2004) that we adapted to fit the Congolese cultural context. The types of lifetime perpetrated violent acts were assessed using a 21-item checklist (perpetrated violence list; possible range: 0-21; Cronbach’s $\alpha = .88$). Perpetrated violent acts included the commission of any act of violence (offensive and defensive acts of aggression), independently of the context in which they took place. Participants were asked to indicate the most stressful event they had ever experienced (from the traumatic event list or the perpetrated violence list), to which the subsequent rating of PTSD symptoms referred.

The DSM-IV PTSD diagnostic status and symptom severity were determined using the PTSD Symptom Scale-Interview (PSS-I, Foa & Tolin, 2000). The PSS-I assesses the 17 DSM-IV symptom criteria for PTSD and refers to symptoms experienced in the previous month. Each of the items was answered on a 4-point scale ranging from 0 (not at all/only once) to 3 (five or more times per week/almost always). A DSM-IV PTSD severity score (possible scores range from 0 - 51; Cronbach’s $\alpha = .89$) was computed by adding all symptom scores.

The DSM-5 PTSD diagnostic status and symptom severity were assessed using the 20 DSM-5 items, which were scored on a 4-point scale ranging from 0 (not at all/only once) to 3 (five or more times per week/almost always). A DSM-5 PTSD severity score (possible scores range from 0-60; Cronbach’s $\alpha = .90$) was computed by adding all symptom scores. To avoid any repetition of the questions, we have asked items which occur in both diagnostic systems (DSM-IV and DSM-5) only once. The new symptoms of PTSD defined in DSM-5 that did not overlap with the DSM-IV items (see Table 4.1) were integrated into the PSS-I (Foa & Tolin, 2000) and added to the respective symptom cluster. The additional items were
4 PTSD according to DSM-IV and DSM-5 diagnostic criteria

created by using phrasing similar to that found in the criteria. Table 4.2 indicates the DSM-5 symptoms which had not been included in the DSM-IV and presents the exact wording of the new DSM-5 items. Consequently, all participants were evaluated for the presence of DSM-IV-based and DSM-5-based PTSD diagnostic criteria. The diagnostic instruments were administered as clinical interviews.

4.3.3 Analysis

The presented descriptive data are expressed as frequencies (%), mean scores and standard deviations. Pearson’s $\chi^2$ analyses were used to compute between-group differences. To investigate the association between the DSM-5 PTSD symptom severity and experienced event types, hierarchical linear regression analysis was applied. The number of traumatic event types (experienced and witnessed) were entered as predictors in step 1, followed by the number of types of perpetrated violent acts in step 2. The regression model fulfilled all necessary quality criteria for linear regression analyses. The residuals did not significantly deviate from normality, linearity, or homoscedasticity. No univariate outliers could be identified. The maximum variance inflation factor did not exceed 2.03. Hence, we do not need to take multi-collinearity into account. Data analysis was conducted using version 21 of the SPSS software. The reported statistical tests were two-tailed.

4.4 Results

4.4.1 Trauma exposure and perpetrated violent acts

All participants had been exposed to at least one traumatic event (A1, DSM-IV and DSM-5) and all participants reported a subjectively felt response involving intense fear, helplessness or horror (A2, DSM-IV). The five most prevalent types of potential traumatic events were "witnessing dead bodies" (97.9%, $n = 93$), "witnessing physical assault" and "witnessing assault with a weapon" (95.8%, $n = 91$, respectively), "assault with a weapon" and "witnessing a killing" (91.6%, $n = 87$, respectively); the five most often reported types of perpetrated violent acts included "defence in a fight" and "hitting back when being attacked" (96.8%, $n = 92$, respectively), "killing someone" (92.6%, $n = 88$), "making another person bleed" (87.4%, $n = 83$) and "physical assault with a weapon" (86.3%, $n = 82$).
### Table 4.1: Exact wording of the new DSM-5 items integrated into the PSS-I (Foa and Tolin, 2000)

<table>
<thead>
<tr>
<th>Item</th>
<th>Wording</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Have you persistently been making efforts to avoid objects, situations or conversations that arouse distressing memories, thoughts or feelings about, or that are closely associated with the traumatic event? Have you had strong negative beliefs or expectations about yourself, others, or the world? (e.g., &quot;I am bad&quot;, &quot;No one can be trusted&quot;, &quot;The world is completely dangerous&quot;, &quot;My whole nervous system is permanently ruined&quot;)</td>
</tr>
<tr>
<td>D2</td>
<td>Have you blamed yourself or others about the traumatic event, its cause or consequences? (do not include the aggressor)</td>
</tr>
<tr>
<td>D3</td>
<td>Have you had any strong negative feelings (e.g., fear, horror, anger, guilt, or shame)?</td>
</tr>
<tr>
<td>D4</td>
<td>Have you felt difficulty to experience positive feelings? (e.g., unable to have loving or happy feelings)</td>
</tr>
<tr>
<td>D7</td>
<td>Have you shown irritable or aggressive behavior? (expressed verbally or physically towards people or objects)</td>
</tr>
<tr>
<td>E1</td>
<td>Have you shown reckless or self-destructive behavior (doing things that might have caused you harm)?</td>
</tr>
</tbody>
</table>
Table 4.2: Frequency of symptom endorsement according to DSM-IV and DSM-5 definition of PTSD (rated ≤ 1 at the PSS-I, Foa & Tolin, 2000)

<table>
<thead>
<tr>
<th>DSM-IV Items</th>
<th>%</th>
<th>n</th>
<th>DSM-IV Items</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reexperiencing (B)</strong></td>
<td></td>
<td></td>
<td><strong>Reexperiencing (B)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1: Intrusions</td>
<td>83.2</td>
<td>79</td>
<td>B1: Intrusions</td>
<td>83.2</td>
<td>79</td>
</tr>
<tr>
<td>B2: Nightmares</td>
<td>53.7</td>
<td>51</td>
<td>B2: Nightmares</td>
<td>53.7</td>
<td>51</td>
</tr>
<tr>
<td>B3: Flashbacks</td>
<td>65.3</td>
<td>62</td>
<td>B3: Flashbacks</td>
<td>65.3</td>
<td>62</td>
</tr>
<tr>
<td>B4: Emotional Reactivity</td>
<td>77.9</td>
<td>74</td>
<td>B4: Emotional Reactivity</td>
<td>77.9</td>
<td>74</td>
</tr>
<tr>
<td>B5: Physical Reactivity</td>
<td>76.8</td>
<td>73</td>
<td>B5: Physical Reactivity</td>
<td>76.8</td>
<td>73</td>
</tr>
<tr>
<td><strong>Avoidance (C)</strong></td>
<td></td>
<td></td>
<td><strong>Avoidance (C)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1: Avoid thoughts/feelings</td>
<td>65.3</td>
<td>62</td>
<td>C1: Avoid thoughts/feelings</td>
<td>65.3</td>
<td>62</td>
</tr>
<tr>
<td>C2: Avoid places/activities</td>
<td>61.1</td>
<td>58</td>
<td>C2: Avoid places/activities/ objects/situations/conversation*</td>
<td>69.5</td>
<td>66</td>
</tr>
<tr>
<td>C3: Amnesia</td>
<td>14.7</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Negative alterations in mood/ cognitions (D)</strong></td>
<td></td>
<td></td>
<td><strong>Negative alterations in mood/ cognitions (D)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4: Loss of interest</td>
<td>44.2</td>
<td>42</td>
<td>D1: Amnesia</td>
<td>14.7</td>
<td>14</td>
</tr>
<tr>
<td>C5: Social detachment</td>
<td>33.7</td>
<td>32</td>
<td>D2: Negative beliefs*</td>
<td>51.6</td>
<td>49</td>
</tr>
<tr>
<td>C6: Psychological numbing</td>
<td>23.2</td>
<td>22</td>
<td>D3: Distorted blame*</td>
<td>66.3</td>
<td>63</td>
</tr>
<tr>
<td>C7: Foreshortened future</td>
<td>56.8</td>
<td>54</td>
<td>D4: Negative emotional state*</td>
<td>53.7</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D5: Loss of interest</td>
<td>44.2</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D6: Social detachment</td>
<td>33.7</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D7: Low positive emotions*</td>
<td>21.1</td>
<td>20</td>
</tr>
<tr>
<td><strong>Hyperarousal (D)</strong></td>
<td></td>
<td></td>
<td><strong>Hyperarousal (E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D1: Difficulty sleeping</td>
<td>62.1</td>
<td>59</td>
<td>E1: Aggression/irritability/anger*</td>
<td>27.4</td>
<td>26</td>
</tr>
<tr>
<td>D2: Irritability/anger outbursts</td>
<td></td>
<td>41.1</td>
<td>E2: Reckless/self-destructive*</td>
<td>22.1</td>
<td>21</td>
</tr>
<tr>
<td>D3: Difficulty concentrating</td>
<td>67.4</td>
<td>64</td>
<td>E3: Hypervigilance</td>
<td>37.9</td>
<td>36</td>
</tr>
<tr>
<td>D4: Hypervigilance</td>
<td>37.9</td>
<td>36</td>
<td>E4: Exaggerated startle response</td>
<td>38.9</td>
<td>37</td>
</tr>
<tr>
<td>D5: Exaggerated startle response</td>
<td></td>
<td>38.9</td>
<td>E5: Difficulty concentrating</td>
<td>67.4</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E6: Difficulty sleeping</td>
<td>62.1</td>
<td>59</td>
</tr>
</tbody>
</table>

Note. *Symptoms not included in the DSM-IV
4.4.2 Frequency of symptom endorsement and rates of PTSD

Table 4.1 displays the rate of endorsement of each of the DSM-IV and DSM-5 symptoms. The most frequently reported DSM-IV and DSM-5 symptoms for both diagnostic systems included symptoms of cluster B (re-experiencing). Table 4.3 lists the frequency of endorsement of each of the DSM-IV and DSM-5 diagnostic criteria of PTSD.

The percentages of participants who met each individual DSM-5 symptom criterion were as follows: 86.3% \((n = 82)\) Criterion B, 80.0% \((n = 76)\) Criterion C, 75.8% \((n = 72)\) Criterion D, and 67.4% \((n = 64)\) Criterion E. The mean DSM-IV PTSD sum score was \(M = 15.42\ (SD = 9.60; \text{range: 0-40});\) the mean DSM-5 PTSD sum score was \(M = 17.72\ (SD = 10.87; \text{range: 0-48}).\)

A total of 44.2% \((n = 42)\) of the sample met the DSM-IV PTSD diagnostic criteria and 49.5% \((n = 47)\) fulfilled criteria for a DSM-5 PTSD diagnosis. 41.0% \((n = 39)\) fulfilled PTSD criteria according to both diagnostic algorithms; 3.2% \((n = 3)\) only according to DSM-IV and 8.5% \((n = 8)\) only according to DSM-5 (see Figure 4.1). The majority (72.3%, \(n = 34)\) of participants who met DSM-5 PTSD criteria also displayed dissociative symptoms (depersonalization: 70.2%, \(n = 33);\) derealization: 72.3%, \(n = 34).\) Of those with DSM-IV PTSD, 92.9% \((n = 39)\) met DSM-5 PTSD; of those who met criteria for a current DSM-5 diagnosis, 83.0% \((n = 39)\) also fulfilled DSM-IV diagnostic criteria. A minority of participants \((8.4%, n=8)\) met PTSD criteria according to the DSM-5 algorithm but not according to the DSM-IV algorithm. In other words, if the DSM-5 would be set as the current "gold standard", then DSM-IV would have produced 8.4% false negatives and produced 3.2% false positives.

![Figure 4.1: PTSD diagnosis according to DSM-IV and DSM-5](image)
4.4.3 Association between event type and PTSD

Most of the ex-combatants indicated "witnessing a killing" (22.1%, $n = 21$) as the most stressful event they had ever experienced, followed by "assault with a weapon" (20.0%, $n = 19$), "witnessing a massacre" (14.7%, $n = 14$) and "killing someone" (10.5%, $n = 10$; categories reported by less than 10% of participants have been omitted). From the total sample, the majority of the interviewed (81.1%, $n = 77$) indicated an event from the traumatic event list as the most stressful event they had ever experienced; 18.9% ($n = 18$) indicated an event during which they themselves had perpetrated violent acts as their most frightening event (perpetrated violence list). Those participants who indicated an event from the perpetrated violence list as their most stressful event that they had ever experienced displayed significant more severe DSM-5 PTSD symptoms compared to those who described an event from the traumatic event list; $M = 24.22$ ($SD = 11.39$) vs. $M = 16.19$ ($SD = 10.23$), respectively, $t(95) = -2.93$, $p = .004$. Moreover, they fulfilled significantly more often the diagnostic criteria for DSM-5 PTSD than ex-combatants who reported an event from the traumatic event list as their most stressful experience; 72.2% ($n = 13$) vs. 44.2% ($n = 34$) respectively, $Ch^2(1, N = 95) = 4.60$, $p = .032$.

As we assumed an overlap between the different predictor variables of PTSD symptom severity, we conducted a hierarchical linear regression analysis. Results are presented in Table 4.4. The predictor variables representing the number of experienced event types and the number of witnessed traumatic event types were entered in step 1, followed by the number of types of perpetrated violent acts in step 2. Both types of traumatic events – experienced and witnessed – were significantly positively associated with the DSM-5 PTSD severity score. The explained variance of this model was 38.3%. Step 2 revealed that the number of traumatic event types remained significant, while the number of types of perpetrated violent acts did not significantly contribute to the prediction of the severity of PTSD symptoms. This final model accounted for 39.8% of the variance in explaining severity of PTSD symptoms.

4.5 Discussion

With the revision of the DSM-IV (APA, 2000) to DSM-5 (APA, 2013), the diagnostic criteria for PTSD have undergone several changes. Although there is great interest in how the new DSM-5 criteria will affect the rates of PTSD, only very few studies to date have examined the impact of the introduced DSM-5 modifications to PTSD diagnosis (Elhai et al., 2012; Miller, Wolf, Kilpatrick, et al., 2013). The major goal of the present study was to compare rates of PTSD according to the DSM-5 with DSM-IV classification rules in a sample of ex-combatants from the DRC. Moreover, we aimed to investigate if the PTSD symptom
Table 4.3: Frequency of PTSD symptom criteria endorsement according to DSM-IV and DSM-5

<table>
<thead>
<tr>
<th>DSM-IV Symptom Criteria</th>
<th>%</th>
<th>n</th>
<th>Cronbach’s α</th>
<th>DSM-5 Symptom Criteria</th>
<th>%</th>
<th>n</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion A</td>
<td>100</td>
<td>95</td>
<td></td>
<td>Criterion A</td>
<td>100</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Criterion B</td>
<td>86.3</td>
<td>82</td>
<td>0.85</td>
<td>Criterion B</td>
<td>86.3</td>
<td>82</td>
<td>0.85</td>
</tr>
<tr>
<td>Criterion C</td>
<td>55.8</td>
<td>53</td>
<td>0.74</td>
<td>Criterion C</td>
<td>80</td>
<td>76</td>
<td>0.88</td>
</tr>
<tr>
<td>Criterion D</td>
<td>65.3</td>
<td>62</td>
<td>0.84</td>
<td>Criterion D</td>
<td>75.8</td>
<td>72</td>
<td>0.64</td>
</tr>
<tr>
<td>Criterion E</td>
<td>86.3</td>
<td>82</td>
<td></td>
<td>Criterion E</td>
<td>67.4</td>
<td>64</td>
<td>0.81</td>
</tr>
<tr>
<td>Criterion F</td>
<td>85.3</td>
<td>81</td>
<td></td>
<td>Criterion F</td>
<td>86.3</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>Criterion G</td>
<td>85.3</td>
<td>81</td>
<td></td>
<td>Criterion G</td>
<td>85.3</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Criterion H</td>
<td>93.7</td>
<td>89</td>
<td></td>
<td>Criterion H</td>
<td>93.7</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>PTSD diagnosis</td>
<td>44.2</td>
<td>42</td>
<td></td>
<td>PTSD diagnosis</td>
<td>49.5</td>
<td>47</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4: Hierarchical multiple regression analysis with DSM-5 PTSD severity score as the dependent variable (N = 95)

<table>
<thead>
<tr>
<th>Variable/Model</th>
<th>$R^2$</th>
<th>df</th>
<th>F</th>
<th>$B$</th>
<th>SE</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>0.38</td>
<td>2</td>
<td>28.54***</td>
<td>2.08</td>
<td>0.57</td>
<td>0.36***</td>
</tr>
<tr>
<td>Traumatic event types experienced</td>
<td></td>
<td></td>
<td></td>
<td>2.3</td>
<td>0.68</td>
<td>0.34***</td>
</tr>
<tr>
<td>Traumatic event types witnessed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>0.4</td>
<td>3</td>
<td>20.09***</td>
<td>1.74</td>
<td>0.61</td>
<td>0.30**</td>
</tr>
<tr>
<td>Traumatic event types experienced</td>
<td></td>
<td></td>
<td></td>
<td>1.73</td>
<td>0.77</td>
<td>0.25*</td>
</tr>
<tr>
<td>Traumatic event types witnessed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Types of perpetrated violent acts</td>
<td></td>
<td></td>
<td></td>
<td>0.43</td>
<td>0.28</td>
<td>0.18ns</td>
</tr>
</tbody>
</table>

Note. ns = not significant, *$p \leq .05$, ** $p \leq .01$, *** $p \leq .001$. 
severity is associated with perpetrated violent acts while controlling for general traumatic events.

All ex-combatants in the present study reported exposure to at least one potentially traumatic event. We found that the changes associated with DSM-5 resulted in an increase in the observed PTSD rate: 49.5% of the total sample met DSM-5 diagnostic criteria for PTSD, while only 44.2% met the diagnostic criteria according to the DSM-IV algorithm and 41.0% fulfilled both sets of criteria. Recent studies with former combatants in eastern DRC reported a lower PTSD (DSM-IV) rate of 21% (Hecker, Hermenau, Mädlin, Hinkel, et al., 2013). The increasing violence in the eastern DRC several months before the present study was conducted probably contributed to this elevated PTSD rate (Chapter 2). Other authors have not consistently reported that the changes associated with DSM-5 might result in increased rates in diagnosed PTSD. Elhai et al. (2012) reported a non-significantly elevated rate of current PTSD for the DSM-5 diagnostic algorithm compared to the DSM-IV symptom criteria. Miller, Wolf, Kilpatrick, et al. (2013) found comparable PTSD rates when diagnosed by the DSM-IV or the DSM-5 diagnostic system among a nationally representative sample of American adults; in contrast, rates were higher according to DSM-IV compared to DSM-5 in a clinical convenience sample of US military veterans. According to Calhoun et al. (2012), the differences in observed prevalence rates greatly depend on the observed base-rate in a given sample. The authors propose that the DSM-5 algorithm would result in an increase of observed prevalence up to a DSM-IV diagnosis of approximately 50%; however, after having exceeded the threshold of 50% DSM-IV diagnosis, the DSM-5 algorithm would result in a decrease in observed prevalence. In the present study, a large overlap between the two diagnostic algorithms was observed: of the ex-combatants with DSM-IV PTSD, 92.9% also met DSM-5 PTSD; of those who met criteria for a current DSM-5 diagnosis, 83.0% fulfilled DSM-IV PTSD diagnosis. This is in line with the findings of Miller et al. (2012), who found that 86% of veterans with DSM-5 PTSD also had DSM-IV PTSD. Results of the present study showed that in 11.6% of the cases, the two diagnostic algorithms produced a differential diagnostic outcome. More PTSD cases were produced according to DSM-5 than using DSM-IV, as more new diagnostic cases were produced (8.4%) than were omitted (3.2%). If the DSM-5 is set as the current "gold standard" the DSM-IV would have produced more false negatives than false positives.

Some researchers have noted that participation in intense violence against others may be considered as potentially traumatizing and may also cause symptoms of PTSD (MacNair, 2002; Staub, 2006). The results of the present study indicate that only few perpetrators (18.9%) identified an event in which they had perpetrated violence as the most distressing event underlying their PTSD symptomatology. This indicates that perpetrating violence is perceived as traumatic for some combatants, but not for all. This finding aligns with previous studies that showed that only a minority of perpetrators indicated an event that they had
perpetrated as their most frightening event (Schaal et al., 2014). However, in the present study, those ex-combatants who indicated a perpetrated violent act as their index trauma were significantly more affected by DSM-5 PTSD compared to those who reported an event from the traumatic event list. This implies that although few ex-combatants indicated a perpetrated event as their most stressful experience, those who did were particularly affected by PTSD.

As a second goal, we investigated the impact of the number of perpetrated violent acts on symptoms of PTSD. The hypothesis that, after accounting for the number of traumatic event types, the number of perpetrated violent acts would be associated with symptoms of PTSD could not be confirmed. The number of perpetrated violent acts did not contribute to PTSD symptom severity, beyond general lifetime traumatic events. In line with other research (e.g., Schaal & Elbert, 2006), the results of this study revealed that the number of traumatic event types (experienced and witnessed) is positively correlated with PTSD symptom severity. The ex-combatants were traumatized by their repeated exposure to traumatic stressors rather than by the number of their perpetrated violent acts. One reason why participants did not become psychologically distressed by their perpetrated violent offenses may be the fascinating and exciting perception of the violent acts (Konner, 2006; Maclure & Denov, 2006); a phenomenon called appetitive aggression (Elbert et al., 2010). Such a protective influence of appetitive aggression on PTSD symptom severity has already been reported in other studies (Hecker, Hermenau, Mädl, Hinkel, et al., 2013; Weierstall et al., 2011). According to Pollock (1999) the development of PTSD in homicide perpetrators depends on the form of violence used. Reactive, unpremeditated violence – not instrumental violence – was associated with a current diagnosis of PTSD in homicide perpetrators (Pollock, 1999).

Previous studies have shown high levels of appetitive aggression in Congolese ex-combatants (Hecker, Hermenau, Mädl, Hinkel, et al., 2013). From the results of the present study, it can be concluded that the subjective perception of the perpetrated violence – rather than the number of perpetrated events – might be of importance for the development of PTSD.

The current study has a number of limitations. Its findings cannot be generalized to all types of fighters as the interviewed participants had left their armed group and were enrolled in the demobilization program of the United Nations. However, we interviewed all ex-combatants who joined the camp during a given time period. Due to the cross-sectional and retrospective nature of the design, it is impossible to establish causal or temporal relationships between the different variables. The newly developed items referring to the DSM-5 symptom criteria were still untested and not validated at the time the study was conducted. Socially desirable responses can never be completely ruled out. However, the participation of respondents was anonymous and questioning took place independent of the camp in an explicit research context, thereby reducing the likelihood of a strong bias.
Moreover, we had previously validated this type of structured interviewing using physiological markers such as cortisol released over the last month in East-African ex-combatants (Steudte-Schmiedgen et al., 2011). A methodological strength of the present study is that its results were based on structured clinical interviews and that the reported findings are based on a study that was conducted under the challenging conditions in an ongoing conflict zone.

### 4.6 Conclusion

The findings demonstrate an increase in DSM-5 PTSD rates compared to the DSM-IV system, as more new diagnostic cases were produced by the DSM-5 diagnostic rules than were dropped. The results emphasize the need for thorough diagnostic evaluations and evidence-based treatments of PTSD in Congolese ex-combatants. The restoration of the psychological functioning of former combatants might also facilitate their reintegration process. A recent study with former combatants in the DRC demonstrated that PTSD can be effectively treated in former child soldiers and ex-combatants (Hermenau, Hecker, Mädl, et al., 2013).

### 4.7 Acknowledgments

We thank the respondents for their trust and openness and appreciate the reliable support of Ben Ombeni Cigolo, Zacharie Muhave and Lisette Panzu Katakya as well as Jean-Marc Tafani, Ndiaga Diagnen, Mass Walimba, Djoda Fidele, Zenaid Gatelli, Topesse Lokonde and the whole team in DDR. Research was funded by the vivo and supported by the Deutsche Forschungsgemeinschaft (German Research Foundation).
5 Sensitive periods for developing a robust trait of appetitive aggressive

5.1 Abstract

Violent behavior can be intrinsically rewarding; especially combatants fighting in current civil wars present with elevated traits of appetitive aggression. The majority of these fighters were recruited as children or adolescents. In the present study we test whether there is a developmental period where combatants are sensitive for developing a robust trait of appetitive aggression.

We investigated 95 combatants in their demobilization process that were recruited at different ages in the Kivu regions of eastern Democratic Republic of Congo. Using random forest with conditional inference trees, we identified recruitment at the ages from 16 and 17 years as being predictive of the level of appetitive aggression; the number of lifetime, perpetrated acts was the most important predictor.

We conclude that high levels of appetitive aggression develop in ex-combatants, especially in those recruited during their late adolescence, which is a developmental period marked by a natural inclination to exercise physical force. Consequently, ex-combatants may remain vulnerable for aggressive behavior patterns and re-recruitment unless they are provided alternative strategies for dealing with their aggression.

Keywords: sensitive periods, aggression, war, DR Congo, (para)military groups, ex-combatants, demobilization, soldier
5 Sensitive periods for developing a robust trait of appetitive aggressive

5.2 Introduction

Former combatants have been found to present with a proclivity towards aggressive behavior. This is commonly referred to as reactive aggression and is attributed to posttraumatic stress disorder (PTSD), particularly the hypervigilance symptom cluster (MacManus et al., 2013; Morland et al., 2012). Recent investigations reported that former members of armed groups frequently describe violent acts as appealing and intrinsically rewarding; a phenomenon referred to as appetitive aggression (Elbert et al., 2010). In most conditions, aggressive behavior seems to be driven by a combination of both the reactive and appetitive form of aggression. In reactive aggression, such as when being threatened, violent behavior is thought to be an effort to reduce a state of negative emotional valence, while in appetitive aggression, violent behavior enhances arousal by increasing positive valence and may lead to further violence in an effort to maintain or increase arousal levels. It is plausible that the likelihood of perpetrating violent acts increases with the trait of appetitive aggression (Köbach et al., in sub; Weierstall, Haer, et al., 2013). The rewarding properties of the violent acts in turn increase the trait of appetitive aggression, a change that seems highly adaptive in hostile conditions like war and (para)military contexts.

In this study, we wanted to explore developmental periods sensitive for the emergence of a high trait in appetitive aggression. We assumed that the adolescent years might be of particular relevance in this respect given that the pubertal detachment process from the natal family occurs and with it opens a window to adapt to more hostile environments. Especially for male adolescents, confrontation with one’s own potency in the exertion of physical force plays an important role for the transition from boyhood to manhood. Furthermore, the desire to conquer one’s own inner fears and to identify with concepts like bravery, valor, heroism, and integrity are important in developing a congruent self-concept and achieving higher chances of reproductive success (Kröber, 2012). A heightened sensitivity to salient cues, which in turn leads to more risky decisions and a tendency toward affective, incentive-based responsiveness may fuel these processes (Spear, 2000; Somerville, Jones, & Casey, 2010). Substance use disorders (Kessler et al., 2005) as well as anti-social behavior (Moffitt, 1993) typically emerge at this time.

To explore sensitive periods for the growth of trait aggression, we used data from adult combatants who had been recruited at various developmental stages and were active members of armed groups for varying periods in the Democratic Republic of Congo (DRC). The Kivu regions of eastern DRC have a long history of occupations by colonial and other external armed forces and intertribal fighting. Fueled by the Rwandan genocide, at least one million people fled into this region. In reaction to the creation of political and military organizations Rwandan and Ugandan armies entered the DRC launching the First Congo War (1996 - 1998), immediately followed by the Second Congo War, also known as Africa’s
Great War (1998 - 2002). This was formally brought to an end with the signing of the Lusaka Peace Accord in 1999. In 2000, a United Nations (UN) mission (MONUC, since 2010 MONUSCO; Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo) was deployed to the DRC. Despite the significant UN presence (MONUSCO, 2014), fighting among various armed groups has continued in the eastern DRC (Elbert et al., 2013). Children at various ages are forcibly recruited or join armed groups out of desperation (Hecker, Hermenau, Mädl, Hinkel, et al., 2013). Their military life is then stipulated by daily exposure to frequently extreme forms of violence. Fellow soldiers become new family-like social systems. As there is an established link between appetitive aggression and perpetrated violent acts; we predict that the age of recruitment further potentiates appetitive aggression, with adolescents being especially likely to be imprinted by experiences of perpetration.

5.3 Methods

5.3.1 Participants

All Congolese ex-combatants who joined the MONUSCO Disarmament, Demobilization and Reintegration (DDR) program during the study period and who were older than 18 years (according to MONUSCO age test) were interviewed. In total, there were 95 participants ranging in age from 16-42 years. The majority of participants belonged to the Hutu (56%, n = 53), Nande (22%, n = 21), or Hunde (10%, n = 9) ethnic groups. They had served as combatants for between one month and 24 years (M = 57.2, SD = 55.5), the majority for different armed groups (two or more armed groups: 52%, n = 49). About two-thirds (65%, n = 62) reported that they had been forcibly recruited at least once, whereas 58% (n = 55) reported that they willingly joined an armed group (usually due to a lack of alternative financial resources). The median age of first recruitment was 17 years, range: 6-35 years). More than two-thirds (65%, n = 62) of the ex-combatants were recruited for the first time as children, i.e., before the age of 18 years. The variance in recruitment age was expected and thought to result in the required variance in trait of appetitive aggression.

5.3.2 Procedure

Interviews were conducted individually at a secluded place in the MONUSCO demobilization camp as part of the respective DDR program. Interviews lasted between 1.5 and 2.5 hours. Participants gave their informed consent in writing or (if illiterate) verbally. All of the subjects who were approached agreed to participate despite the fact that no reimbursement had been
offered. All ex-combatants who arrived at the camp during the following time periods were interviewed and included in the analysis: February 2nd to 11th, February 27th to March 13th and March 26th to April 5th, 2013. (It should be noted that life in the "bush" is extremely tough even during periods without combat, when there is frequently insufficient nutrition, very limited access to medical treatment, no possibility to lead a family life etc. The ex-combatants frequently want their voices to be heard and are ready to report to the outside world even if they see no immediate personal benefit. This explains the very high acceptance rate.) The ethical commission of the University of Konstanz, the board of the NGO vivo and MONUSCO approved the study. The questionnaires used in the study were translated into Kiswahili and back by independent groups of translators from Goma. The interviews were conducted by a group of local interviewers (one psychologist, four psychology students and one translator). These interviewers were trained during an intensive ten-day session in the basic theoretical concepts underlying the research and in sensitive and empathic interviewing techniques. The interviewers received two follow-up training (3 days and 7 days). Throughout the data collection periods, interviewers were closely supervised by clinical experts and received extensive feedback. All of the diagnostic instruments described in the following section were administered in the form of structured interviews.

5.3.3 Measures

Sociodemographic information included age, ethnicity, educational background and details regarding the participant’s military career (group, year joined/left, voluntary/forced recruitment).

Exposure to violence A 31-item event checklist adapted from previous studies of ex-combatants in the Kivu regions (e.g., Hecker, Hermenau, Mädli, Hinkel, et al., 2013; Hecker et al., 2012) was administered to assess lifetime exposure to different types of potentially traumatic events (experienced and witnessed) and perpetrated violent acts (war and non-war related). The total number of types of witnessed (possible range: 0-10) and experienced (possible range: 0-12) traumatic events and the number of types of perpetrated violent acts (possible range: 0-9) was calculated. Reliability measures showed that the applied event checklist had good consistency (Cronbach’s $\alpha = .87$) and high inter-rater reliability (Cohen’s $\kappa = .89$).

PTSD Participants’ diagnostic status and PTSD symptom severity were assessed using the PTSD Symptom Scale-Interview (PSS-I; Foa & Tolin, 2000). The PSS-I is based on the 17 DSM-IV (APA, 2000) symptom criteria for PTSD and measures symptom intensity during the previous month. PTSD severity was calculated by totaling symptom scores (scores
range from 0-51). Internal consistency and inter-rater reliability revealed excellent values (Cronbach’s $\alpha = .89$; *intraclass correlation coefficient*, ICC = .98).

**Appetitive aggression**  
Appetitive aggression was assessed using the Appetitive Aggression Scale (AAS, Weierstall & Elbert, 2011). The AAS consists of 15 items, which are rated by responses on a five-point scale ranging from 0 (I totally disagree) to 4 (I totally agree). The items solicit information about participants' perception of violence (e.g., "Is it exciting for you, if you make an opponent really suffer?"; "Once fighting has started, do you get carried away by the violence?"). The AAS has been successfully implemented (Hecker et al., 2012; Weierstall, Schalinski, et al., 2012) and validated (Weierstall & Elbert, 2011) in comparable East African samples. The AAS score is calculated by adding the scores of the 15 items (possible scores range from 0-60). Psychometric property measures indicated excellent internal consistency (Cronbach’s $\alpha = .91$) and high inter-rater reliability (ICC = .96) in the present study.

### 5.3.4 Analysis

We used random forest (Breiman, 2001) embedded in a conditional inference framework (hereafter "conditional inference random forest" or RF-CI; Hothorn, Hornik, & Zeileis, 2006). Unlike the classical random forest, the RF-CI does not display a bias towards predictors with many categories in the variable selection process (Strobl et al., 2008). Following the principles of ensemble methods, a certain number of trees (ntree) are aggregated to compose the random forest. Each tree is built using binary splits of the previously subsampled data (subsampling rate = 63.2%; Strobl, Malley, & Tutz, 2009). The splitting variable is chosen according to the strength of the association between the covariates and the outcome (Hothorn, Hornik, & Zeileis, 2006; Strobl, Malley, & Tutz, 2009) from a set of randomly preselected predictors ($p$, mtry, $p/3$; Grömping, 2009). Next, the importance of each predictor variable is ranked based on the ensemble of trees (conditional variable importance, cvi; Strobl, Boulesteix, Kneib, Augustin, and Zeileis, 2008). The *goodness of fit* can be assessed using the out-of-bag data (OOB). The results are used to calculate a *Pseudo-$R^2$* from the mean squared error (MSE) and the total sum of squares (SST; OOB-$R^2 = 1 - \text{MSE}/\text{SST}$; Grömping, 2009).

To explore the relative impact recruitment had at a specific age, we re-coded the assessed variable of the participants’ periods of military recruitment into dichotomous variables, referring to being in an armed group or not (i.e., recruitment of 6 years of age? yes/no, recruitment at 7 years of age? yes/no, ..., recruitment of 25 years of age? yes/no). For those younger than 25, we predicted "not recruited" and controlled with a variable coding the year(s) until/after 25. We also controlled for lifetime perpetrated violent acts.
Any periods sensitive for developing appetitive aggression would result from the predictor rankings specified by the variable importance (cvi).

The random forest analysis was conducted using R (version 2.15.0). The implementation we used was cforest (Hothorn, Bühlmann, et al., 2006) from the R package party (Strobl, Hothorn, & Zeileis, 2009) with unbiased variable selection (Hothorn, Bühlmann, et al., 2006). Details, including code and results for the four RF-CI models, can be accessed in the Supplemental Material presented in the Appendix.

### 5.4 Results

The exposure to violence was high: means for the number of different types of traumatic events were $M = 6.38$, $SD = 1.32$, range: 0-8 for witnessed and $M = 5.66$, $SD = 1.85$, range: 1-10 for experienced stressors. Participants reported having perpetrated $M = 4.44$, $SD = 1.80$, range: 0-9 violent acts.

RF-CI revealed that (para)military recruitment at the age of 16 years ($cvi = 2.75$), 17 years ($cvi = 2.24$) and 18 years ($cvi = 1.27$) does predict the level of appetitive aggression, with lifetime perpetrated acts being the most important predictor ($cvi = 66.46$). Notably, the (para)military recruitment at the ages of 6-14 years and above 20 years did not reach cvis larger than .2 and are thereby negligible (see Figure 5.1). The explanation of variance from the OBB data is 31%. In a slightly varied model excluding lifetime perpetrated acts, 10% are explained by recruitment-related age-variables; being in an armed group at the age of **16 and 17 years** remain the most important predictors and can therefore be considered as the most critical sensitive periods in the development of a robust trait of appetitive aggression. More details can be found in the Appendix.

### 5.5 Discussion

In this study, we explored the periods sensitive for the development of appetitive aggression. Using RF-CI, we analyzed data from Congolese ex-combatants who had perpetrated various and frequently extreme forms of violence during their time as members of armed groups. In addition to the number of lifetime perpetrated violent acts, being recruited during late adolescence, particularly at the ages of 16 and 17, turned out to be critical for the development of an appealing perception of violent cues; about 10% of variance is explained by these sensitive periods in our sample.

Currently, the number of child soldiers is estimated at 300 000 (UNICEF), and thereby the number of former child soldiers who are now adults is likely to be considerably higher.
As implicated by our results, not only is their level of appetitive aggression expected to be elevated but they are also at a greater risk of violent behavior resulting in higher rates of familial violence, rape, and criminality as well as lower thresholds in rejoining an armed group (Hermenau, Hecker, Mädl, et al., 2013). In fact, former combatants are a major source of destabilization in post-conflict regions (Banholzer 2014). In order to rebuild a stable and peaceful society, it is important to provide interventions that also address the heightened attraction to aggression. Yet, the development of appropriate evidence-based treatment modules has only been recently attempted (Crombach & Elbert, 2014b; Hermenau, Hecker, Schaal, et al., 2013; Köbach, Schaal, Hecker, and Elbert, in sub).

Moreover, this finding sheds light on the minimum age requirements in military service from a psychological perspective. Commonly, 18 years of age is the legal minimum age of (voluntary) recruitment. However, in the United States, Germany, the Netherlands, or Canada young men are accepted by the age of 17 years and in the Great Britain even a year earlier. In Great Britain, these young men can also be deployed in "war-fighting-situations" (Walker, 2010). Remarkably, 17% of military personnel does have a criminal record Great Britain (MacManus et al., 2013)!

The result is in line with findings on the age of onset of antisocial personality disorder (Moffitt, 1993) as well as the age of onset of substance use disorders (Kessler et al., 2005; Paus, Keshavan, & Giedd, 2008), which, as with appetitive aggression, are driven by the shaping of neural reward circuits (Elbert et al., 2010). With regard to findings in neuroscience, it seems that neural reward circuitry developed during adolescence (Andersen, 2003) is more sensitive to cues associated with violence and thus may contribute to the emergence of a stable trait of appetitive aggression. However, developmental dynamics of the neural correlates of the love for battle (Moran et al., 2014) remain to be explored.

Figure 5.1: Sensitive periods for developing a robust trait of appetitive aggression

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Finally, it is important to note that the period of recruitment is only a rough measure of the point in time in which the violent acts had been executed. More precise measures may produce higher cvis relative to other predictors and better fits to the OBB data.

5.6 Acknowledgments

We owe an immense gratitude to all of the participants who openly disclosed their experiences. We also appreciate the reliable support of Dr. Susanne Schaal, Ben Ombeni Cigolo, Zacharie Muhave and Lisette Panzu Katakya as well as Jean-Marc Tafani, Ndiaga Diagnen, Mass Walimba, Djoda Fidele, Topesse Lokonde and the whole team in DDR. We are grateful also to Heike Riedke, Dr. Martina Ruf and Dr. Harald Hinkel. We also appreciate the contributions of Dannie Meyer-Parlapanis who kindly assisted in writing. Research was supported by DFG and ERC and vivo.
6 Effectiveness and dissemination of FORNET

6.1 Abstract

Objective. Between 20% and 50% of ex-combatants present with trauma-related disorders, and more than half have a low threshold for resorting to violence. Therefore, psychotherapeutic assistance should address both trauma and aggressive tendencies. Supporting the demobilization and reintegration process of ex-combatants in the eastern DRC, we implemented Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET) – a brief intervention that was conducted by local counselors of a first (DS1; counselors trained by experts) and second (DS2; counselors trained by experienced counselors of DS1) dissemination stage.

Method. A total of 98 combatants in their demobilization process were treated by counselors in DS1 and DS2 using FORNET; treatment-as-usual served as the control condition. FORNET training included a 3-week workshop. PTSD, appetitive aggression, depression, and drug dependence were assessed prior to the intervention and 6 and 12 months post-intervention; additionally, we assessed reintegration outcomes.

Results. Six months post-intervention, FORNET significantly reduced PTSD symptoms (DS1: $d_{within}=1.35$; DS2: $d_{within}=1.41$) but had less effect on the level of appetitive aggression (DS1: $d_{within}=0.14$; DS2: $d_{within}=0.70$); moreover, large beneficial effects were found for depression severity (DS1: $d_{within}=1.14$; DS2: $d_{within}=1.42$) and drug dependence (DS1: $d_{within}=0.93$; DS2: $d_{within}=0.68$). Effects for reintegration indices were moderate to small. Treatment gains were retained at 12 months.

Conclusions. Individuals without previous training in psychotherapy can learn to effectively apply the brief intervention FORNET and support the demobilization process in ongoing conflicts. The study suggests that it is possible to pass down effective psychotherapeutic intervention techniques over generations of counselors.

Keywords: PTSD, Aggression, FORNET, Dissemination, Violence, War, Trauma, LMIC, psychotherapeutic intervention in ongoing armed conflict settings, demobilization, MONUSCO,
6.2 Introduction

One of the main obstacles to mental health care in low- and middle-income countries (LMIC), and post-conflict regions in particular, is the lack of adequately trained counselors. Consequently, a high percentage of people in need of mental health care do not receive it (Saxena et al., 2007). A key strategy to narrow the treatment gap is to scale up evidence-based interventions using local personnel and to shift tasks from clinical experts to trained counselors (Jacob et al., 2014; Saxena et al., 2007). At present, promising effects of adapted psychotherapeutic interventions have been found for PTSD and trauma-related disorders (e.g., for Narrative Exposure Therapy, NET; Jacob et al., 2014; Neuner, Catani, et al., 2008; Schauer et al., 2011). However, the evidence is still considered "low" (for a review see Van Ginneken et al., 2013).

The consequences associated with inadequate access to mental health services are exacerbated in conflict regions such as the DRC. Despite international peacekeeping efforts, the conflict in the Kivu regions has resulted in mass violence, massacres and forced migration of thousands of people (Stearns, 2011, 2012b). Former members of (para)military groups often suffer from mental health complications that cannot be addressed adequately in the health care system. Continuous posttraumatic stress disorder (PTSD), depression, suicidal ideation and/or substance disorders are frequent (e.g., Betancourt et al., 2013; Heltemes et al., 2014; Johnson et al., 2008, 2010; Nock et al., 2013; Odenwald et al., 2007; Walker, 2010). Additionally, ex-combatants present with tendencies towards aggressive behavior; enhanced aggressive reactions are particularly associated with the hypervigilance symptom of (combat-related) PTSD (Jones, 2012; Klostermann, Mignone, Kelley, Musson, & Bohall, 2012; MacManus et al., 2013; Morland et al., 2012). Moreover, following the experience of combat high (Grossman, 1995, p. 243; see also Chapter 2), former combatants have reported a shift towards perceiving self-exerted violence as appealing (e.g., Hecker et al., 2012; Weierstall, Hinsberger, et al., 2013; Weierstall, Huth, et al., 2012; Weierstall et al., 2011).

These war-related changes in mental states are associated with various forms of psychological malfunctioning affecting the individuals’ minds, bodies, families and communities (Schauer & Schauer, 2010). In other words, the combatants’ history of war and violence appears to interfere with reintegration and peacekeeping efforts (for review see Mädl, Schauer, Odenwald, & Elbert, 2010; S. Walker, 2010) and thus, former members of (para)military groups can become a major source of destabilization (Banholzer, 2014). Ertl, Pfeiffer,
Schauer-Kaiser, Elbert, and Neuner (2014) demonstrated a positive association between the exposure to war, mental illness and maladjustment in a sample of Ugandan child soldiers. Savoca and Rosenheck (2000) and Gear (2002) found elevated unemployment rates in US veterans and in former combatants in South Africa, respectively. In Northern Uganda, Vinck et al. (2007) found attitudes towards violent conflict resolution were associated with stronger symptoms of PTSD and depression. A positive perception of self-committed violence (appetitive aggression) has been demonstrated to predict reenlistment after demobilization and failed reintegration: two major problems in the eastern DRC (Hermenau, Hecker, Mädl, et al., 2013; Elbert et al., 2013). A number of researchers have demonstrated high stability of the aforementioned psychological complications in similar populations (Milliken et al., 2007; Pigeon, Campbell, Possemato, & Ouimette, 2013; Thomas et al., 2010).

In the last decade, various trials have investigated the effectiveness of psychotherapeutic assistance in post-conflict regions (e.g., Hermenau, Hecker, Schaal, et al., 2013; McMullen et al., 2013; Tol et al., 2011). One of the best-established approaches is Narrative Exposure Therapy (NET; Schauer et al., 2011), an evidence-based, easily disseminable, short intervention for victims of war and violence that suffer from PTSD (Jacob et al., 2014; Neuner, Onyut, et al., 2008). However, having been a perpetrator of violence is often additionally associated with heightened levels of appetitive aggression (Weierstall & Elbert, 2011), and with an increased risk of not responding to NET (Stenmark et al., 2014). To meet the needs of this subgroup, Elbert et al. (2012) developed NET into Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET), targeting PTSD and appetitive aggression by means of exposure and focusing the role shift from a combatant to a civilian. In a first randomized controlled trial, Hermenau, Hecker, Schaal, et al. (2013) demonstrated that FORNET successfully reduced PTSD symptoms and facilitated reintegration by decreasing the connection to (para)military life in former child soldiers from the DRC. Moreover, Crombach and Elbert (2014b) showed that FORNET reduced the number of criminal acts performed by former street children in Burundi.

The goal of this study was to investigate the effectiveness of FORNET delivered by local counselors trained in FORNET in a first and second dissemination stage. We also wanted to investigate the feasibility of such an intervention during the early demobilization process. We defined three hypotheses a priori: (1) Ex-combatants who receive FORNET intervention, compared to treatment-as-usual (TAU) will show a greater reduction in PTSD symptom severity and the level of appetitive aggression (primary outcome), as well as lower depression and drug dependence and a better reintegration (economic reintegration and connection with (para)military life; secondary outcome). (2) FORNET conducted by counselors that were trained by experts will be effective (dissemination stage 1), even when conducted by counselors who have been trained by experienced peer-counselors (dissemination stage 2). (3) Treatment gains will be long lasting and observable in one-year follow-up tests.
6.3 Methods

6.3.1 Trial design

The trial had two successive dissemination stages (DS): In the first stage, local individuals without previous experience in psychotherapy were trained by clinical experts (DS1). In the second stage, the by then experienced counselors from the first stage trained a second group of local individuals (DS2). DS1 and DS2 incorporated three phases of treatment delivery; each DS featured a balanced parallel-group, semi-random design with a TAU control condition.

6.3.2 Participants

We included only adult male combatants from the eastern DRC suffering from trauma symptoms and heightened levels of aggression (≤6 symptoms of PTSD and ≤6 items affirmed in the aggression questionnaire). Exclusion criteria were serious physical injury or sickness and acute suicidal ideation or psychosis. The final sample contained a total of 98 male former combatants with a mean age of \( M = 23.48 \) (\( SD = 5.81 \)). Table 6.1 describes the sample characteristics at baseline per treatment condition; DS1 and DS2 did not differ regarding these variables. The flow of participants is described in Figure 6.1.

6.3.3 Setting and procedures

The trial took place at the MONUSCO (Mission de l’Organisation des Nations Unies pour la Stabilisation en République Démocratique du Congo) demobilization camp (Disarmament, Demobilization, Reintegration, DDR) and in a reintegration center run by a local, non-governmental, non-profit organization, both settled in Goma, the capital of the North Kivu province. All participants in the present study spent approximately 2-3 weeks on site. The reintegration program was designed for a full year.

Soldiers willing to demobilize attended the camp daily. They usually arrived in groups and were registered by the screening unit in an apparently random order. At each stage of dissemination, we randomized the first half of eligible participants on the basis of their registration sequence (simple randomization with 1:1 allocation ratio). The following participants were then matched to the first half of participants according to their PTSD symptom severity and level of aggression, and received the opposite treatment of their counterpart; in the reintegration center we proceeded likewise. After excluding participants with few symptoms and without a follow-up assessment, approximately half of participants (53.1%) were randomized in the final sample. It is important to note that the matched
Figure 6.1: Flow of participants
Table 6.1: Sample characteristics at trial baseline divided by treatment condition and dissemination stage

<table>
<thead>
<tr>
<th></th>
<th>FORNET</th>
<th>TAU</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>M ± SD [CI]</td>
<td>M ± SD [CI]</td>
</tr>
<tr>
<td><strong>Age in years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>23.14 ±5.52 [21.00, 25.28]</td>
<td>25.52 ±7.18 [22.42, 28.63]</td>
</tr>
<tr>
<td><strong>Years of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5.43 ±3.56 [3.81, 7.04]</td>
<td>6.77 ±3.62 [5.31, 8.23]</td>
</tr>
<tr>
<td>2</td>
<td>5.57 ±3.94 [4.04, 7.10]</td>
<td>4.35 ±3.59 [2.80, 5.90]</td>
</tr>
<tr>
<td><strong>Age in years of entry in first AG</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16.05 ±6.47¹ [13.02, 19.08]</td>
<td>16.46 ±5.09 [14.04, 18.52]</td>
</tr>
<tr>
<td><strong>Months spent in the AG</strong></td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>44.97 ±33.95¹ [29.09, 60.86]</td>
<td>46.62 ±52.81 [25.29, 67.95]</td>
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<tr>
<td>2</td>
<td>50.11 ±45.62 [32.42, 67.80]</td>
<td>57.80 ±52.45 [35.12, 80.48]</td>
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<tr>
<td><strong>Lifetime traum. events</strong></td>
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<tr>
<td><strong>Lifetime perp. violence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5.43 ±2.42 [4.33, 6.53]</td>
<td>3.96 ±2.07² [3.11, 4.81]²</td>
</tr>
<tr>
<td>2</td>
<td>5.32 ±1.93 [4.15, 5.33]</td>
<td>4.74 ±1.36 [4.57, 6.07]</td>
</tr>
</tbody>
</table>

*Note. *p ≤ .05, **p ≤ .01, ***p ≤ .001 DS1: nFORNET = 21, nTAU = 26; DS2: nFORNET = 23, nTAU = 28; ¹n = 20; ²n = 25; DS = dissemination stage, AG = armed group; FORNET = Narrative Exposure Therapy for Forensic Offender Rehabilitation, TAU = treatment-as-usual.
participants (46.9%) were allocated to balance symptom severity in the two groups and to facilitate treatment flow. This occurred without knowing any personal characteristics that could possibly influence the outcome. While all authors had worked in Goma, the first author was on-site during the entire training and assessment period. The first author also implemented the random allocation and constantly monitored the trial (including data assessment and treatment phases). None of the screening unit, the counselors, or the interviewers were able to observe, to foresee, or to influence the allocation process.

In the first days after their arrival, we interviewed all adult male ex-combatants who arrived at the DDR camp between July 23rd until 29th, August 7th until 17th, and August 30th until September 15th, 2012 (DS1); or February 2nd until 11th, February 27th until March 13th, and March 26th until April 5th, 2013 (DS2). The assessments were stopped once each counselor had 1-2 eligible clients. Ex-combatants in the reintegration center were selected by the director and interviewed at the center. Follow-up assessments were conducted in February, March and April 2013 (DS1: 6-months follow-up) and for both phases in August and September 2013 (DS1: 12-months follow-up; DS2: 6-months follow-up). The interviews were conducted individually in a private setting and lasted between 1.5 and 2.5 hours. None of the subjects rejected participation in the preliminary diagnostic interview.

Diagnostic interviews were carried out by a group of six mother-tongue Kiswahili-speaking research assistants, recruited from non-MONUSCO/DDR settings (one psychologist, four psychology students and one translator) to ensure absolute blindness to the treatment conditions in the follow-up assessments. During an intensive 10-day workshop, the assistants were trained in psychological concepts and in sensitive and empathetic interviewing techniques. The interviewers received follow-up training sessions in October 2012 (3 days) and in February 2013 (7 days). During the entire phase of data collection, interviewers received extensive feedback and were closely supervised by clinical experts. Prior to the start of the trial, independent interpreters translated all instruments in written form from English to Kiswahili, the lingua franca of the Kivu regions. A blind back-translation in English ensured valid translation. Inconsistencies were discussed with both translators and a clinical expert.

After the interview, eligible participants were briefed on the general experimental set-up: voluntarily participation, possibility for withdrawal at any time without negative consequences, and compensation with a basic needs kit (including a mattress, a plastic sheet, and a blanket). To keep the outcome expectations constant, the treatment was communicated as a talking program and the control condition as a leisure program for rest after an exhausting time in the military.

The Ethical Review Board of the University of Konstanz, the board of the NGO vivo, the authorities of MONUSCO and the local reintegration center approved the present study.
6.3.4 Local team of counselors and dissemination strategy

The majority of counselors (17 in total) had worked in the DDR unit of MONUSCO and was selected to participate in the training by their superiors. We also included three staff members of the local reintegration center (DS1) and two medical doctors (DS2) who worked for associated institutions. In two, 3-week FORNET training sessions, the theoretical concepts of PTSD, aggression and other trauma-related disorders, as well as the treatment approach were taught theoretically and practically; particular focus was given to practical therapeutic skills in treating trauma and aggression using exposure in sensu. In addition, the trainees learned basic counseling skills. In the first and the second training courses, identical didactic tools were applied: interactive lecturing for theoretical content and a variety of practical exercises including role-playing in front of the group by trainers and trainees, as well as in small groups (2-3 trainees) with and without supervision.

**DS1** To disseminate FORNET to the first generation of counselors, two postdoctoral clinical psychologists from the University of Konstanz conducted the initial 3-week FORNET training. A clinical psychologist closely monitored and supervised (individually and in the group) the succeeding treatments. In the final part of the DS1 treatment phase, four counselors were chosen to participate in the following train-the-trainer training as aspirant FORNET trainers.

**DS2** To disseminate FORNET to the second generation of counselors, the four FORNET trainers conducted the second 3-week FORNET training. First, they prepared their own training manual and scheduled the course of the training. Next, they carried out the training with their peers and received extended feedback from two clinical psychologists supervising the training. Finally, they provided regular peer supervision with trainees who conducted FORNET. The peer supervision was in turn supervised individually and in groups by the clinical psychologist on site.

6.3.5 Interventions

**FORNET** Following NET (Schauer et al., 2011) – an evidence-based field intervention for trauma victims – we adapted FORNET to address the particular needs of violent offenders (e.g., rebels, child soldiers, street kids, gang members, for further details see Hermenau, Hecker, Schaal, et al., 2013). The intervention consisted of five individual and two group sessions. In the individual sessions (ca. 2 hours), the client chronologically re-con structs his/her biography. As in NET, the first session begins with the lifeline; the client situates stones and flowers along a rope, with stones representing negative/traumatic events and
major positive events being represented by flowers. In addition to the stones and flowers, the individual places sticks along the rope to symbolize active involvement in violent acts (e.g., combat, rape, massacre, etc.) in an attempt to avoid emotional valence or moral judgment being associated with such events. However, the client can combine a stick with a flower or a stone as a way to designate a positive or negative perception of the violent experience. In the exposure session, the most traumatic experiences and the violent acts that involved the strongest emotions are re-experienced in sensu. Here, the therapist focuses on the first perpetrated killing/severe injury and/or the first rape. During exposure sessions, the therapist encourages the client to re-live the event and continually asks for current and past emotional, physiological/interoceptive, cognitive and sensory reactions. After a narration of the first killing/injury and/or first rape, particular focus is given to the threshold the client overcame to harm the person/s and the diminution of this threshold in subsequent acts. Concluding the event, the client is encouraged to articulate current thoughts and feelings about the incident. Following the individual sessions, the two group sessions (ca. 2 hours) consist of two therapists and 4-5 clients. Focusing on the role change from combatant to civilian, the clients are encouraged to discuss positive and negative aspects of the two roles and finally to frame their future hopes and wishes. In two pilot studies with former child soldiers in the eastern DRC and with street children in Burundi, the intervention reduced aggressive behavior and PTSD severity (Crombach & Elbert, 2014b; Hermenau, Hecker, Mädl, et al., 2013).

**Treatment-as-usual** Participants assigned to TAU remained in the demobilization camp for 2-3 weeks or completed the usual program in the local reintegration center, respectively.

### 6.3.6 Outcome measures

The battery was administered as a semi-structured interview in Kiswahili except for a few cases that called for Kinyarwanda. At the beginning of the interview, sociodemographic information was obtained from each participant and included age, ethnicity, educational background and details regarding the participant’s military career.

**Exposure to violence** A 31-item event-checklist adapted from previous studies in similar populations (e.g., Hecker et al., 2012; Hecker, Hermenau, Mädl, Hinkel, et al., 2013) was administered to assess lifetime exposure to different types of potentially traumatic events (experienced and witnessed) and perpetrated violent acts. A sum score was calculated for the number of types of witnessed and experienced traumatic events (possible range: 0-22) as well as for the number of types of perpetrated violent acts (possible range: 0-9). Reliability
measures for the applied event-checklist revealed high inter-rater reliability (Cohen’s $\kappa = .98$). For further details see Chapter 2.

**Primary outcome** Participants’ diagnostic status and PTSD symptom severity were evaluated using the PTSD Symptom Scale-Interview (PSS-I; Foa & Tolin, 2000). The PSS-I assesses the 17 DSM-IV (APA, 2000) symptom criteria for PTSD. We measured the symptom occurrence during the previous month (instead of the last 2 weeks) to check the diagnostic status. Each item is rated on a four-point scale ranging from 0 (*not at all/only once*) to 3 (*five or more times per week/almost always*). PTSD severity was calculated by summing all of the symptom scores (possible range 0-51). Internal consistency and inter-rater reliability revealed excellent values (Cronbach’s $\alpha = .91$; intraclass correlation coefficient, $ICC = .89$).

Appetitive aggression was assessed using the Appetitive and Facilitative Aggression Scale (AFAS; DS1) and the Appetitive Aggression Scale (AAS, Weierstall & Elbert, 2011; DS2 and follow-ups). The AAS has been shown to have excellent psychometric properties but does not assess reactive aggression. Therefore, we initially applied the AFAS, which revealed low variance for our African sample for DS1. The appetitive aggression score we used in the final analysis consisted of 7 dichotomous items covering the facets that were assessed in both questionnaires: testing strength against others is fun (1), seeing the victim suffering (2) or bleeding (3) as well as harming others is exciting (4), rush of fighting (5), habituating to cruelty (6), and not caring for one’s integrity during a fight (7). The original version of the AFAS contains 30 items that assess current appetitive and reactive ("facilitative") aggression, and the AAS consists of 15 items assessing appetitive aggression only. Both instruments rate the statements on a five-point scale; notably, the AFAS is on a frequency scale from *never* (0) to *more than two times a week* (4) whereas the AAS is on a consent scale from *I disagree with the given question* (0) to *I totally agree* (4). The statements were considered true if the item was approved. Psychometric properties were excellent ($ICC = .93$).

**Secondary outcome** Diagnostic status and depression symptom severity were determined using the Patient Health Questionnaire-9 (PHQ-9; Kroenke & Spitzer, 2002). The nine items correspond to the DSM-IV symptom criteria for major depression and assess the participants' feelings two weeks prior to testing. Each item is rated on a four-point scale ranging from 0 (*not at all*) to 3 (*nearly every day*). In this sample, the Cronbach’s $\alpha$ coefficient was .86, and indicated excellent inter-rater reliability ($ICC = .96$).

Drug Dependence was diagnosed according to DSM-IV symptom criteria using the Texas Christian University Drug Screen II (TCUDS II; K. Knight et al., 2002), a standardized 9-item tool that assesses (yes/no) each criterion according to the participant’s behavior in the past 12 months. The severity of drug dependence was calculated by summing up all of
the items (possible range: 0-9). In evaluations, the instrument has demonstrated stability across racial and ethnic subgroups (Simpson et al., 2012). Its psychometric properties are highly satisfactory (Cohen’s $\kappa = .94$).

To evaluate the clients’ reintegration success, we assessed economic status and the participants’ connection with (para)military life. The outstanding importance of sustaining military networks in the aftermath of war in regard to the risk of re-engagement in organized violence is analyzed in Nilsson (2008). Economic reintegration was assessed by a selection of five questions; each answer was converted into a point system from which the total score was computed. The index ranges from 0 (failed economic reintegration) to 30 (highly successful economic reintegration). The inter-rater reliability was excellent (Cohen’s $\kappa = .93$). Furthermore, we utilized 12 items to assess the connection with (para)military life. We asked questions about the frequency of actual contact with armed forces and about the subject’s affiliation with the specific lifestyle and attitudes of (para)military groups. Each item was rated on a scale from 0 (not at all) to 4 (more than two times a week / very much) and added up to a final score ranging from 0-60. Table 6.2 shows the list of items and their descriptive statistics. The internal consistency was good for the 6-months follow-up assessment (Cronbach’s $\alpha = .81$) but poor for the 12-month follow-up (Cronbach’s $\alpha = .20$). The inter-rater reliability was excellent ($ICC < .99$) for the instrument at both time-points.

### 6.3.7 Analysis

Group differences were calculated using the $\chi^2$-test for categorical and the $t$-test (independent and paired; one-tailed for directional hypotheses) for continuous variables. Additionally, we report 95% confidence intervals (CI). Bonferroni adjustment of 95% significance levels specifies the $p$-value at $p \leq .025$ for primary and $p \leq .0125$ for secondary outcomes. Cohen’s $d$ effect sizes between .20 and .49 indicate a small effect, .50 and .79 a medium effect, and $\geq .80$ a large effect. We considered Cohen’s $d$ effect sizes within a treatment condition (FORNET) to be equivalent (Hypothesis 2) when there was a substantial match (> 80%) between the Cohen’s $d$ confidence intervals of DS2 and DS1. To test the efficacy of FORNET, we conducted 2 (treatment condition) x 2 (DS) x 2 (time: baseline, 6-months follow-up) mixed-model analyses of covariance (ANCOVA) for PTSD and appetitive aggression (primary outcome) and for trauma-related syndromes (depression and drug dependence); baseline symptom severity and setting (DDR vs. reintegration center) were entered as covariates (Analysis I; Figure 6.1). Likewise, 2 (group) x 3 (time: baseline, 6-months follow-up, 12-months follow up) repeated measures ANCOVAs (baseline symptom severity as covariates) were conducted to confirm the maintenance of treatment gains (Analysis II; Figure 6.1). None of the variables deviated significantly from the normal distribution and homoscedasticity. As the sub-samples had equal sizes, the ANCOVAs could be regarded as robust against
Table 6.2: Descriptive information on economic reintegration and connection with (para)military life 6 months after demobilization

<table>
<thead>
<tr>
<th>Economic reintegration</th>
<th>DS1</th>
<th>DS2</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you have a job currently? Yes (n, %)</td>
<td>40 (85.1)</td>
<td>40 (78.4)</td>
<td>0/5</td>
</tr>
<tr>
<td>How much is your regular income ($)? (M, ±SD)</td>
<td>3.21 (3.74)</td>
<td>4.66 (3.99)</td>
<td>0-10</td>
</tr>
<tr>
<td>Do you have your own house? Yes (n, %)</td>
<td>11 (23.4)</td>
<td>18 (35.3)</td>
<td>0/5</td>
</tr>
<tr>
<td>Do you have your own mobile phone? Yes (n, %)</td>
<td>17 (36.2)</td>
<td>17 (33.3)</td>
<td>0/5</td>
</tr>
<tr>
<td>How often do you eat meat or fish per week? (M, ±SD)</td>
<td>2.25 (1.63)</td>
<td>1.78 (1.57)</td>
<td>0-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection with (para)military life (yes/≤1)</th>
<th>n (%)</th>
<th>n (%)</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often where you in contact with your former unit/commander, any other armed group?</td>
<td>21 (45.7)</td>
<td>9 (17.6)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did your former unit/try to convince you to go back to an armed group?</td>
<td>27 (58.7)</td>
<td>7 (13.7)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did any other armed group try to convince you to go back to an armed group?</td>
<td>18 (39.1)</td>
<td>12 (23.5)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often were you in contact with former combatants who engaged in criminal activities?</td>
<td>4 (8.7)</td>
<td>1 (2.0)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did you engage in criminal activities?</td>
<td>4 (8.7)</td>
<td>0 (0)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did you get problems with the police?</td>
<td>6 (13.0)</td>
<td>11 (21.6)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did you get arrested?</td>
<td>7 (15.2)</td>
<td>7 (13.7)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did you think about going back to an armed group?</td>
<td>11 (23.9)</td>
<td>7 (13.7)</td>
<td>0-5</td>
</tr>
<tr>
<td>How often did you make specific plans to join an armed group again?</td>
<td>6 (13.0)</td>
<td>3 (5.9)</td>
<td>0-5</td>
</tr>
<tr>
<td>How much did you consider yourself as a soldier?</td>
<td>15 (33.3)</td>
<td>12 (23.5)</td>
<td>0-5</td>
</tr>
<tr>
<td>How much did you enjoy to talk about your life as soldier?</td>
<td>25 (54.3)</td>
<td>25 (49.0)</td>
<td>0-5</td>
</tr>
<tr>
<td>How much did you enjoy to think back about your life as soldier?</td>
<td>26 (56.5)</td>
<td>24 (48.0)</td>
<td>0-5</td>
</tr>
</tbody>
</table>

Note. DS = dissemination stage.
violations of homogeneity of variances.

Eta squared effect sizes – partial ($\epsilon^2_p$) and generalized ($\epsilon^2_G$) – were computed; generalized ($\epsilon^2_G$) allows comparisons across different (repeated measure/mixed model) AN(C)OVA designs (Bakeman, 2005; Lakens, 2013; Olejnik & Algina, 2003). Our metric for a small effect was $\epsilon^2 \geq .0099$, for a medium effect $\epsilon^2 \geq .0588$, and for large effect $\epsilon^2 \geq .1379$ (Cohen, 1988). We lost some of the matched participants ($n = 42$) due to the deterioration in the security situation. To maintain the sample size, we did not require exact matching dyads in the final analysis. Inter-rater interviews ($N = 77$; $n_{\text{expert}} = 19$, 24.7%) were conducted throughout the whole assessment process. Following Hallgren (2012) we computed intraclass correlation coefficients (ICC; two-way, mixed; absolute agreement) for ordinal and Cohen’s $\kappa$ for nominal data. We used SPSS 21 and R (version 2.15.0) for the analysis.

6.4 Results

Baseline exposure to violence is summarized in Table 6.1. Descriptive statistics for primary and secondary outcome measures divided by treatment condition and DS are displayed in Table 6.3. An overview of the results is provided in Figure 6.2. Within-group comparisons are reported in the results, Subsection 6.4.2.

6.4.1 Effectiveness of FORNET (Analysis I)

**Primary outcome** Mixed-model ANCOVA showed a significant interaction of time x treatment ($F(1, 92) = 14.15$, $p \leq .001$, $\epsilon^2_p = .133$, $\epsilon^2_G = .095$), indicating greater PTSD symptom reduction in the FORNET group compared to TAU. The main effect of time did not reach significance. Between-group comparisons 6 month post treatment showed significantly fewer symptoms in the FORNET condition compared to TAU ($t(96) = 3.55$, $p < .001$, Cohen’s $d = .72$). Effect sizes were moderate to large. The remission rate of ex-combatants who received FORNET was substantially higher compared to TAU: at baseline, 29 ex-combatants in the FORNET group fulfilled the diagnostic criteria for PTSD; 6 months later two-thirds ($n = 19$, 66%) were in remission. In TAU, a total of 23 participants suffered from PTSD at baseline and at 6 months later 10 (43%) were in remission. The number of former combatants suffering from the clinical symptoms of PTSD at the 6-months follow-up differed significantly among the two groups ($\text{Chi}^2(1) = 5.77$, $p = .015$).

No significant effects were found in regard to the level of appetitive aggression (interaction effect of time x treatment: $F(1, 92) = 1.13$, $p = .291$, $\epsilon^2_p = .012$, $\epsilon^2_G = .008$, main effect of time: $F(1, 92) = 0.04$, $p=.947$, $\epsilon^2_p < .001$, $\epsilon^2_G < .001$). Accordingly,
Figure 6.2: Treatment gains for primary (PTSD, appetitive aggression) and secondary (depression, drug dependence, economic reintegration, connection to (para)military life) outcome measures. The figure illustrates interaction effects for 6- and 12-months follow-up assessments, including the total sample of Analysis I at baseline and 6 mo follow-up and, complementary, the sample of Analysis II at 12 mo follow-up. (*)p ≤ .10, *p ≤ .05, **p ≤ .01, ***p ≤ .001; FORNET=Narrative Exposure Therapy for Forensic Offender Rehabilitation, TAU=Treatment-as-usual, DS=dissemination stage.)
between-group comparisons were also not significant (t(96) = -1.27, p = .104, Cohen’s d = -0.26).

Secondary outcome A mixed-model ANCOVA for the severity of depression showed a significant interaction of time x treatment (F(1, 92) = 14.87, p ≤ .001, $\epsilon_p^2 = .139$, $\epsilon_G^2 = .097$). The main effect of time did not reach the 95% significance level (F(1, 92) = 3.33, p = .071, $\epsilon_p^2 = .035$, $\epsilon_G^2 = .024$). Six months after the intervention, participants who received FORNET reported significantly fewer depression symptoms (t(96) = 3.80, p < .001, Cohen’s d = .77). Effect sizes were moderate to large. Only 2 clients in each group fulfilled the diagnostic criteria for Major Depression at baseline. While both participants in the FORNET group recovered, one additional participant fulfilled the criteria for Major Depression at the 6-months follow-up in TAU.

Regarding a reduction in the symptom severity of drug dependence, neither the interaction (time x treatment: F(1, 92) = 1.43, p = .235, $\epsilon_p^2 = .015$, $\epsilon_G^2 = .010$), nor the main effect (time: F(1, 91) = 3.07, p = .083, $\epsilon_p^2 = .032$, $\epsilon_G^2 = .022$) was significant. Accordingly, no significant between-group difference was found 6 months after demobilization (t(96) = -0.16, p = .439). However, the remission rate of the DSM-IV diagnosis Drug Dependence was substantially higher in the FORNET group; 24% of participants remitted in TAU vs. 53% in FORNET.

Regarding the economic status, participants in the FORNET condition showed significantly better reintegration compared to those in TAU (t(96) = -2.77, p = .004, Cohen’s d = .28). The mean differences for the connection with (para)military life were not significant (t(96) = -0.60, p = .276).

The covariate setting (DDR vs. local reintegration camp) had no influence on primary (PTSD: F(1, 92) = 0.19, p = .666; appetitive aggression: F(1, 92) = 3.55, p = .063) or secondary (depression: F(1, 92) = 0.32, p = .576; drug dependence: F(1, 92) = 1.13, p = .292) outcomes.

6.4.2 Dissemination

The 95% CIs of Cohen’s d in DS2 compared with DS1 resulting from within-group comparisons indicated comparable effects of FORNET. Regarding the primary outcome, the effect size for the reduction of PTSD symptom severity was marginally higher in DS2 (d = 1.41) than in DS1 (d = 1.35) and the upper and lower limits in DS2 (CI 0.81, 2.01) were located inside the 95% CI of Cohen’s d in DS1 (CI 0.65, 2.04). The level of appetitive aggression was reduced in DS2 (d = 0.70, CI 0.14, 1.25), but not in DS1 (d = 0.14, CI <0, 0.67). For depression, the effect size was higher in DS2 (d = 1.42, CI 0.82, 2.02 compared to d =
1.14, CI 0.46, 1.81 in DS1), and the upper limit of the 95% CI of Cohen’s $d$ was also higher. The reduction of drug dependence symptoms was higher in DS1 ($d = 0.93, \text{CI } 0.26, 1.58$) than in DS2 ($d = 0.68, \text{CI } 0.13, 1.24$), but there was still a major overlap of the two CIs (86.2%). Similar results were found for between-group comparisons, as shown in Table 6.3. At the clinical level, remission rates for the diagnosis of PTSD, Major Depression and Drug Dependence were higher when compared with the control condition in both dissemination steps. Additionally, the interaction terms for time x treatment x DS did not indicate different treatment effects for the first and second generation of counselors (PTSD severity: $F(1, 92) = 0.13, p = .724, \varepsilon_p^2 = .001, \varepsilon_G^2 < .001$; appetitive aggression: $F(1, 92) = 0.00, p = .955, \varepsilon_p^2 < .001, \varepsilon_G^2 < .001$; depression severity: $F(1, 92) = 0.00, p = .955, \varepsilon_p^2 < .001, \varepsilon_G^2 < .001$; drug dependence: $F(1, 92) = 0.55, p = .461, \varepsilon_p^2 < .006, \varepsilon_G^2 = .004$).
Table 6.3: Baseline, 6-, and 12-months follow-up scores for FORNET and TAU condition divided by DS1 and DS2

<table>
<thead>
<tr>
<th>DS</th>
<th>FORNET</th>
<th>TAU</th>
<th>Statistic</th>
<th>Cohen’s d [CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M \pm SD$</td>
<td>$M \pm SD$</td>
<td>$t(__)$</td>
<td>$[-__, +__]$</td>
</tr>
</tbody>
</table>

**Primary outcome measures**

<table>
<thead>
<tr>
<th>PTSD severity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>16.33 ±8.59</td>
<td>15.08 ±6.91</td>
</tr>
<tr>
<td>2</td>
<td>20.25 ±9.76</td>
<td>19.00 ±8.24</td>
</tr>
<tr>
<td>6 mo after demob 1</td>
<td>3.71 ±4.71</td>
<td>9.00 ±8.28</td>
</tr>
<tr>
<td>2</td>
<td>3.89 ±6.34</td>
<td>8.22 ±6.95</td>
</tr>
<tr>
<td>12 mo after demob</td>
<td>1</td>
<td>1.91 ±3.08</td>
</tr>
</tbody>
</table>

**Appetitive aggression**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>1.90 ±2.19</td>
<td>1.42 ±1.70</td>
</tr>
<tr>
<td>2</td>
<td>3.04 ±1.90</td>
<td>2.35 ±1.82</td>
</tr>
<tr>
<td>6 mo after demob 1</td>
<td>1.81 ±2.06</td>
<td>1.38 ±1.88</td>
</tr>
<tr>
<td>2</td>
<td>1.64 ±1.89</td>
<td>1.13 ±1.06</td>
</tr>
<tr>
<td>12 mo after demob 1</td>
<td>1.73 ±1.27</td>
<td>1.46 ±1.71</td>
</tr>
</tbody>
</table>

**Secondary outcome measures**

<table>
<thead>
<tr>
<th>Depression severity</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline 1</td>
<td>8.05 ±5.58</td>
<td>6.88 ±5.82</td>
</tr>
<tr>
<td>2</td>
<td>10.18 ±4.91</td>
<td>8.48 ±5.07</td>
</tr>
<tr>
<td>6 mo after demob 1</td>
<td>2.29 ±3.80</td>
<td>5.65 ±4.87</td>
</tr>
</tbody>
</table>

continued...


<table>
<thead>
<tr>
<th>Drug dependence</th>
<th>FORNET</th>
<th>TAU</th>
<th>Statistic</th>
<th>Cohen’s d [CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5.00 ± 3.10 [3.59, 6.41]</td>
<td>2.73 ± 3.07 [1.49, 3.97]</td>
<td><em>t</em>(45) = -2.51**</td>
<td>-0.74 [-1.36, 0.11]</td>
</tr>
<tr>
<td>2</td>
<td>4.14 ± 3.35 [2.84, 5.44]</td>
<td>2.43 ± 3.01 [1.13, 3.74]</td>
<td><em>t</em>(49) = -1.89*</td>
<td>-0.53 [-1.12, 0.05]</td>
</tr>
<tr>
<td><strong>6 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2.05 ± 2.58 [0.87, 3.22]</td>
<td>2.19 ± 2.48 [1.19, 3.19]</td>
<td><em>t</em>(45) = 0.20</td>
<td>0.06 [-0.55, 0.66]</td>
</tr>
<tr>
<td>2</td>
<td>1.93 ± 2.75 [0.86, 2.99]</td>
<td>1.57 ± 2.63 [0.43, 2.70]</td>
<td><em>t</em>(49) = -0.48</td>
<td>-0.13 [-0.71, 0.44]</td>
</tr>
<tr>
<td><strong>12 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>2.00 ± 2.19 [0.53, 3.47]</td>
<td>3.62 ± 3.15 [1.71, 5.52]</td>
<td><em>t</em>(22) = 1.42(*)</td>
<td>0.59 [-0.32, 1.49]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reintegration: socioeconomic reintegration</th>
<th>FORNET</th>
<th>TAU</th>
<th>Statistic</th>
<th>Cohen’s d [CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16.00 ± 8.63 [12.07, 19.93]</td>
<td>14.12 ± 5.41 [11.93, 16.30]</td>
<td><em>t</em>(45) = -0.91</td>
<td>-0.27 [-0.87, 0.33]</td>
</tr>
<tr>
<td>2</td>
<td>18.00 ± 6.18 [15.61, 20.39]</td>
<td>12.65 ± 6.46 [9.86, 15.45]</td>
<td><em>t</em>(49) = -3.01**</td>
<td>-0.84 [-1.45, -0.25]</td>
</tr>
<tr>
<td><strong>12 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>20.82 ± 5.56 [17.08, 24.56]</td>
<td>16.38 ± 7.49 [11.85, 20.91]</td>
<td><em>t</em>(22) = -1.62(*)</td>
<td>-0.66 [-1.58, 0.25]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reintegration: connection with (para)military life</th>
<th>FORNET</th>
<th>TAU</th>
<th>Statistic</th>
<th>Cohen’s d [CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>7.52 ± 6.81 [4.42, 10.62]</td>
<td>6.42 ± 8.19 [3.11, 9.73]</td>
<td><em>t</em>(45) = -0.49</td>
<td>-0.14 [-0.75, 0.46]</td>
</tr>
<tr>
<td>2</td>
<td>2.89 ± 2.57 [1.90, 3.39]</td>
<td>4.61 ± 4.58 [2.63, 6.29]</td>
<td>1.69*</td>
<td>0.47 [-0.11, 1.10]</td>
</tr>
<tr>
<td><strong>12 mo after demob</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1*</td>
<td>5.91 ± 2.88 [3.97, 7.84]</td>
<td>4.62 ± 3.01 [2.79, 6.44]</td>
<td>-1.07</td>
<td>-0.21 [-1.10, 0.67]</td>
</tr>
</tbody>
</table>

*Note.* (*p ≤ .10, *p ≤ .05, **p ≤ .01, ***p ≤ .001; AG=armed group, mo=month, demob=demobilization, DS=dissemination stage, FORNET=Narrative Exposure Therapy for Forensic Offender Rehabilitation, TAU=Treatment-as-usual; DS1: *n*FORNET = 21, nTAU = 26; DS2: *n*FORNET = 28, nTAU = 23; DS1*: *n*FORNET = 11, nTAU = 13.
6.4.3 Maintenance of treatment gains (Analysis II)

As inferred in the flow of participants (Analysis II; Figure 6.1), we assessed the long-term effects of FORNET with a subsample of ex-combatants who demobilized in DS1 via DDR. Repeated-measures ANCOVA, including 6 and 12 month follow-up assessments, revealed a significant interaction effect of time x treatment for PTSD ($F(2, 20) = 7.18, p = .002, \varepsilon^2_p = .935, \varepsilon^2_G = .494$). This effect was not significant for appetitive aggression ($F(2, 20) = 1.49, p = .238, \varepsilon^2_p = .748, \varepsilon^2_G = .161$). Pairwise comparisons 12 months after demobilization revealed significant mean differences between FORNET and TAU for PTSD symptom severity (Table 6.3), but not for appetitive aggression. Remission rates additionally confirmed the maintenance of treatment gains for PTSD: 100% were in remission in FORNET, whereas only one (20%) participant was in remission in TAU. Large effects were found for both secondary mental health outcome measures (depression: $F(2, 20) = 7.88, p = .001, \varepsilon^2_p = .940, \varepsilon^2_G = .591$; drug dependence: $F(2, 20) = 2.92, p = .065, \varepsilon^2_p = .854, \varepsilon^2_G = .284$). Symptoms of depression were lower in FORNET. Regarding drug dependence, mean differences were not significant at a 95% probability level but showed a trend towards significance ($p < .10$). Of those participants that fulfilled the diagnostic criteria of Drug Dependence and received FORNET, half were in remission at the 12-month follow-up, while in TAU, 2 additional participants fulfilled the diagnostic criteria. While in DS1 at 6 months after demobilization, no benefits of FORNET were found in between-group comparison of the severity score of drug dependence, at 12 months, differences indicated decelerated benefits with $p < .10$. Notably, after adjustment for multiple testing $p < .10$ would imply a 60% significance level, hence, a high risk of type-II-error.

6.5 Discussion

In a sample of adult ex-combatants, we tested a psychotherapeutic intervention that (a) addresses both trauma symptoms and heightened levels of aggression and (b) was conducted by counselors in a first and second dissemination generation. Firstly, the results demonstrate that FORNET, compared to TAU, effectively reduced PTSD symptom severity. However, the level of appetitive aggression was not improved. Beneficial effects were also found on secondary outcome measures, especially depression symptoms and Drug Dependence at the clinical level. Follow-up assessments one year after the intervention suggested further treatment gains in the long term (assessed in DS1 only). Secondly, equal effects were found when FORNET was conducted by first- vs. second-generation counselors. Moreover, we found that FORNET can effectively be implemented in the early demobilization process and is effective in settings with ongoing conflict.

Violent offenders with PTSD and trauma-related disorders have an increased risk of
not responding to NET when their offenses have not been explicitly addressed (Stenmark et al., 2014). Therefore, with FORNET, we have expanded evidence-based NET to address the specific needs of violent offenders, such as heightened levels of PTSD and aggression (Elbert et al., 2012; Hermenau, Hecker, Schaal, et al., 2013; Crombach & Elbert, 2014b). We demonstrated that FORNET – implemented in the early demobilization process – effectively reduces trauma symptoms, even in a setting of ongoing severe conflict (Security Council Report S/2014/42). The effect sizes were in accordance with other clinical trials that have assessed the effectiveness of more time-consuming treatments conducted by clinical experts with (para)military samples (for reviews in high-income countries see Steenkamp & Litz, 2013; Zinzow et al., 2012). Only minor effects were found for appetitive aggression. Notably, Crombach and Elbert (2014b) reported that former street children continued to rate violent acts as appealing, irrespective of their particular treatment condition. However, those who received FORNET did not act out violent acts as often as those in the control condition. It seems that memories of the "highs" of combat keep ratings of violent acts elevated. However, this does not necessarily mean that former fighters – in the streets or in war – will behave more aggressively when returning to a civil setting, especially when the change in role is emphasized as in FORNET and defense-driven violent reaction wane with the reduction of PTSD symptoms. The follow-up in this investigation was not long enough to reliably measure the portion of the participants that rejoined an armed group. However, actual behavioral measures or indices of the number of crimes committed, as in the Crombach and Elbert (2014) study, may be needed to determine whether FORNET’s module of role change together with the NET-typical reprocessing of the memories of violent acts will actually change behavioral outcomes. The effects on trauma-related problems were promising: depression severity was reduced significantly 6 and 12 months after demobilization and remission rates for Drug Dependence were higher in the FORNET groups. Reintegration outcomes seem to depend to a greater extent on political stability. In short, the conflict intensity in North Kivu increased in April 2012 with the invasion of M23 rebels into parts of North Kivu, and peaked when the rebels entered North Kivu’s capital, Goma, in November 2012 (3 months after the DS1 intervention). The conflict then declined with an increase of international support in May 2013, during the treatment phase of DS2. Accordingly, the connection with (para)military life within the FORNET group was higher in DS1 (when participants were released into an escalating conflict) compared with DS2 (when participants were released after the conflicts peak and after the implementation of additional international support). Moreover, the between-group comparisons of economic reintegration were only significant in DS2 and at the 12-month follow-up for DS1. We consider this as evidence that the reduction of mental health problems will facilitate economic reintegration if the political situation leads to increasing stability. Given that the mean difference of the connection with (para)military life in DS2 was only significant at a 90% level and without correction for
multiple testing, we consider this result as suggestive. Further investigation is required.

Simultaneously haunted by intrusive memories, hypervigilance and fear on the one hand and experiencing the acting out of violence as appealing on the other, ex-combatants seem to be trapped in a cycle of violence. Especially in post-conflict regions with less effective government authorities, this cycle seriously impacts the individual, the family, the community and the stability of the country at large. It should be noted that estimates of the size of the M23 rebel organization at the time of its peak activity were not more than 2000! In other words, it does not take many combatants to start a war in a failed state. Thus, addressing violent acts and the related thoughts and feelings in the course of the demobilization process is a worthwhile endeavor. A brief intervention such as FORNET has additional advantages: first, the reduction of the stigma that can be a major barrier to mental health care access (if there is mental health access at all; Hoge et al., 2004; Saxena et al., 2007) and second, the relatively fast implementation of structures that are sustainable through dissemination. Moreover, the attrition rate can be kept very low when the intervention is part of a program that also assists with economic integration into civil society. Given the significant proportion of participants struggling with drug use disorders, medical assistance during detoxification should also be provided.

Importantly, we also successfully disseminated FORNET into a first and second generation of counselors. A review of the global situation rapidly reveals the relevance of this finding: at present, there are 33 ongoing "new" wars, i.e., wars that largely victimize the civilian population, including children. Four out of five fatalities are civilians and four out of five are child soldiers – summed up to an estimate of more than 300,000 children under arms. The probability of resolution for these wars is low, and even then, the risk of renewed outbreaks remains high (Glassmyer & Sambanis, 2008). One of the major sources of destabilization are former combatants, particularly those with poor reintegration (Banholzer, 2014; Humphreys & Weinstein, 2004) and heightened levels of aggression (Hermenau, Hecker, Mäd, et al., 2013). Further, the treatment gap is extremely high in LMIC, where the majority of civil wars are fought. The scarcity of adequately skilled personnel and easily disseminable, evidence-based interventions are one of the main obstacles to treatment (Saxena et al., 2007). At this point, it is necessary to re-design psychotherapeutic approaches that are effectively practiced in high-income countries and to develop novel strategies to disseminate psychotherapeutic skills across generations of counselors.

In two studies in Uganda where NET was utilized by local counselors, the intervention successfully reduced PTSD and other trauma-related symptoms (Ertl et al., 2011; Neuner, Catani, et al., 2008). Later, Jacob et al. (2014) conducted a clinical trial assessing the dissemination of NET to a second generation of counselors. In both dissemination stages, trauma symptoms of Rwandan genocide survivors were reduced significantly. Consistently, the results presented in this study demonstrate the potential for effective dissemination
of FORNET conducted by the first and the second generation of counselors as part of a demobilization program.

The results are limited by the unnecessarily high number of participants that were lost to follow-up, mainly in DS1, which was caused by the escalation of the conflict. This forced us to abandon matching dyads in the analysis to avoid further losses. Yet, compared to other studies (e.g., Bass et al., 2013) and considering the conflict intensity, a high number of participants made the effort to travel back to the camp for follow-up assessment, sometimes requiring a journey through unsafe territories. Regarding the level of appetitive aggression, the assessment methods need to be refined to be more sensitive to behavioral changes and, to a lesser extent, to subjective views of aggression.

6.6 Conclusion

The present findings demonstrate that FORNET effectively reduces PTSD and other trauma-related symptoms in former members of (para)military groups. In addition, we demonstrated that FORNET may be implemented in the demobilization process and that the intervention remains effective when disseminated across generations of counselors without previous therapeutic experience.

6.7 Acknowledgments

Our immense gratitude is owed to all of the participants who accepted sometimes long journeys through North Kivu in politically unsettled times to take part in the follow-up assessment. We thank our trainers Jean de Dieu Kambale, Emery Ntaneza, Emery Lukambo and Jeannot Kahombe and all counselors as well as the interviewers Ben Ombeni Cigolo, Lisette Katakyá, and Zacharie Ndeze. We also appreciated the support of Jean Marc Tafani, Ndiaga Diagne, Mass Walimba, Djoda Fidele, Topusse Lokonde and the whole team in DDR. We are grateful also to Heike Riedke, Dr Martina Ruf-Leuschner, Dr Harald Hinkel and Danie Meyer-Parlapanis. This research was supported by vivo international and the Deutsche Forschungsgemeinschaft.
Part III

General discussion
7 Discussion of results

In post-war societies, the reintegration of ex-combatants poses a major challenges. The re-adjustment of those who inflicted rape, hunger and other atrocities upon enemies, including the civilian population, and comrades in arms is however often problematic; with their knowledge of warfare, cohesive networks, and an enhanced affiliation to violence, they are prone to criminality, gang-building, riots, re-recruitment, and family violence. However, perpetrators of violence themselves are not immune from suffering its effects.

The present thesis explored the blurring line between combat high and traumatic stress and its resultant long-term mental consequences. The first chapters of part II, Chapter 2, 3 and 4 examined mental injuries in ex-combatants: prevalences of posttraumatic stress, appetitive aggression and drug dependence were extremely high. Furthermore, the number of perpetrated violent acts predicted the level of appetitive aggression, even years after demobilization. Violence with strong predatory cues was most influential (Chapter 2 and 3). As shown in prior studies, traumatic stress was associated with PTSD symptom severity. In regard to sensitive periods for developing an appealing perception of violence, the present thesis reveals that being recruited in late adolescence (16 and 17 years) had the highest predictive importance (Chapter 5). Finally, Chapter 6 describes how FORNET implemented in the MONUSCO demobilization program effectively reduced trauma-related symptoms and facilitated the reintegration process; even when local counselors of the second dissemination stage conducted these treatments.

On the basis of the research questions outlined in Chapter 1, the following sections will discuss the evidence derived from the present thesis.

7.1 Mental health problems in the aftermath of combat

Fighting in one of the current wars brings with it a constant risk to physical integrity. Civil wars in particular are known to be extremely brutal (Eck & Hultman, 2007). Prior research reported enhanced symptoms of posttraumatic stress and (appetitive) aggression in the aftermath of combat exposure (e.g., Elbert et al., 2010; Ertl et al., 2014). The first studies of this thesis provide an overview of combat-related mental health problems of Congolese ex-combatants in their demobilization process.
7.1.1 Prevalence of combat-related mental consequences

Combat-related problems are appallingly frequent in the Congolese ex-combatants who had decided to leave their armed group and demobilize via MONUSCO (Chapter 2). Between 30-45% of participants met PTSD diagnostic criteria and 30% had at least moderate symptoms of depression; the criteria for Major Depression were only fulfilled in rare cases. Furthermore, the study revealed that four out of 10 ex-combatants meet the diagnostic criteria for Drug Dependence. As expected, the ratio was higher in the subsample of ex-combatants meeting PTSD diagnostic criteria (60%). Notably, high conflict intensity was associated with enhanced symptoms of posttraumatic stress and depression. Moreover, heightened levels of aggression were found in the sample: more than 45% reported that it was exciting to make the opponent really suffer and that during the fight, the desire to kill had taken control over them. The trait of appetitive aggression was high and comparable with ex-combatants originating from other samples in Burundi, the eastern DRC or Columbia (Hecker et al., 2012; Weierstall, Castellanos, et al., 2013). In consequence, ex-combatants are handicapped in terms of reintegration. Psychiatric conditions implicate a certain degree of dysfunctioning by definition (APA, 2013). In prior research, a negative association with physical health (Schnurr & Green, 2004) and the socioeconomic status had been demonstrated (Dohrenwend et al., 1992). Tendencies towards aggressive behaviors increase the likelihood of gang building, criminality and re-enlistment (Hermenau, Hecker, Mädle, et al., 2013; Mogapi, 2004).

In sum, psychiatric conditions and tendencies towards aggression are common in Congolese ex-combatants and need to be addressed adequately to enable successful reintegration. PTSD and appetitive aggression deserve particular attention, together with drug use disorders. Yet, demobilization programs mainly focus on educational and economic support. The results of the present thesis demonstrate the necessity of developing psychotherapeutic interventions to effectively reduce combat-related mental problems so that ex-combatants can benefit from conventional programs.

**DSM-IV vs. DSM-5** In regard to PTSD prevalence rates, the third study demonstrated that 93% of those meeting the diagnostic criteria according to DSM-IV would also meet the criteria specified in DSM-5; thus, relative to the DSM-5 as current "gold standard", DSM-IV would have produced 8% false negatives and 3% false positive. PTSD rates may increase due to different diagnostic systems. Further research should take this into consideration.
7.1.2 Predictors of appetitive aggression and posttraumatic stress

In the present thesis we examined the relation of combat exposure with appetitive aggression and posttraumatic stress as well as the relationship between age of recruitment and the appetite for violence.

**Combat high and traumatic stress** The building block effect is a consistent finding in PTSD research (Kolassa & Elbert, 2007). A high number of traumatic events enhances the risk of developing PTSD; also the severity of posttraumatic stress is positively correlated with the number of lifetime traumatic events (Neuner et al., 2004; Schauer et al., 2003). Thus, the high rates of mental illness in post-conflict societies emerge from extreme forms of stress and violence experienced during war. With respect to experiences, combatants differ from other populations; they typically not only experience, but also perpetrate extreme forms of violence. The literature gives differing accounts of perpetrators’ experience of committing violence (Elbert et al., 2010; Maguen et al., 2011), perhaps reflecting the wide variety of violent acts and interactions of different factors. In some cases perpetration is traumatic, in others it is exciting and pleasurable. What sort of event or act predicts appetitive aggression and/or posttraumatic stress? Using RF-CI, a non-parametric machine learning technique, the studies described in Chapter 2 and 3 revealed that the sum of lifetime traumatic events was most important in predicting posttraumatic stress while the sum of lifetime perpetrated violent acts was most important in predicting appetitive aggression. Furthermore, these studies showed that incidents incorporating strong predatory cues (pursuing the victim, hearing the screams, seeing the blood of the victim, watching the death throes, etc.) were most important for the prediction of higher levels of appetitive aggression. Thus, combat high and its sequelae were most influential in the highly predatory attacks. It is however noteworthy that perpetrated acts were not entirely separate from posttraumatic stress, nor were traumatic events entirely unrelated to appetitive aggression, thus providing evidence for the functionally linked neural networks as suggested in Elbert et al. (2010). Importantly, the latter findings were demonstrated in two independent studies with Congolese ex-combatants in their demobilization process (Chapter 2), and Burundian ex-combatants about 5 years after their demobilization (Chapter 3), thus, implicating enhanced robustness as well as high stability of these associations. In both samples, prevalence rates as well as the variable rankings for the prediction of the level of appetitive aggression and posttraumatic stress were similar. The third study used a hierarchical linear regression model to explain posttraumatic stress by the sum of experienced and witnessed traumatic events and the sum of perpetrated acts. Concordantly, the sum of lifetime perpetrated acts did not significantly predict posttraumatic stress.
Sensitive periods  Earlier studies had shown that particularly those who joined an armed group as minors presented with higher levels of appetitive aggression (Hecker et al., 2012). In fact, growing up, becoming a "man" also means to be confronted with ones’ personal potency to exert physical violence and power, to assume the role of protector of the family and community (Kröber, 2012); this may even be enhanced in civil war societies. Facilitating this developmental step, adolescents present with enhanced risk-taking behavior and an altered sensitivity to rewards. At the neural level, this period is associated with an imbalance in the development of prefrontal in comparison to antecedent structures (Spear, 2000). Using RF-CI, we found that young men recruited at the age of 16 and 17 years are most prone to developing a robust trait of appetitive aggression. Due to the small sample size and the noisy measure of having exerted violence, the result is of preliminary nature. Nevertheless, the conjunction of age-related neural development of reward and control structures and the perpetration of extreme forms of violence at war may underlie the adapted change in processing perpetrated violence.

In sum, these findings suggest a strong incident-symptom relation for perpetrated acts and appetitive aggression, parallel to that demonstrated before for traumatic events and posttraumatic stress. Nevertheless, the findings also suggest that these combat-related mental problems are linked. Ex-combatants, in particular those who have been recruited as young men aged 16 and 17 years, may have enhanced appetitive feelings towards violence coexisting with subliminal manifestations of posttraumatic stress. In psychotherapeutic interventions, both aspects need to be addressed to enable ex-combatants to change those elements of their personality, which have been shaped by war, and to start a peaceful civil life.

7.1.3 Re-modeling neural networks with FORNET

A first attempt to address both sides of these intermingled memory components of combat high and traumatic stress was realized in FORNET; Elbert et al. (2012) adapted NET (Schauer et al., 2005, 2011), a highly manualized, evidence-based, and disseminable short-intervention for trauma victims, to additionally reflect combat highs, and thus reduce heightened levels of aggression. Moreover, two group sessions were added in order to increase functionality and facilitate the reintegration of ex-combatants. Taking into account the lack of qualified mental health professionals in post-war regions (Saxena et al., 2007), the present thesis evaluated the effectiveness and additionally the dissemination of FORNET implemented in the current MONUSCO/DDR program. In both dissemination stages (DS1 and DS2), posttraumatic stress and depression severity as well as Drug Dependence at a clinical level were reduced 6 months after FORNET. However, no treatment effect was
7 Discussion of results

found for appetitive aggression. The renewed outbreak of the conflict in North Kivu, which coincided with the release of participants from DS1 may have influenced the reintegration of this group. In DS2, when the conflict intensity was no longer at its height, both increased economic reintegration and reduced contact with (para)military life were observed. The treatment effects were stable at 12-months follow-up and the dissemination successful.

In opposition to our expectations, FORNET did not reduce the level of appetitive aggression. Similar findings were also reported in the two previous trials in DRC (Hermenau, Hecker, Schaal, et al., 2013) and Burundi (Crombach & Elbert, 2014b); though, the street kids in Burundi who received FORNET carried out fewer violent acts than those in the waiting-list control conditions. Two explanations for this are offered: firstly, appetitive aggression could be a functional trait-like aspect of personality, rather than a state-like psychopathological development, thus it may not as easily be treatable. This is analogous to the case of posttraumatic stress, where PTSD symptoms are targeted, rather than the trait anxiety. Secondly, self-reported levels of aggression are strongly biased by social desirability; especially when ex-combatants identify with being civilian, these preferences may not be reported. These remarks are important for future research and will be discussed in detail in the next section.

However, this clinical trial contributes other important findings to the developing evidence of mental health interventions in DDR, and post-conflict settings in general. A unique finding is that FORNET sustainably reduced PTSD symptom severity and depression, thus, mental health outcomes, even though the conflict escalated after the participants were released. Hence, evidence-based psychotherapeutic short interventions are effective though the armed conflict is ongoing.

In contrast, reintegration benefits seem to be associated with the current status of conflict. Though speculative, it is reasonable that ex-combatants who settle into a more stable environment after their demobilization show better economic reintegration, cut off their military networks, and distance themselves from military-like behaviors and attitudes. Remarkably, ex-combatants who received FORNET and were released into an escalating conflict seemed to benefit nevertheless in regard to economic reintegration when the transition to peace began.

In conclusion, FORNET can effectively be implemented and disseminated in DDR programs and thus, may facilitate a country’s transition to peace. This is a pilot study and further research, outlined in the following section, could help to deepen our understanding of trauma and aggression as well as broaden its impact upon society.
7.2 Future implications for research and praxis

In the following subsections, future research implications will be drawn from the findings of the current thesis.

7.2.1 Mental health in former members of (para)military groups

This thesis revealed that PTSD and appetitive aggression as well as Drug Dependence are frequent in Congolese ex-combatants in their demobilization process; depression symptoms seem to occur predominantly at a subclinical level. Further, conflict intensity boosted PTSD and depression symptoms. Future research may focus on larger and more representative samples of former (para)military personnel in DDR programs in DRC and in other countries. Moreover, prevalence rates of active military personnel of countries with varying states of conflict should be assessed in future studies. Finally, research could be extended to non-military violent offenders like hooligans, forensic patients, or prisoners in more politically stable states.

7.2.2 Predictors and correlates

The present thesis found that the number of perpetrated violent acts is strongly associated with the level of appetitive aggression; a finding also reported in previous studies (e.g., Weierstall & Elbert, 2011). Furthermore, we found that certain perpetrated acts (massacre, attacking a village or settlement, etc.) were more predictive in regard to appetitive aggression. The extent to which appetitive aggression preexists as an inner human drive and/or grows from certain environmental inputs remains unresolved as yet; longitudinal assessments and correlates at the neural level may provide further clarification in the future. Figure 7.1 suggests a model about mechanisms behind the findings in this theses.

Furthermore, a linkage between recruitment at the age of 16 and 17 years and the level of appetitive aggression was found. Further research is required to assess an age-related development of enhanced reward circuits that are associated with the violent cues, e.g., watching fights, domestic violence, etc. Various factors need to be taken into account, including sex-related hormones like testosterone which mediates i.a. the neural maturation especially in adolescence (Raznahan et al., 2010) as well as the interplay of posttraumatic stress and appetitive aggression for individuals who experienced family violence. The causal model of PTSD suggested by Admon et al. (2014; Figure 1.1) may provide a preliminary theoretical working model for examining predisposed, acquired and age-related neural factors for the development of appetitive aggression as an antidote to posttraumatic stress (see Figure 7.1).


**Figure 7.1:** A working model accounting for neural abnormalities in appetitive aggression, analogue to PTSD (modified on the basis of Admon et al., 2013). The model postulates that as in PTSD, genetic and environmental factors, as well as the interaction between them (broken black line), may lead certain individuals to display an abnormal structure and hyperfunction of the amygdala (Amy) and dorsal anterior cingulated cortex (dACC). The model further suggests that such predispositions make individuals prone to express heightened arousal. Following combat high, a subset of those predisposely vulnerable individuals may acquire additional neural abnormalities in the form of reduced ventromedial prefrontal cortex (vmPFC) volume, and its connectivity with the hippocampus (HC). These acquired abnormalities may contribute to impaired excitement or arousal inhibition capability, which may not yet mean a positive or negative valence. However, the nucleus accumbens (Nacc), which plays an important role in reward circuits would increase its activity and thus, add a positive connotation to the heightened arousal. In consequence, frequency of "approach" of violent cues would increase. Conclusively, the working model suggests that the summation of both predisposing and acquired neural abnormalities, as well as of their potential interplay (broken curved line), results in the full phenomenon that entails appetitive aggression. Importantly, the model recognizes the contribution of additional brain regions as potential mediators (broken gray lines). Accordingly, a hypofunction of dorsomedial prefrontal cortex (dmPFC) and a hyperfunction of the insula, may mediate appetitive aggression and PTSD through their suggested roles in emotional regulation, and interoception.
Appetitive aggression and conflict research  The presented evidence of appetitive aggression deriving from ongoing conflict is congruent with the finding that ex-combatants with higher levels of appetitive aggression present with a higher risk of re-recruitment (Hermenau, Hecker, Mädl, et al., 2013). Future surveys should shed light on the impact of this predatory love of battle in war-torn societies on the perpetuation of civil war in addition to known predictors of armed conflict (Blattman & Annan, 2010).

7.2.3 Effectiveness and dissemination of FORNET

The present thesis provides evidence that PTSD symptom severity can be reduced in a 2-week psychotherapeutic intervention focusing on events of traumatic stress and combat high; beneficial effects have also been found for depression and Drug Dependence. Appetitive aggression was reduced in both conditions. Moreover, the intervention was feasible (a) for dissemination into further generations of local counselors, (b) for implementation in DDR programs, and (c) effective in ongoing conflict with respect to PTSD and depression. Future research may include clinical trials with larger samples, further dissemination stages, and a macro-level outcome, e.g., changes in criminality rates, local-level violence or human rights violations. The high prevalence of Drug Dependence should be addressed by integrating an additional evidence-based therapeutic tool at the end of the FORNET intervention.

As the sequencing of DDR fragments has been discussed by scholars previously (Knight & Özerdem, 2004; Banholzer, 2014), there is the question concerning the sequence of the DDR process in which FORNET should be applied. The present thesis reveals that FORNET is effective at the very beginning of the demobilization process. However, the follow-up assessment in Chapter 5 shows that trauma-related symptoms decrease even without FORNET; thus, a certain number of ex-combatants have spontaneous remissions after their demobilization. Researchers may conclude from the latter that implementing psychotherapy at a later point of reintegration could be more efficient. It should be kept in mind however, that the benefits ex-combatants can draw from early demobilization fragments (e.g., educational programs) would be reduced. Furthermore, ex-combatants who concluded their demobilization process may not be willing to undergo a psychotherapeutic treatment; especially those with high levels of appetitive aggression and fewer symptoms to PTSD. For those the burden of suffering would not become aware until the downward spiral of violence results in a dead end, e.g., in prison or other scenarios of social isolation. At this point the re-reintegration will become more and more difficult. Therefore, the implementation of psychotherapeutic interventions as early as possible in the demobilization process is highly recommended.

It is noteworthy that continuous scrutiny is an important issue for the implementation of clinical trials in these regions. Usually, scientific procedures are neither familiar to local
staff, nor to expatriates working in the field. Therefore, it would be recommended that scientific experts supervise the whole implementation process on site (allocation, blinding, etc.). Further, to invite independent researchers that could confirm the adherence to established guidelines would strengthen the trust in the data. This was not carried out in the present work, but will be strived for in future research.

FORNET has the reduction of both PTSD and appetitive aggression as its two primary goals; the reduction of the latter has not yet been confirmed by either of the trials (see Chapter 6; Crombach & Elbert, 2014b; Hermenau, Hecker, Schaal, et al., 2013). These results deserve a more detailed discussion in regard to future directions and research:

**Appetitive aggression in the therapeutic context**

Since its introduction five years ago (Elbert et al., 2010), the concept of appetitive aggression had been postulated to represent an adaptive and robust trait of perceiving violent cues appealingly, but, importantly, not implicating a psychopathological development. This approach had been supported by research in this group (see Table 1.1), including this thesis. Further, the theory postulates that due to the (1) negative impact of appetitive aggression on the re-adjustment to civil life and (2) overlapping neural representations of combat high and traumatic stress, appetitive aggression needs to be addressed in order to reduce PTSD and enable readjustment to a peaceful society. Thus, FORNET was developed to reduce i.a., appetitive aggression. However, prior trials failed to demonstrate that FORNET reduces this trait.

**Appetitive aggression: coping, trait, or syndrome?** As outlined in Chapter 1, posttraumatic stress and appetitive perceptions of aggression underlie de-contextualized, entangled neural networks, explaining intrusions that appear to happen "here" and "now" (Elbert et al., 2010). Enhanced appetitive aggression may serve as a coping strategy for symptoms of posttraumatic stress in highly violent environments. This is because PTSD and appetitive aggression share the same sensory cues, if a person cannot escape exposure to violence, then the person can change the interpretation of the perceived cues, linking them to reward-based structures and thereby seeing them as enjoyable rather than traumatic. This re-interpretation seems to be facilitated in adolescents, who had been found with an altered sensitivity to reward (Somerville et al., 2010). Finally, such a coping strategy may be internalized, thus becoming a stable trait as assessed in this thesis.

Further, PTSD and appetitive aggression imply contrasting behavioral patterns; namely, avoidance and approach (Hecker et al., 2012) as well as different alterations of cognitions and mood: negative vs. positive. Hypervigilance may fuel the intensity of intrusions,
avoidance/approach, and the negative/positive alteration of cognition and mood. A syndrome of post-combat-high in a direct analogy with DSM-5 PTSD diagnostic criteria would be the consequence.

Another pathological development is possible: as outlined previously, the sequelae of combat high in comparison to traumatic stress is associated with different functional neural activity in victims and offenders (Moran et al., 2014). While strong fear circuits are built in posttraumatic stress (Kolassa & Elbert, 2007), strong associations emerge between cues of violence and reward circuits and thus, cause a positive alteration of cognitions and mood. Notably, it had been demonstrated in this thesis that even decades after having been a soldier, exposure to violence-related cues induces an excitement, or in other word, positively alters the subjects’ mood (Chapter 2). The latter bears the potential for a "process" or "behavioral" addiction (APA, 2013): the compulsive approach of "mood-altering events" (e.g., sex, food, gambling, appetitive aggression). Consequently, appetitive aggressive behavior that is exerted in order to alter ones "mood" has the potential to develop into an addiction (Schaef, 1988; Schneider, Irons, & Physicians, 2001). Similar concepts are for instance food addiction, gambling addiction, or sex addiction. The assessment of appetitive aggression as trait includes addiction-related concepts, e.g., habituation to cruelty, experiencing a "thirst" (craving) to fight, the desire to kill takes control over oneself. Table 7.1 and 7.2 suggests possible criteria to assess such an addiction in analogy to the Stimulant Use Disorder defined in the DSM-5 (APA, 2000). Future research may develop specific questionnaires and conduct studies with violent offenders to confine a potential psychopathological concept(s) of appetitive aggression.

**Social desirability** Moreover, the assessment of aggression is potentially associated with biases in social desirability (e.g., Harris, 1997; Weierstall & Elbert, 2011); in civilians more than in combatants. In the present thesis, follow up assessments of appetitive aggression may therefore not reliably reflect the change in appetitive aggression. Alternative assessment methods, for instance implicit aggression tests (e.g., Bluemke & Zumbach, 2007), the hot sauce paradigm (e.g., Ritter & Eslea, 2005), or noise blast (e.g., Thomaes, Bushman, Stegge, & Olthof, 2008) have been developed; of course, the use of these measures may be associated with other challenges, especially in the field. Correlates in neural activity as well as hormonal or physiological reaction may provide further possible outcome measures.

**Could FORNET have an impact at the macro-level?** In the present thesis and in a previous trial (Hermenau, Hecker, Schaal, et al., 2013), FORNET reduced combat-related mental problems and facilitated economic reintegration as well as the ex-combatants’ detachment from (para)military life. In fact, the thesis of Nilsson (2008) highlights the actual
**Table 7.1: Appetitive aggression as Stimulant Use Disorder I (APA, 2014)**

<table>
<thead>
<tr>
<th>Aggression &quot;Use&quot; Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  1</td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
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<td>12</td>
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<td>13</td>
</tr>
</tbody>
</table>

Specify if:
- In early remission
- In early remission

Specify current severity
- Mild: Presence of 2-3 symptoms
- Moderate: Presence of 4-5 symptoms
- Severe: Presence of 6 or more symptoms
influence of such military liaisons. Therefore, it is reasonable that a comprehensive provision of FORNET for ex-combatants with heightened levels of appetitive aggression would reduce the incidence of violence. Future research may include larger clinical trials and particularly focus on outcome measures at the macro-level, for instance criminality rates if available or other assessments of local-level violence as well as family violence.

Table 7.2: Appetitive aggression as Stimulant Use Disorder II (APA, 2014)

<table>
<thead>
<tr>
<th>Aggression withdrawal</th>
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<tbody>
<tr>
<td>A</td>
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</table>
Part IV

Conclusion
Conclusion

The question of how to successfully navigate the transition to peace in war torn countries is becoming more crucial in various fields of science. Prior incidents have shown that ex-combatants could devastate dear endeavors of various peace advocates. For this reason we need to focus on exactly this population for the consolidation of peace. The present thesis demonstrated that the years of war, and thus, exposure to horrific forms of violence on a daily basis, continuously scars the combatants’ psyche. Posttraumatic stress, aggressive outbursts, and a preference or even a need to be violent become fundamental parts of their lives. The war may formally be over, but is still going on in the combatants’ minds; as they seek to solve their problems the only way they know, violence and drug use develop as major coping strategies in many cases.

The present thesis highlights the role of appetitive aggression in ex-combatants: prior perpetrated violence, especially acts with strong predatory characteristics, predicted higher levels of appetitive aggression, but not necessarily posttraumatic stress. Moreover, appetitive aggression was higher in those ex-combatants that were recruited in late adolescence.

FORNET, a 7-session, exposure-based intervention, with two group sessions focusing on their role change, reduced combat-related symptoms (PTSD, depression, Drug Dependence at the clinical level) in Congolese ex-combatants at the beginning of their demobilization process. FORNET was effective in two succeeding dissemination stages. Remarkably, these effects were also present in an unsettled conflict situation when serious fighting was going on. Moreover, FORNET facilitated the reintegration of ex-combatants.

The dissemination of evidence-based psychotherapeutic tools is crucial for the implementation of mental health support in post-conflict regions and low-and middle income countries, where access to mental health personnel is practically non-existent. The present thesis provides important evidence for the effectiveness of such dissemination projects. Nevertheless, the importance and the need for close supervision and future research should not be neglected.

This project adds to the increasing evidence for the effectiveness of the FORNET intervention, and thus encourages a different way of thinking about perpetrators; abandoning rigid victim-perpetrator archetypes and focusing instead on a whole range of influential life events. Future endeavors establishing sustainable psychotherapeutic structures to provide support to ex-combatants is fundamental to the stability of the individual, their families, communities, and countries in the aftermath of armed conflicts.
Part V

Appendix
8 Supplemental Material

The articles presented in Chapter 2, 3, and 5 had been submitted with supplemental (online) material presenting the R codes for the RF-CI analyses in order to provide transparency and facilitate replication attempts in FORNET.

Combat high or traumatic stress

AAS and specific events
PSS-I and specific events
AAS and the sum of events
PSS-I and the sum of events

Combat high or traumatic stress (replication)

AAS and specific events
PSS-I and specific events
AAS and the sum of events
PSS-I and the sum of events

Sensitive periods for developing a robust trait of appetitive aggression

AAS and the years of age of recruitment
Supplemental Online Material: AAS and specific events

Random forest - conditional inference (RF-CI) RF-CI: regressing specific events on the level of appetitive aggression

Lifetime exposure to violence

- e1: Have you ever been hit (with or without belt, board, stick etc) by one of your parents/your caretaker in a way that marks were left on your body?
- e2: Have you ever witnessed a family member being hit (with or without stick, board, belt, etc) by one of your other family members in a way that marks were left on his/her body?
- e3: Has one of your parents/your caretaker ever burnt your on purpose (e.g. hot water, cigarette, fire)?
- e4: Have you ever witnessed how one of your parents/your caretaker ever burnt your on purpose (e.g. hot water, cigarette, fire)?
- e5: Have you ever experienced a natural disaster (for example, flood, land side , volcano outbreak, earthquake) in such a way that your life was in danger?
- e6: Have you ever experienced a life-threatening fire or explosion?
- e7: Have you ever experienced an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- e8: Have you ever witnessed an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- e9: Have you ever suffered from a life-threatening illness or injury?
- e10: Has a close friend or family member ever had a life-threatening illness or injury?
- e11: Have you ever been physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks) in such a way that you had fear for your life?
- e12: Have you ever witnessed somebody being physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks) in such a way that you had fear for your life?
- e13: Have you ever yourself physically assaulted someone in such a way?
- e14: Have you ever been assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- e15: Have you ever witnessed someone else being assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- e16: Have you ever yourself physically assaulted someone with a weapon?
- e17: Have you ever mulitlated another person with a weapon?
- e18: Have you ever seen somebody being killed or killing him-/herself?
- e19: Have you ever killed someone?
- e20: Have you ever experienced a sexual assault?
- e21: Have you ever witnessed a sexual assault?
- e22: Have you ever sexually assaulted someone?
- e23: Have you ever witnessed dead bodies?
- e24: Have you ever witnessed a massacre (deliberaive killing of a group of civilians)?
- e25: Have you ever participated in a massacre?
- e26: Have you ever been threatened to be killed by your commander (e.g. for no reason, for disobeying rules, for failed escapeattempt)?
- e27: Have you ever stolen food to survive? (assigned to perpetrator events)
- e28: Have you ever eaten human flesh?
- e29: Have you ever been forced to eat human flesh?
- e30: Have you ever attacked a village or settlement?
- e31: Have you ever experienced any other frightening event not yet mentioned?

```r
library(party)
attach(data_RF)
# Compute 500 trees with 10 randomly preselected predictors adopting
# unbiased variable selection
set.seed(493)
forest1 <- cforest(as.numeric(aas_ss) ~ e1 + e2 + e3 + e4 + e5 + e6 + e7 + e8 + e9 + e10 + e11 + e12 + e13 + e14 + e15 + e16 + e17 + e18 + e19 + e20 + e21 + e22 + e23 + e24 + e25 + e26 + e27 + e28 + e29 + e30 + e31 + e_other, data = data_RF, controls = cforest_unbiased(mtry = 10, ntree = 500))
# Compute conditional variable importance
vic1 <- varimp(forest1, conditional = TRUE)
write.table(vic1)
```
# Compute pseudo-Rsquared from the out-of-bag data
pred1 <- predict(forest1, OOB = TRUE)
MSE1 <- mean((data_RF$aas_ss - pred1)^2)
SST1 <- mean((data_RF$aas_ss - mean(data_RF$aas_ss))^2)
R_Sq1 <- (1 - (MSE1/SST1))

R_Sq1

[1] 0.3309

detach(data_RF)

MSE1=144.95
SST1=216.63
R_SQ1=0.3309

attach(data_RF)

# png('AASspecevents.png', height=7, width=7, res=500, units='in')
set.seed(493)
regressor1tree <- ctree(as.numeric(aas_ss) ~ el1 + el2 + el3 + el4 + el5 + el6 + el7 + el8 + el9 + el10 + el11 + el12 + el13 + el14 + el15 + el16 + el17 + el18 + el19 + el20 + el21 + el22 + el23 + el24 + el25 + el26 + el27 + el28 + el29 + el30 + el_other, data = data_RF, controls = ctree_control())
plot(regressor1tree)

# dev.off()
detach(data_RF)
Supplemental Online Material: PSS-I and specific events

Random forest - conditional inference (RF-CI)

RF-CI: regressing the sum of events (witnessed, experienced and perpetrated) on the level of appetitive aggression

Lifetime exposure to violence
- el1: Have you ever been hit (with or without stick, board, belt, etc) by one of your parents/your caretaker in a way that marks were left on your body?
- el2: Have you ever witnessed a family member being hit (with or without stick, board, belt, etc) by one of your other family members in a way that marks were left on his/her body?
- el3: Has one of your parents/your caretaker ever burnt you on purpose (e.g. hot water, cigarette, fire)?
- el4: Have you ever witnessed how one of your parent/your caretaker ever burnt your on purpose (e.g. hot water, cigarette, fire)?
- el5: Have you ever experienced a natural disaster (for example, flood, land side, volcano outbreak, earthquake) in such a way that your life was in danger?
- el6: Have you ever experienced a life-threatening fire or explosion?
- el7: Have you ever experienced an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- el8: Have you ever witnessed an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- el9: Have you ever suffered from a life-threatening illness or injury?
- el10: Has a close friend or family member ever had a life-threatening illness or injury?
- el11: Have you ever been physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks)) in such a way that you had fear for your life?
- el12: Have you ever witnessed somebody being physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks))?
- el13: Have you yourself ever physically assaulted someone in such a way?
- el14: Have you ever been assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el15: Have you ever witnessed someone else being assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el16: Have you yourself ever physically assaulted someone with a weapon?
- el17: Have you ever mutilated another person with a weapon?
- el18: Have you ever seen somebody being killed or killing him-/herself?
- el19: Have you ever killed someone?
- el20: Have you ever experienced a sexual assault?
- el21: Have you ever sexually assaulted someone?
- el22: Have you ever witnessed a sexual assault?
- el23: Have you ever attacked a village or settlement?
- el24: Have you ever stolen food to survive? (assigned to perpetrator events)
- el25: Have you ever eaten human flesh?
- el26: Have you ever been forced to eat human flesh?
- el27: Have you ever been threatened to be killed by your commander (e.g. for no reason, for disobeying rules, for failed escapeattempt)?
- el28: Have you ever been hunger or been forced to eat human flesh?
- el29: Have you ever been threatened to be killed by your commander (e.g. for no reason, for disobeying rules, for failed escapeattempt)?
- el30: Have you ever been physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks)) in such a way that you had fear for your life?
- el31: Have you ever retaliated with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el32: Have you ever retaliated with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el_other: Have you ever experienced any other frightening event not yet mentioned?

```
library(party)
attach(data_RF)

# Compute 500 trees from 10 randomly preselected predictors adopting
# unbiased variable selection
set.seed(124)
forest2 <- cforest(as.numeric(ptsd_ss) ~ el1 + el2 + el3 + el4 + el5 + el6 + el7 + el9 + el10 + el11 + el12 + el13 + el14 + el15 + el16 + el17 + el18 + el19 + el20 + el21 + el22 + el23 + el24 + el25 + el26 + el27 + el28 + el29 + el30 + el31 + el32 + el_other, data = data_RF, controls = cforest_unbiased(ntry = 10, ntree = 500))

# Compute conditional variable importance
vic2 <- varimp(forest2, conditional = TRUE)
write.table(vic2)
```
# Compute pseudo-Rsquared from the out-of-bag-data
pred2 <- predict(forest2, OOB = TRUE)
MSE2 <- mean((data_RF$ptsd_ss - predict(forest2))^2)
SST2 <- mean((data_RF$ptsd_ss - mean(data_RF$ptsd_ss))^2)
R_Sq2 <- (1 - (MSE2/SST2))
detach(data_RF)

MSE2=66.16
SST2=91.23
R_Sq2=0.2748

attach(data_RF)

# dev.off()
detach(data_RF)
Supplemental Online Material: AAS and the sum of events

Random forest - conditional inference (RF-CI)
RF-CI: regressing the sum of events (witnessed, experienced and perpetrated) on the level of appetitive aggression

Lifetime exposure to violence
- el_w: lifetime traumatic events - witnessed
- el_e: lifetime traumatic events - experienced
- el_p: lifetime perpetrated violent acts

```r
library(party)
attach(data_RF)
# Compute 500 trees from 2 randomly preselected predictors adopting unbiased variable selection
# Compute conditional variable importance
vic3 <- varimp(forest3, conditional = TRUE)
write.table(vic3)
```

```
x el_w 3.66952282966937
  el_e 3.71874916982995
  el_p 87.5705411861065
```

```
# Compute pseudo-R^2 from the out-of-bag-data
pred3 <- predict(forest3, OOB = TRUE)
MSE3 <- mean((data_RF$aas_ss - pred3)^2)
SST3 <- mean((data_RF$aas_ss - mean(data_RF$aas_ss))^2)
R_Sq3 <- (1 - (MSE3/SST3))
detach(data_RF)
```

```
MSE3=121.77
SST3=216.63
R_Sq3=0.4379
```

```
attach(data_RF)
set.seed(524)
regress3tree <- ctree(as.numeric(aas_ss) ~ el_e + el_w + el_p, data = data_RF, controls = ctree_control())
plot(regress3tree)
detach(data_RF)
```

Random forest - conditional inference (RF-CI)

RF-CI: regressing the sum of events (witnessed, experienced and perpetrated) on posttraumatic stress (PSS-I)

Lifetime exposure to violence

\[ \text{el}_w: \text{lifetime traumatic events - witnessed} \]

\[ \text{el}_e: \text{lifetime traumatic events - experienced} \]

\[ \text{el}_p: \text{lifetime perpetrated violent acts} \]

```
library(party)
attach(data_RF)
# Compute 500 trees from 2 randomly preselected predictors adopting
# unbiased variable selection
set.seed(124)
forest4 <- cforest(as.numeric(ptsd_ss) ~ el_e + el_w + el_p, data = data_RF,
                     controls = cforest_unbiased(mtry = 2, ntree = 500))
# Compute conditional variable importance
vic4 <- varimp(forest4, conditional = TRUE)
write.table(vic4)
```

```
"el_e" 10.3788915753316
"el_w" 8.48475571678772
"el_p" 1.8922371460891
```

```
# Compute pseudo-$r^2$ from the out-of-bag-data
pred4 <- predict(forest4, OOB = TRUE)
MSE4 <- mean((data_RF$ptsd_ss - pred4)^2)
SST4 <- mean((data_RF$ptsd_ss - mean(data_RF$ptsd_ss))^2)
R_Sq4 <- (1 - MSE4/SST4)
detach(data_RF)
```

MSE4=59.86
SST4=91.23
R^2=0.3439

attach(data_RF)
# png('PTSDspecevents.png', height=7, width=7, res=500, units='in')
set.seed(124)
regress4tree <- ctree(as.numeric(ptsd_ss) ~ el_e + el_w + el_p, data = data_RF, 
controls = ctree_control())
plot(regress4tree)

# dev.off()
detach(data_RF)
Supplemental Online Material: AAS and specific events

Random forest - conditional inference (RF-CI) RF-CI: regressing specific events on the level of appetitive aggression

Lifetime exposure to violence

el1: Have you experienced childhood physical abuse?
el1a: Have you experienced childhood verbal abuse?
el1b: Have you experienced childhood sexual abuse?
el5: Have you ever experienced a natural disaster (for example, flood, landside, volcano outbreak, earthquake) in such a way that your life was in danger?
el6: Have you ever experienced a life-threatening fire or explosion?
el7: Have you ever experienced an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity?)
el8: Have you ever witnessed an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity?)
el9: Have you ever suffered from a life-threatening illness or injury?
el10: Has a close friend or family member ever had a life-threatening illness or injury?
el11: Have you ever been physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks) in such a way that you had fear for your life?)
el12: Have you ever witnessed somebody being physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks)?
el13: Have you yourself ever physically assaulted someone in such a way?
el15: Have you ever been assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
el16: Have you ever witnessed someone else being assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
el17: Have you yourself ever physically assaulted someone with a weapon?
el18: Have you ever mutilated another person with a weapon?
el19: Have you ever seen somebody being killed or killing him/herself?
el20: Have you ever killed someone?
el21: Have you ever experienced a sexual assault?
el22: Have you ever witnessed a sexual assault?
el23: Have you yourself ever sexually assaulted someone?
el24: Have you ever witnessed dead bodies?
el25: Have you ever witnessed a massacre (deliberate killing of a group of civilians)?
el26: Have you ever participated in a massacre?
el27: Have you ever been threatened to be killed by your commander (e.g. for no reason, for disobeying rules, for failed escape attempt)?
el29: Have you ever been deprived for food?
el30: Have you ever stolen food to survive? (assigned to perpetrator events)
el31: Have you ever eaten human flesh?
el32: Have you ever been forced to eat human flesh?
el33: Have you ever attacked a village or settlement?
el_other: Have you ever experienced any other frightening event not yet mentioned?

Differences in events:

Family violence

el1: Have you ever been hit (with or without belt, board, stick etc) by one of your parents/your caretaker in a way that marks were left on your body?
el2: Have you ever witnessed a family member being hit (with or without stick, board, belt, etc) by one of your other family members in a way that marks were left on his/her body?
el3: Has one of your parents/your caretaker ever burnt you on purpose (e.g. hot water, cigarette, fire)?
el4: Have you ever witnessed how one of your parents/your caretaker ever burnt you on purpose (e.g. hot water, cigarette, fire)?

Other

el29: Have you ever stolen food to survive? (assigned to perpetrator events)
el30: Have you ever eaten human flesh?
el31: Have you ever been forced to eat human flesh?
el32: Have you ever attacked a village or settlement?
el_other: Have you ever experienced any other frightening event not yet mentioned?

library(party)
set.seed(124)
forest1 <- cforest(as.numeric(aas_ss) ~ el1 + el1a + el1b + el5 + el6 + el7 + el8 + el9 + el10 + el11 + el12 + el13 + el15 + el16 + el17 + el18 + el19 + el20 + el21 + el22 + el23 + el24 + el25 + el26 + el27 + el28 + el29, data = bur.data.rf, controls = cforest_unbiased(mtry = 10, ntree = 500))
# Compute conditional variable importance
vic1 <- varimp(forest1, conditional = TRUE)
write.table(vic1)
library(party)
set.seed(124)
regress1tree <- ctree(as.numeric(aas_ss) ~ el1 + el1a + el1b + el5 + el6 + el7 +
                        el8 + el9 + el10 + el11 + el12 + el13 + el15 + el16 +
                        el17 + el18 + el19 + el20 + el21 + el22 + el23 + el24 + el25 +
                        el26 + el27 + el29, data = bur.data.rf, controls = ctree_control())
plot(regress1tree)
Supplemental Online Material: PTSD and specific events

Random forest - conditional inference (RF-CI) RF-CI: regressing specific events on the symptom severity of PTSD

Lifetime exposure to violence
- el1: Have you experienced childhood physical abuse?
- el1a: Have you experienced childhood sexual abuse?
- el5: Have you ever experienced a natural disaster (for example, flood, land slide, volcano outbreak, earthquake) in such a way that your life was in danger?
- el6: Have you ever experienced a life-threatening fire or explosion?
- el7: Have you ever experienced an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- el8: Have you ever witnessed an accident (e.g. car accident, bus accident, serious accident at work, home or, during recreational activity)?
- el9: Have you ever suffered from a life-threatening illness or injury?
- el10: Has a close friend or family member ever had a life-threatening illness or injury?
- el11: Have you ever been physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks)) in such a way that you had fear for your life?
- el12: Have you ever witnessed somebody being physically assaulted (for example being attacked, hit, slapped, kicked, beaten up (includes beatings with sticks))?
- el13: Have you yourself ever physically assaulted someone in such a way?
- el14: Have you ever been assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el15: Have you ever been assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el16: Have you ever witnessed someone else being assaulted with a weapon (for example being shot, mutilated, stabbed, threatened with a knife, gun)?
- el17: Have you yourself ever physically assaulted someone with a weapon?
- el18: Have you ever mutilated another person with a weapon?
- el19: Have you ever seen somebody being killed or killing him/herself?
- el20: Have you ever killed someone?
- el21: Have you ever experienced a sexual assault?
- el22: Have you ever witnessed a sexual assault?
- el23: Have you yourself ever sexually assaulted someone?
- el24: Have you ever witnessed dead bodies?
- el25: Have you ever witnessed a massacre (deliberate killing of a group of civilians)?
- el26: Have you ever participated in a massacre?
- el27: Have you ever been threatened to be killed by your commander (e.g. for no reason, for disobeying rules, for failed escape attempt)?
- el28: Have you ever been deprived of food?

Differences in events:
- Family violence
  - el1: Have you ever been hit (with or without belt, board, stick etc) by one of your parents/caretaker in a way that marks were left on your body?
  - el2: Have you ever witnessed a family member being hit (with or without belt, board, stick, etc) by one of your other family members in a way that marks were left on his/her body?
  - el3: Has one of your parents/caretaker ever burnt you on purpose (e.g. hot water, cigarette, fire)?
  - el4: Have you ever witnessed how one of your parents/caretaker ever burnt you on purpose (e.g. hot water, cigarette, fire)?
- Other
  - el29: Have you ever stolen food to survive? (assigned to perpetrator events)
  - el30: Have you ever eaten human flesh?
  - el31: Have you ever been forced to eat human flesh?
  - el32: Have you ever attacked a village or settlement?
  - el_other: Have you ever experienced any other frightening event not yet mentioned?

```
library(party)
# Compute 500 trees from 10 randomly preselected predictors adopting
# unbiased variable selection
set.seed(124)
forest2 <- cforest(as.numeric(ptsd_ss) ~ e11 + e11a + e11b + e15 + e16 + e17 +
                   e18 + e13a + e13b + e13c + e13d + e13e + e13f + e13g +
                   e19, data = bur.data.rf, controls = cforest_unbiased(mtry = 10, ntree = 500))
# Compute conditional variable importance
vic2 <- varimp(forest2, conditional = TRUE)
write.table(vic2)
```
# Compute pseudo-Rsquared from the out-of-bag data

```r
pred2 <- predict(forest2, OOB = TRUE)
MSE2 <- mean((bur.data.rf$ptsd_ss - predict(forest2))^2)
SST2 <- mean((bur.data.rf$ptsd_ss - mean(bur.data.rf$ptsd_ss))^2)
R_Sq2 <- (1 - (MSE2 / SST2))
```

```r
cat(R_Sq2[1])
```

```
[1] 0.2976
```

```r
set.seed(124)
regress2tree <- ctree(as.numeric(ptsd_ss) ~ el1 + el1a + el1b + el5 + el6 + el7 + el8 + el9 + el10 + el11 + el12 + el13 + el15 + el16 + el17 + el18 + el19 + el20 + el21 + el22 + el23 + el24 + el25 + el26 + el27 + el29, data = bur.data_rf, controls = ctree_control())
plot(regress2tree)
```
Combat high or traumatic stress: violent offending is associated with appetitive aggression but not with symptoms of traumatic stress

Replication with data from demobilized soldiers in Burundi

Corresponding author: Anke Köbach, University of Konstanz, Department of Psychology, Universitätsstrasse 10, 78467 Konstanz, Germany. E-mail: anke.koebach@uni-konstanz.de; Konstanz, August 16th, 2014

Supplemental Online Material: AAS and the sum of events

Random forest - conditional inference (RF-CI) RF-CI: regressing the sum of events on the level of appetitive aggression

Lifetime exposure to violence

| el_e: lifetime self-experienced traumatic events (range: 0-12) |
| el_w: lifetime witnessed traumatic events (range: 0-8) |
| el_p: lifetime self-committed types of violence (range: 0-6) |

library(party)

# Compute 500 trees from 10 randomly preselected predictors adopting unbiased variable selection
set.seed(124)
forest3 <- cforest(as.numeric(aas_ss) ~ el_e + el_w + el_p, data = bur.data.rf, controls = cforest_unbiased(mtry = 2, ntree = 500))
# Compute conditional variable importance
vic3 <- varimp(forest3, conditional = TRUE)
write.table(vic3)

"el_e" 13.4193915081624
"el_w" 4.64706903718589
"el_p" 27.8234418742573

# Compute pseudo-Rsquared from the out-of-bag-data
pred3 <- predict(forest3, OOB = TRUE)
MSE3 <- mean((bur.data.rf$aas_ss - predict(forest3))**2)
SST3 <- mean((bur.data.rf$aas_ss - mean(bur.data.rf$aas_ss))**2)
R_Sq3 <- (1 - (MSE3/SST3))
R_Sq3
[1] 0.3599

library(party)
set.seed(124)
regress3tree <- ctree(as.numeric(aas_ss) ~ el_e + el_w + el_p, data = bur.data.rf, controls = ctree_control(mtry = 2, ntree = 500))

8 Supplemental Material
Supplemental Online Material: PTSD and the sum of events

Random forest - conditional inference (RF-CI) RF-CI: regressing the sum of events on the severity of PTSD

Lifetime exposure to violence

- \( e_{l,e} \): lifetime self-experienced traumatic events (range: 0-12)
- \( e_{l,w} \): lifetime witnessed traumatic events (range: 0-8)
- \( e_{l,p} \): lifetime self-committed types of violence (range: 0-7)

```r
library(party)
set.seed(124)
forest4 <- cforest(as.numeric(ptsd_ss) ~ e_{l,e} + e_{l,w} + e_{l,p}, data = bur.data.rf,
                   controls = cforest_unbiased(mtry = 2, ntree = 500))
# Compute conditional variable importance
vic4 <- varimp(forest4, conditional = TRUE)
write.table(vic4)
```

"x" 23.2236213854954
"e_{l,e}" -0.24187002929853
"e_{l,p}" 1.11556075696602

# Compute pseudo-Rsquared from the out-of-bag-data
pred4 <- predict(forest4, OOB = TRUE)
MSE4 <- mean((bur.data.rf$ptsd_ss - predict(forest4))^2)
SS4 <- mean(bur.data.rf$ptsd_ss - mean(bur.data.rf$ptsd_ss))^2
R_Sq4 <- (1 - (MSE4/SS4))

```
[1] 0.239
```

```
library(party)
set.seed(124)
regress4tree <- ctree(as.numeric(ptsd_ss) ~ e_{l,e} + e_{l,w} + e_{l,p}, data = bur.data.rf,
                      controls = ctree_control())
plot(regress4tree)
```
attach(bur.data.rf)
# parametric regression
ptsd.bur.lm <- lm(ptsd_ss ~ el_e + el_w + el_p, na.action = na.exclude)
summary(ptsd.bur.lm)

Call:
  lm(formula = ptsd_ss ~ el_e + el_w + el_p, na.action = na.exclude)
Residuals:
   Min     1Q  Median     3Q    Max
-21.07  -8.38  -1.53   7.15  30.70
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -5.7265     3.8629   -1.48     0.14
el_e          2.1383     0.3063    6.98  1.4e-11 ***
el_w          0.9555     0.6458    1.48     0.14
el_p         -0.0158     0.3993   -0.04     0.97
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Residual standard error: 10.2 on 363 degrees of freedom
Multiple R-squared: 0.175,  Adjusted R-squared: 0.168
F-statistic: 25.6 on 3 and 363 DF,  p-value: 4.52e-15

ptsd.sum.bur.lm <- summary(ptsd.bur.lm)
ptsd.bur.fsq <- ptsd.sum.bur.lm$r.squared / (1 - ptsd.sum.bur.lm$r.squared)
ptsd.bur.fsq

[1] 0.212

detach(bur.data.rf)
Sensitive Periods in the Development of Appetitive Aggression

Content
1. Random forest regression on the level of appetitive aggression using DDR data (predictors: el_p, age25, rec6-25)
2. Random forest regression on the level of appetitive aggression using DDR data (predictors: age25, rec6-25)

Predictor variables:
el_p: number of lifetime perpetrated acts
age25: number of years to/after being 25 years
rec6: having been recruited at the age of 6 years
rec7: having been recruited at the age of 7 years
rec8: having been recruited at the age of 8 years
rec9: having been recruited at the age of 9 years
and so on until
rec25: having been recruited at the age of 25 years

```
library(party)
set.seed(433)
forest.ddr <- cforest(as.numeric(aas_ss) ~ age25 + el_p + rec6 + rec7 + rec8 + rec9 + rec10 + rec11 + rec12 + rec13 + rec14 + rec15 + rec16 + rec17 + rec18 + rec19 + rec20 + rec21 + rec22 + rec23 + rec24 + rec25, data = ddr.data, controls = cforest_unbiased(mtry = 7, ntree = 2000))

# Compute conditional variable importance
vic.ddr <- varimp(forest.ddr, conditional = TRUE)
write.table(vic.ddr)
```

```
"age25" 1.39187731749062
"el_p" 66.444929947494
"rec6" 0
"rec7" 0
"rec8" 0
"rec9" 0
"rec10" -0.00775490196078431
"rec11" -0.00420995089493795
"rec12" -0.0352652209382313
"rec13" -0.137459718450389
"rec14" 0.0268928411981515
"rec15" 0.788146768441523
"rec16" 2.75091918577093
"rec17" 2.2405692323909
"rec18" 1.26771679617125
"rec19" 0.123797661204291
"rec20" 0.788358716835347
"rec21" 0.166266182938834
"rec22" -0.222997346909657
"rec23" -0.085917144999663
"rec24" -0.211904698798706
"rec25" 0.0911570864974486
```

```
plot(vic.ddr, frame = FALSE)
```

129
# Compute pseudo-R^2 from the out-of-bag-data

```r
pred.ddr <- predict(forest.ddr, OOB = TRUE)
pred.ddr.1 <- predict(forest.ddr.1, OOB = TRUE)
MSE.ddr <- mean((ddr.data$aas_ss - pred.ddr)^2)
SST.ddr <- mean(ddr.data$aas_ss) - mean(ddr.data$aas_ss)^2
R_Sq.ddr <- 1 - (MSE.ddr/SST.ddr)
R_Sq.ddr
```

```
[1] 0.3127
```

library(party)
set.seed(433)
forest.ddr.1 <- cforest(as.numeric(aas_ss) ~ age25 + rec6 + rec7 + rec8 + rec9 + rec10 + rec11 + rec12 + rec13 + rec14 + rec15 + rec16 + rec17 + rec18 + rec19 + rec20 + rec21 + rec22 + rec23 + rec24 + rec25, data = ddr.data, controls = cforest_unbiased(mtry = 7, ntree = 2000))

# Compute conditional variable importance
vici.ddr.1 <- varimp(forest.ddr.1, conditional = TRUE)
write.table(vici.ddr.1)

```
x
    age25 2.03316123681267
     rec6  0.00000000000000
     rec7  0.00000000000000
     rec8  0.00000000000000
     rec9  0.00000000000000
     rec10 0.00000000000000
     rec11 -0.001796218487395
     rec12 -0.004772803381332
     rec13 -0.30482907917774
     rec14 -0.5844996366939
     rec15 1.77702971913087
     rec16 4.1878017233877
     rec17 2.42554002061973
     rec18 -0.097870275340605
     rec19  0.35763551966111
     rec20  1.54442995007463
     rec21  0.93873042063467
     rec22 -0.37500050857756
     rec23 -0.26136902534936
     rec24 -0.37641456559519
     rec25 -0.28530372578791
```

plot(vici.ddr.1, frame = FALSE)

```
x
    age25 2.03316123681267
     rec6  0.00000000000000
     rec7  0.00000000000000
     rec8  0.00000000000000
     rec9  0.00000000000000
     rec10 0.00000000000000
     rec11 -0.001796218487395
     rec12 -0.004772803381332
     rec13 -0.30482907917774
     rec14 -0.5844996366939
     rec15 1.77702971913087
     rec16 4.1878017233877
     rec17 2.42554002061973
     rec18 -0.097870275340605
     rec19  0.35763551966111
     rec20  1.54442995007463
     rec21  0.93873042063467
     rec22 -0.37500050857756
     rec23 -0.26136902534936
     rec24 -0.37641456559519
     rec25 -0.28530372578791
```

plot(vici.ddr.1, frame = FALSE)

```
x
    age25 2.03316123681267
     rec6  0.00000000000000
     rec7  0.00000000000000
     rec8  0.00000000000000
     rec9  0.00000000000000
     rec10 0.00000000000000
     rec11 -0.001796218487395
     rec12 -0.004772803381332
     rec13 -0.30482907917774
     rec14 -0.5844996366939
     rec15 1.77702971913087
     rec16 4.1878017233877
     rec17 2.42554002061973
     rec18 -0.097870275340605
     rec19  0.35763551966111
     rec20  1.54442995007463
     rec21  0.93873042063467
     rec22 -0.37500050857756
     rec23 -0.26136902534936
     rec24 -0.37641456559519
     rec25 -0.28530372578791
```

# Compute pseudo-R^2 from the out-of-bag-data

```r
pred.ddr.1 <- predict(forest.ddr.1, OOB = TRUE)
pred.ddr.1 <- mean((ddr.data$aas_ss - pred.ddr.1)^2)
SST.ddr.1 <- mean(ddr.data$aas_ss) - mean(ddr.data$aas_ss)^2
R_Sq.ddr.1 <- 1 - (MSE.ddr.1/SST.ddr.1)
R_Sq.ddr.1
```

```
[1] 0.09986
```
FORNET manual

The following part presents the FORNET manual composed for the implementation of a psychotherapeutic support structure in MONUSCO/DDR Goma. The manual includes educational tools for the training of trainers.
FORNET
Narrative Exposure Therapy for Forensic Offender Rehabilitation

Training Manual

Draft for the project:

BUILDING MONUCSO CAPACITY TO ESTABLISH PSYCHOLOGICAL SUPPORT FOR
FORMER COMBATANTS

Developed by: vivo international
In Cooperation with University of Konstanz (Germany)

Contact:
e-mail: info@vivo.org
http://www.vivo.org
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Abstract

War and armed conflict have massive detrimental effects on mental health. For young men and boys war means suffering both as victim and perpetrator. As a consequence of the exposure to extreme forms of violence they are at high risk for combat-related disorders, e.g. post-traumatic stress disorder (PTSD) as well as having higher aggressive behavior.

Schauer, Neuner and Elbert (2005, 2011) designed Narrative Exposure Therapy (NET) for the treatment of patients who suffer from Posttraumatic Stress Disorder (PTSD) and trauma-related mental problems. NET is evidence-based, highly manualized, culturally sensitive, disseminable, and with it an appropriate intervention for post-conflict and refugee settings.

Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET) aims at reducing PTSD symptoms and in addition elevated aggressive behavior. It helps former combatants to anchor not only fearful and traumatic war events (as in its preceding version NET) but also positive experiences that are commonly linked to experienced and perpetrated aggression.

The present manual was originally designed to provide a basis for the FORNET training of MONUSCO personnel in July and November 2012 as well as for the provision of educational training tools for the training of trainers in November 2012. Please consider that the present manuscript is a draft version and not meant for publication outside the present thesis.
Evidence

Theoretical concepts as well as the treatment follows scientific evidence of research in various countries over many years. Publications can be found online on www.vivo.org and on the homepage of University of Konstanz. For further questions please contact vivo (info@vivo.org).

The manuals of NET and FORNET are published as follows:

...NET:

...and FORNET:
1 Combat-related disorders

The following part defines mental disorders associated with combat exposure like traumatic experiences and perpetrated violent acts.

1.1 Posttraumatic Stress Disorder (PTSD)

In areas with a history of war and violence, post-traumatic stress disorder is the most common mental illness. Prevalence rates in countries like Sudan, Uganda, Rwanda or Afghanistan are between 20% and 49%.

1.1.1 Stress and the traumatic event

Stress is an increase in the organisms’ demand to adapt to the environment and can be classified as traumatic stress, macro stress (critical life events) and micro stress (daily difficulties). Potential traumatic events are for instance serious accidents (witnessed or experienced), sexual abuses, natural disasters (flood, earthquake), war and combat exposure, physical assaults (with and without weapon), sudden violent deaths (witnessing murder or killing) and more. The higher the number of traumatic events a person experienced, the higher is the probability that s/he suffers from PTSD (see Figure 1.1).
1 Combat-related disorders

Figure 1.1: Building block effect

The more traumatic events experienced, the higher the probability of PTSD/PTSD Symptom Severity (PDS sum score; e.g., Neuner, Schauer, Karunakara, Klaschik, Robert, & Elbert, 2004)

1.1.2 Definition of PTSD (DSM-IV-TR)

In 2000, the American Psychiatric Association revised the PTSD diagnostic criteria in the fourth edition of its Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR). The diagnostic criteria (A-F) are specified below. Diagnostic criteria for PTSD include a history of exposure to a traumatic event meeting two criteria (subjective and objective) and symptoms from each of three symptom clusters: intrusive recollections, avoidance/numbing symptoms, and hyperarousal symptoms. A fifth criterion measures duration of symptoms and a sixth assesses functional impairment.

Criterion A: stressor

The person has been exposed to a traumatic event in which both of the following have been present:

1. The person has experienced, witnessed, or had been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others.

2. The person’s response involved intense fear, helplessness, or horror.

   Note: in children, it may be expressed instead by disorganized or agitated behavior.

Criterion B: intrusive recollection

The traumatic event is persistently re-experienced in at least one of the following ways:
1 Combat-related disorders

1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions.  
   Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.

2. Recurrent distressing dreams of the event.  
   Note: in children, there may be frightening dreams without recognizable content.

3. Acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated).  
   Note: in children, trauma-specific reenactment may occur.

4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

5. Physiological reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.

Criterion C: avoidance/psychological numbing  
Persistent avoidance of stimuli associated with the trauma and psychological numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following:

1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma.
2. Efforts to avoid activities, places, or people that arise recollections of the trauma.
3. Inability to recall an important aspect of the trauma.
4. Markedly diminished interest or participation in significant activities.
5. Feeling of detachment or estrangement from others.
6. Restricted range of affect (e.g., unable to have loving feelings).
7. Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span).

Criterion D: hyperarousal  
Persistent symptoms of increasing arousal (not present before the trauma), indicated by at least two of the following:

1. Difficulty falling or staying asleep.
2. Irritability or outbursts of anger.
1 Combat-related disorders

3. Difficulty concentrating.
4. Hypervigilance.
5. Exaggerated startle response.

**Criterion E: duration**
Duration of the disturbance (symptoms in B, C, and D) is more than one month.

**Criterion F: functional significance**
The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:
Acute: if duration of symptoms is less than three months
Chronic: if duration of symptoms is three months or more

Specify if:
With or without delayed onset: delayed onset when symptoms occur least six months after the traumatic event.

1.2 Aggression

Aggression is defined as (verbal or physical) behavior intended to injure someone in order to achieve a certain goal. Aggression can be reactive or instrumental.

Reactive aggression refers to violent behavior caused by an external or internal condition, e.g., reaction to pain. A feeling of relief typically follows reactive violent behavior. In contrast, instrumental violent behavior is intended to gain something, e.g., respect, money, a mobile phone etc. and is associated with the feeling of power and success. One form of instrumental aggression is appetitive aggression: a controlled, goal-orientated version of violent behavior, experienced as fascinating and attractive; thus, committed to gain a positive excitement.
1 Combat-related disorders

Table 1.1: Different types of aggression

<table>
<thead>
<tr>
<th>Type of aggression</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 reactive aggression</td>
<td>affective, impulsive violent behavior, which is caused by an external or internal condition</td>
<td>killing to defend someone, anger</td>
</tr>
<tr>
<td>2 instrumental aggression</td>
<td>planned, goal-directed violent behavior intended to gain something</td>
<td>killing to gain something (e.g., respect, money, mobile phone, satisfaction)</td>
</tr>
<tr>
<td>2a appetitive aggression</td>
<td>planned, goal-directed violent behavior intended to gain positive excitement</td>
<td>killing to gain or keep an internal positive excitement</td>
</tr>
</tbody>
</table>

Evolutionary origin of appetitive aggression

Hunting is a universal element of human behavior, especially strong in men. Because this arduous and dangerous task is necessary for survival, it has evolved to become attractive and exciting. Accordingly, we can still observe physiological traces of a reward response to hunting aggression in hormonal and neurobiological measures. The positive perception of the stimuli associated with hunting can be transferred to violence against humans, and this can be seen in the positive perception of the violent act and its associated cues today. In peaceful societies, the inbuilt impulse towards extreme forms of violence are inhibited by internalized moral values and law. However, during a fight these higher cognitive systems are deactivated and more fundamental survival mechanisms are activated. Once a person experienced the rewarding impact of aggression, extreme forms of violence become more prominent in a person’s action schemes. Hence, for active soldiers, rebels, and other fighters appetitive aggression is less a matter of psychopathology than a common survival strategy caused by the constant exposure to violence.

1.3 Other trauma-related mental disorders

PTSD symptoms and aggressive behavior are often associated with so-called comorbid mental illnesses, termed here as other trauma related disorders: affective disorders like depression, other anxiety disorders (e.g., social phobia), as well as substance abuse, and dependence are the most common.

EXCURS: suicidality

Suicidality is a temporary crisis and does not manifest itself in the same way as a mental
Combat-related disorders

Disorder like for instance PTSD. It is particularly important to identify the suicide risk during the diagnostic interview as well as regularly reassessing it during therapeutic sessions (e.g., via M.I.N.I. Suicidality Interview).

### Table 1.2: M.I.N.I. Suicidality Interview

<table>
<thead>
<tr>
<th>In the past month did you:</th>
<th>points</th>
<th>no</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 Think that you would be better off dead or wish you were dead?</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2 Want to harm yourself?</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C3 Think about suicide?</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4 Have a suicide plan?</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5 Attempt suicide?</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**In your lifetime:**

| C6 Did you ever make a suicide attempt? | 4 |

**Suicide Risk:**

- 1 – 5 Points: Low
- 6 – 9 Points: Moderate
- More than 10 Points: High

In case of a moderate or high suicide risk the therapist/interviewer has to react immediately. The client cannot be released without an intervention!

How can the therapist/interviewer intervene?

- First goal: gain time!
- Identification of reasons for suicide wish
- Listen to his/her problems, show empathy and convey hope:
  “Today it is difficult for you, but I will be here to help you and to see how we can solve your problems.”
- Activation of resources: ask for family members, friends, and persons to whom he/she has a positive relationship; ask for hobbies and important areas of life.
- Anti-suicide contract:
  “Can you promise me not to kill yourself before we meet next time?”
- Provide an emergency number to call and develop an emergency plan
- Check for suicidality regularly throughout the treatment
1.4 Educational tools

2. Defining own stressors
3. Giving examples for different forms of aggression
4. Role-plays for diagnostic interviews
5. Role-plays for resource activation in case of acute suicidality
2 Theoretical approach

The following part will explain the physical reactions during the exposure to violence as victim (traumatic event) and as perpetrator (hunt/fight), its causal relationship to PTSD and appetitive aggression and raise implications for the therapeutic approach on the basis of the etiological knowledge.

2.1 The peritraumatic reaction

Experiencing a traumatic event is associated with a massive physical reaction, called alarm reaction (or defense cascade; see Figure 2.1). The body undergoes six successive sequences: Freeze, Fight/Flight, Fright, Flag and Faint.

1. **Freeze**

Recognizing the threat, the “orienting response” overcomes the body in a matter of seconds. The organism is “freezing” and turns from normal state to an attentive immobility (incapability of moving). The person stops, looks, listens and evaluates the situation. Neuronal and endocrine body responses allow the person to evaluate the situation faster and with it, to take the potentially life-saving decisions immediately.

2. **Fight or Flight**

Depending on past experiences, opportunities for flight as well as the person’s relative strength against the attacker, the person decides between either “fight” or “flight”. This response is bolstered by an increase in sympathetic arousal, which can have side effects of such as a feeling of dizziness, lightheadedness, palpitation, a dry mouth, numbing, muscle tension, and a feeling of irritability.

4. **Fright**

The failure of “fight” or “flight” will initiate the “fright” reaction; tonic, unresponsive immobility marked by fast heart beating (tachycardia, >100 heartbeats/min), fast blood flow (vasoconstriction), hypertension, hyperalertness, high emotional arousal and fear – reactions that are largely repressing anger. Assaultive breakouts of the victim are followed by immobility (periods of reactive fight are followed by temporary non-reactive “shut-down” responses).

5. **Flag**

Experiencing ongoing aggression in which the victim has no chance to defeat his/her attacker (e.g., torture or rape) the body switches from hyper-functioning (“fright” reaction) to hypo-functioning (“shut-down” reaction). The activation of the para-sympathetic nervous system and its associated systems become dominant and cause the “shut-down” reaction of the victim by slowing down the heart beat (bradycardia, <60 heartbeats/min), decreasing blood flow (vasodilatation), causing muscle relaxation (hypotension), reduction of arousal, surrender, making it incapable of processing information of the surrounding (cognitive failure), numbing the emotions, and finally extending the onset and termination of assaultive breakouts. Typically, the body becomes warm and the limbs become limp at this stage of the cascade. “Shut-down” reactions are more likely if the traumatic event is connected to body fluids (e.g., blood, urine, sperm); particularly their smell is connected to feelings of disgust. It is also more likely when connected to an act in which the physical integrity of a person is disrupted (e.g., rape), and if severe body pain is unbearable (e.g., torture).

6. **Faint**

The final reaction is “fainting”. The body functioning is at its lowest level. Information (sensory, interoceptive, emotional, cognitive, place, time, happening) is neither processed by the brain nor stored in the memory.
The dominant emotional reaction during traumatic events is FEAR!

2.2 The physical reaction of fighting

Experiencing a traumatic event the body becomes unresponsive and immobile. During fighting the opposite is the case: the body is mobile and the mind extremely alert. The physical reaction is dominated by the sympathetic activation, characterized by a strong, flexible behavioral capacity (tonic mobility), fast heart beating (tachycardia), fast blood flow (through vasoconstriction) and muscle tension. Neuroendocrine segregations of testosterone and endorphins cause analgesia (repression of pain) and an intense positive emotional excitation. Key stimuli, that elicit the physical as well as the emotional arousal and the desire hunt/fight might typically include the sight of blood and the screams of the victim. The more experience a person has in hunting and appetitive combat situations (combat high) the more fascinating the act becomes and the more present is violence in the fighter’s mind (see 2.4.3 Hunting network).

A quote from a Hutu fighter during the Rwandan Genocide (Jean Hatzfeld: Zeit der Macheten): “The hunt was barbaric, the hunters were barbaric, the loot was barbaric – and barbarism controlled our thoughts.”

Whereas reactive aggression is associated with relief after the successful combat, instrumental aggression is connected to power or a positive excitement. A form of instrumental aggression is appetitive aggression: aimed at attaining a POSITIVE EXCITEMENT through the violent act itself.

2.3 Hormonal reaction to stress

Traumatic experiences as well as combat are conditions of stress: The body has to regulate its functions to cope with and to adapt to the current situation (freeze, fight, flight, fright, combat high, flag, faint) for the short and the long run. The “fast-acting pathway” segregates adrenalin and noradrenalin within a period of (milli)seconds. The hormones allow more efficient processing of information, faster reactions and the mobilization of energy. The “slow-acting pathway” becomes activated after 20-30 minutes. The active hormone in this process is cortisol. Its effect depends on the target tissue. The short-term resilience of the person becomes increased by elevated delivery of oxygen and glucose, higher heart rate, fast respiration, inhibited digestion etc. However, over a long period of time, chronologically high cortisol levels
will have a detrimental effect on the brain, e.g., the hippocampus, but also for the other body organs there is a higher wear and tear.

2.4 Memory, traumatic stress and combat

In situations of stress, our brain is flooded by various hormones and neurotransmitter, which allow the subject to (re)act more efficiently under the given conditions. Hormones (e.g., cortisol) and neurotransmitters (e.g., adrenalin and noradrenalin, endorphins) affect neuronal processes like the process of information transmission or the reaction time, but they also modify the memory – the way processed information is stored. The following section provides a short introduction of different types of human memory systems and explains how information is processed and stored during stress, how the information is recalled in future, and how this leads to the symptoms of PTSD and elevated levels of aggression.

2.4.1 Different types of memories

Human memory consists of a complex interconnected neuronal ensembles that allow humans to cope appropriately with past, present, and future experiences. The basic divisions of memory is the implicit (non-declarative, hot) and the explicit (declarative, cold) component. The information concerning the two memory types is usually connected and embedded in the autobiographical memory.

The cold memory

The cold memory contains explicit, declarative information: the kind of the event (what?), the time (when?) and the space (where?). The information can be consciously retrieved. The brain structure responsible for processing, storing, and recalling declarative information (event, time, space) is the hippocampus.

*Example for "cold" information about the event when Paul moved to Goma: “In 2005 I moved to Goma. It was Monday, 25 May, 9am (time), when I arrived in town and at the house where I was supposed to live (space). It was just near the airport. I talked to my neighbor, called Odette (who, what), at 10am (when). She was 50 years old and had 5 children. The two elder were my age…”*

The hot memory

The hot memory includes implicit, non-declarative information: reports on sensory, cognitive, emotional and physical perceptions. The information is retrieved automatically stimulated by
2. Theoretical approach

cues and dominated by the sensation of “here” and “now”. Emotion-related brain structures such as the amygdala coordinate the processing, storage and recall of non-declarative information (sensory, emotional, cognitive, and interoceptive perceptions).

Example for “hot” information about the event when Paul moved to Goma: “It was sunny and warm. I was sweating (physical). The streets were crowded and dusty (sensory). I felt good about starting my new life (emotional). I felt independent (emotional). The house was gray (sensory). There were other houses around (sensory). I talked to my neighbor. I thought: “She is nice” (cognitive). She was big and resembled my mom . . . .”

The autobiographical memory

The autobiographical memory organizes all information of persons, locations, activities, plans, and goals of different life periods in a chronological order.

Example for the autobiographical integration of Paul’s cold and hot memory: “Before I moved to Goma I lived with my mom, dad and my seven siblings in Masisi. I finished school very successful and my parents decided to send me to university in Goma. When I started university I was 20 years old. I studied for 4 years. Afterwards I worked for an NGO called Mercy Corps as a translator for 1 year. Then . . . .”

Both memory systems work together to create functionally integrated memories (see Figure 2.2):
Sensory-perceptual network: the hot and cold memory work together, sensory, emotional, cognitive, and interoceptive information of an event can be connected to contextual information and will be situated chronologically in between other events; thus in the autobiographic memory. Example: “I can remember that it was a warm day in spring. It was near my parent’s house, someday in the 80s, I was not yet going to school. I had a blue bike; it was a friend’s bike, he lived next to us at this time. My father was pushing me and I can remember well the feeling I had when I started rolling on my own.”

Trauma, violence and memory performance

The amygdala is extremely active in both situations, where the person is the victim, and combat high, where the person is the perpetrator. In contrast, the functionality of the hippocampus is dramatically reduced. Hence, in both situations sensory, interoceptive, cognitive and emotional (hot) information are processed and stored in great detail, whereas contextual information (“what”, “where”, and “when”) are neglected (cold; see Figure 2.3).
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Figure 2.3: Memory performance and neuronal activity

Hence, the neuronal representation of the traumatic event/fight in the hot and cold memory are processed separately and become detached (see Figure 2.4). The two memories are no longer connected and cannot be integrated into the autobiographical memory.

Having the hot and cold memory disconnected, a single activation of any of the neuronal representation of the hot memory (so-called cues) triggers the sensory, cognitive, emotional and physiological reliving of the event, experienced as “here” and “now”.

Figure 2.4: Fear network of a single traumatic event

The hot and cold memory are disconnected. Excitatory connections link the neuronal representations of the traumatic event. If one cue (guns, guilt, horror, “I can’t do anything”, shaky legs,...) is triggered, the whole network becomes activated! The person is unable to re-orientate by means of contextual information of “where”, “when” and “how” the event happened.
The hot and cold memory become disconnected in the same way as with the fear network. Excitatory connections link the neuronal representation of the violent act. If one representation is triggered by an internal cue (hear pounding, fast breathing,...) or external cue (blood, dust, knife,...), the whole network becomes activated! The person will be unable to re-orientate by means of contextual information (“where”, “when” and “how” the event happened) and is primed to behave in the same way as during the violent act!

2.4.2 The fear network

The memory of a single traumatic experience can be understood as an associative network. Neuronal representations in the brain are connected via nerves more or less cohesively (depending on the number of activation, the extent to which the event is still connected to the cold information, etc.). In the associative network, sensory (pictures, sounds, pain, odor), cognitive (“I can do nothing”, “why is nobody helping”) and emotional (disgust, fear, horror, grief, shame, jealousy) experiences are linked with the peritraumatic (interoceptive) reaction. In the case of the fear network – the associative network for traumatic events – the information is detached from the explicit information (cold: “what”, “where”, “when”?). The activation of the network by one of the cues will elicit not only the specific traumatic event, but the whole fear network. The way in which the event is relived depends on the dominant peritraumatic reactions: having primarily responded with an hyperactive “fright” reaction, the event will be relived again this way: tension and hyper-activation of the organism. The client will have a fast heartbeat, hyperventilation, tensed muscles; the body becomes stiff and cold. In contrast, if the peritraumatic reactions dominated by the “shut-down” response, the traumatic events...
Theoretical approach

will be re-lived with hypotension and a dominant para-sympathetic activation: the breath, blood flow and heart beating will slow, and the body becomes limp and warm.

Each further traumatic event will be added to the fear network by its ensemble of associative representations. Hereby, the representations overlap, that is to say, different traumatic events will evoke the same emotions, cognitions, and bodily reactions. As the fear network grows (by the accumulation of different types of traumatic events) the number of cues that can elicit the activation of the fear network will increase. Furthermore, the fear network becomes more and more cohesive with each activation. The following picture shows a fear network of three different events: A volcano eruption, domestic violence and the traumatic experience of loosing a battle. As one single cue is triggered, the whole network becomes activated. The person re-lives the feelings of fear, horror, as well as the interoceptive response (e.g., fast heartbeat). The hot memory of these events is activated.

Figure 2.6: Fear network

As sensory, emotional, cognitive and interoceptive experiences of different traumatic events are interconnected, the whole network can be triggered by a single cue.
2.4.3 The hunting network

Like the fear network there is also a neuronal representation of cues for hunting and combat highs. Typical cues eliciting the hunting network are for example the sight of blood, the victims’ fight to survive, etc. The more experience a person has in such events of violence the more cohesive the network and the more appealing, fascinating, and appetitive the act becomes.

Normally, moral evaluations, depending on culture and context, are applied to inhibit appetitive aggression during daily life. Combatants – “equipped” with a cohesive hunting network – (re)act with intensified aggression because they relive their past experiences through the activation to the hunting network.

Figure 2.7: Hunting network

Like the fear network, the sensory, emotional, cognitive and interoceptive experiences of different violent acts are interconnected, and the whole network can be triggered by a single cue (e.g., blood, fire, the sight of the enemy).

The memories of traumatic stress and combat highs will have overlapping cues. However, there is still no fusion of the two types of networks. In fact, due to the contrary valence (fear vs. positive excitement), the two types of networks oppose each other. If an individual cue, such as the sight of blood, becomes a part of the hunting network, instead of the fear network, then,
2 Theoretical approach

this reduces the risk of PTSD, as the fear network is not activated. This explains why fighters who commit more violent acts, show a higher resilience to PTSD. The cues that normally evoke the fear network are controlled by the hunting network and connected to positive excitement instead of fear.

Figure 2.8: Fear and hunting network 1

Due to the contrary valence the fear and hunting network the two counterparts oppose each other. Depending on the latest experiences, current life conditions and the number of lifetime traumatic events either the hunting or the fear network can be more dominant. Members of armed groups living under constant insecurity and repetitive (successful) combat situations develop dominant hunting networks.
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Figure 2.9: Fear and hunting network II

Repetitive exposure to violence as victim as well as changing conditions (e.g., the transition from combatant to civilian), can produce modifications of the two networks. If the fear network grows (new cues are added) or the hunting network is not triggered regularly anymore (e.g. after demobilization), the fear network can take over cues that were formerly dominated by the hunting network and integrate them into its own network: Whereas blood used to be a trigger for the hunting network (positive excitement) during the time as combatant, it will now trigger the fear network. In fact, veterans are frequently observed with late-onset PTSD.

2.4.4 Implications for treatment

The etiology of PTSD and appetitive aggression implicates four mechanisms for interventions:

- Reintegration of the events into the autobiographical memory
- Repeated exposure of the fear and hunting network to connect the hot and cold memory
- Habituation to fear and positive excitement by means of confrontation in a secure environment
- Change of behavioral habits and increase of functioning in daily life (e.g., via interpersonal therapy)
2 Theoretical approach

2.5 Educational tools

1. Lecturing
2. Regular repetition
3. Reproduction of contents and associations with own experiences in small groups
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

FORNET was developed on the basis of NET (Schauer, Neuner, Elbert, 2011) to target symptoms of posttraumatic stress and in addition tendencies towards violent behaviors (appetitive aggression). In FORNET, both traumatic experiences and perpetrated violence are addressed through narrative exposure. It thereby acknowledges that the past of many survivors of war and armed conflict includes both having been a victim and a perpetrator. FORNET is a short-term, culturally sensitive treatment approach. In FORNET some of the effective tools of different therapeutic approaches like cognitive-behavioral therapy, testimony therapy, interpersonal therapy and client-centered psychotherapy are combined.

3.1 Basic rules

There are some basic rules that have to be considered carefully throughout the whole treatment.

- Create a space of safety within the client-therapist relationship
- Make sure that the client is in control of the situation
- Ensure predictability of your actions, next steps, behavior
- Respect physical integrity of your client
- Accept your client, his/her emotion and expression, his/her past actions without judgment
- Be congruent: what you feel will transpire to your client eventually
- Be an empathic listener: verbalize feelings, body sensations, thoughts, eye contact, full attention
- Give statements of positive appraisal throughout the whole treatment phase (e.g., "you are doing this very well")
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

- Ensure total confidentiality

Table 3.1: Overview

<table>
<thead>
<tr>
<th>Session</th>
<th>Tool</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Diagnostic</td>
<td>Identification of mental disorders</td>
</tr>
<tr>
<td>1</td>
<td>Lifeline</td>
<td>Introduction – safety – confidentiality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Psychoeducation and explanation of the treatment procedure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lifeline</td>
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<td>- Treatment of the first stone</td>
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<tr>
<td></td>
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<td>Afterwards: planning of the coming sessions (without the client)</td>
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<tr>
<td>2-5</td>
<td>Narration</td>
<td>Narrative exposure (maximally two stones/sticks per session)</td>
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<tr>
<td></td>
<td></td>
<td>At the end of the 5th session: explication of the following group therapy and confidentiality during group sessions</td>
</tr>
<tr>
<td>6+7</td>
<td>Group therapy</td>
<td>Discussing (dis-)advantages of the current role change from combatant to civilian and future wishes</td>
</tr>
</tbody>
</table>

3.2 Psychoeducation

- Explanation that certain reactions after traumatic events are common reactions (normalization)
- Explanation about confidentiality and the therapeutic procedure (e.g., the number of sessions, the duration of sessions)
- Informed consent (has to be signed by the client and the counselor as well as by the caregiver if the client is a minor)

Example: I understand from your answers, that you have experienced severely stressful incidents in your life and that you suffer because of it. When a person suffers from these experiences his/her body and his/her mind can be affected. It is therefore normal for people like you, who have undergone violent, stressful, or sad experiences in the past to be left with certain problems that still affect your life today. Some people just wish to forget these events. But it is hard to forget the pain. Many people, who experienced traumatic events, keep their memories and pain to themselves. They avoid speaking about what has happened to them with others. Even if they want to speak, there is often no one to listen to them, maybe because the others are suffering, too. If you do not speak out your experiences, it means that you are keeping those experiences to yourself. Worrying like this by yourself can make you very lonely. For some people the thoughts, pictures, memories of those events come to their mind at times even though they do not want them to and they may disturb their daily activities. Victims may also feel a great need to avoid the places where the incident occurred, the people, and any activities that might remind them. As a result, sweating, shivering, strong heartbeat, cramp of the muscles, headache, sleep disturbances, bad dreams and concentration difficulties can occur. You might experience problems during the night or at daytime because of this. You might not be able to do your daily work as well as you would like to, you might not be able to concentrate well in school or focus on activities you
 have to do and you might feel tired and exhausted a lot. You might also feel frightened or angry or sad during the day without any reason. Therefore we want to help you to heal the wound caused by these bad events in your past life. We have found that talking about the past can be very helpful. So we invite people who have encountered terrible experiences to talk to us. I want to listen to all your experiences in life, good ones and bad ones. I know that it is not easy for you as it may be painful. But I am there with you to help you bear these feelings. I want to be your companion and want to revisit with you all the important experiences of your past life. I know that it will be a great help to you to talk about the sad experiences and express your feelings about them. Putting your sad and fearful feelings into words can greatly ease the burden on you. There is another important reason for talking about the experiences, which cause you mental and physical pain. If people do not speak about their experiences they may never be known to others and the outside world. We think that the past should not be forgotten. One day you and your children may live in peace. Then someone should tell them about your life experiences. I therefore wish to help you to be able to talk about your own past. I promise that I will be accompanying you as best I can during the times we meet and even later, should you need my help. I would like you to know that whatever you tell me will be strictly confidential. I am not allowed to talk to anyone about what you tell me, unless you wish so. You must promise me in return, that you will look after yourself well and that you will come to meet me every time we have agreed on a session. You must also promise me that if you feel bad or unwell, you will let me know as soon as you can and that you will not do anything on purpose that will hurt your body or your mind. If you want to tell me your story this would mean that we, you and me, meet about 5 times. Afterwards we would meet two more times with three more persons who also talked to me or another therapist and who have had similar experiences. During the last two sessions we won’t talk about your past life experiences in detail anymore. There we will talk more general about the changes in your lives. I will of course not share your experiences with the group. Because - you remember - everything you tell me I will be kept secret. But - of course - if you want to share your experience with the group you are free to do so. Each of our meetings will take about 90-120 minutes. After you have talked to us, we want to know how you are doing then. There will be one more interview about 3 to 4 months after we finish meeting. And to learn how you are doing in the long term, there will be one more interview in about one year.”

Do you have any questions? Are you ready to participate? (Signing of Informed Consent)

3.3 Lifeline

The first FORNET session is the lifeline session. With symbols for good, bad and violent events the client reconstructs his/her life together with the therapist.

Different symbols:

- Rope as a symbol for the life
- Stones as symbol for traumatic and bad events
3. Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

- Sticks as symbol for events in which the client was actively involved in violent acts
- Flowers as symbol for good events

The stones, sticks and flowers are of different sizes. For example, a small stone for a bad event and a big stone for a very bad event.

Important:

- Mark the beginning of the life
- Mark the presence on the rope
- Some part of the rope should be left for the future
- The meaning of every stone, stick, and flower should be named
- Tell the client that during the lifeline exercise you should not go into details (and interrupt him politely if s/he does!)
- For the sticks: focus on the first time a violent act was perpetrated
  - ALWAYS position the first killing and the first rape
  - Also position any other violent act which was associated with lots of emotions (good, powerful, bad)
- Help the clients by identifying life periods (e.g., time before school, time in primary, time with Mai Mai Nyatura, etc.)
- The exit and entry into the armed group marks an important moment in the combatants’ life: Mention it during the lifeline session!
- Try not to activate the hot memory!
- Questions concerning every stone, stick and flower
  - Which emotion was dominant (fear, pleasure, happiness, etc.)
  - Age and year, when the event happened
  - Place, where the event happened
  - Duration of the event (five minutes, one hour, etc.)
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

Goal of the lifeline

The lifeline exercise is a tool for the therapist to get a first overview over all the important experiences in the client’s life but also for the client to start the reintegration of traumatic and violent experiences in his/her autobiographic memory.

Example for an instruction: Today I would like to do a small exercise with you. I brought a rope, sticks, stones and flowers with me. Let’s have a look at the rope. This rope is a symbol for your life. The rope begins here [direct attention to one end of the rope], so this is the moment when you were born. Here we are today [direct attention to the other end of the rope]. So this is your past, and this part resembles your future. Now we can have a look at the stones, sticks and flowers. I brought with me stones, sticks and flowers in different forms and sizes. The stones are symbols for bad events, the sticks are symbols for events in which you were violent to someone else, and flowers for good events. You might have experienced some very bad events and some events that were bad, but not as bad as the very bad events. For the very bad events you should pick the biggest stones and for the less bad events the somewhat smaller stones. For the flowers this is pretty similar. We have big, beautiful flowers for the very wonderful events in our life and smaller flowers for the nice events in our life. It is the same for the sticks it is the same. The big sticks represent events in which you were involved actively in a violent act and you have had lots of strong good or bad emotions, and small stick where you were involved in violence but it did not make you feel lots of strong emotions that time. Now I would like to ask you to put on the rope stones, sticks and flowers for all the important events that happened during your life. Please start with your birth and then slowly move on. I will ask you some questions about the events but we won’t talk about them in detail right now. Later on, when we are going to talk about your whole life, we will have much more time and talk about all events in detail. Do you understand the exercise? Do you have any question? Would you like to start now?

After the lifeline session the therapist draws the lifeline. The drawing has to include information about what, when and where the event happened.

Selecting sticks and stones for treatment

In consideration of the limited number of sessions it is essential to select those sticks and stones for exposure that are associated with the most intense feelings.

Some guidelines

- Calculate two symbols (stick or stone; not flower) for one session
- Always treat the first killing (or severe injury) and the first rape
- Treat the stick where the client had again a very high level of emotion
- Always treat the worst event (the most frightening event of the client)
- Concentrate on other events where the client reported a high level of fear
- Be careful with big stones associated with a loss. As they are not inevitably traumatic they have to be sufficiently explored during the lifeline session!
Note. During the whole FORNET treatment a well-explored lifeline is the key feature to provide a structured and effective therapy. To achieve a relationship of trust all questions have to be answered honestly and the issue of confidentiality should have been made very clear so that the client feels free to speak about his/her events. Furthermore, the therapist has to make sure that the client understood the symbols – if there is doubt, ask the client if s/he can repeat what the therapist said about the symbols. Reinforce if s/he recalls it right and explain again if not!

3.4 Narration

The four following narrative sessions are based on a therapeutic method called narrative exposure: the client gets "exposed in sensu" to the stimuli, which provoke the pathological behavior. The exposure sessions are based on the unconditional acceptance of every emotion. Both the recall of positive and of negative affective responses are encouraged – even when the worst offenses are recalled. The therapist encourages the client to verbalize and relive all the feelings connected to perpetrated violent acts and traumatic experiences. The therapist guides the client to contrast between "now" and "then". Besides the feelings and cognitions of the past, the client’s current view of the event, including his/her thoughts, feelings, and bodily sensations, is taken into account. Exposing the client to the violent acts s/he committed as well as to traumatic experiences activates the hunting and fear network. Constant verbalization and the contrast of "now" and "then" will finally enable the brain to connect the events of the two networks with their contextual information. The start of the narration is the time when the client was born and the end is today. The therapist is a guide for the client through the whole process and explores all the important life events. Thereby the therapist should focus on the traumatic events as well as on violent acts the client committed (e.g., killing, rape). During the whole process, the therapist will document everything and make sure that s/he are going through the whole life in chronological order. To jump backward and forward will make it impossible for the client to reintegrate the events in the chronological order.

Example for an instruction: Thank you so much for doing the lifeline exercise. Now we have a nice overview of what has happened in your life. I will keep the drawing with me and will bring it to our treatment session. I can see from your lifeline that you have experienced some nice events, but also some bad events and events in which you were actively involved in violent acts. I know that it is difficult to talk about the bad events, but on the same time I know that it can be very helpful to share these experiences and the feelings connected with the experiences with somebody. So I would like to offer you the opportunity to talk with me about your whole life. We will start with your birth – even though you will not remember your birth – but I’m sure somebody might have told you something about the time when you were born. Then we will slowly move on and I will ask you many questions and interrupt your narration from time to time, because I’m really interested in understanding
your story completely. I will also ask you from time to time how you are feeling while telling me the story and, of course, you should inform me in case you do not feel well. I will treat everything in a strictly confidential manner. How do you feel right now? Can we start?

The therapist starts with the life circumstances when the person was born, e.g.

- when/where was the person born
- who was living with the person
- ...

Example of the beginning of a narration: My name is Bahati Paul. I was born in Kongo on the 20th of September in 1993. My mother Christine and my father Shakuru lived in a village called Saké. Before I was born they went to Goma. First they stayed at my auntie’s house. She is the sister of my father. I was born in the hospital in Goma. After I was born my parents went back to Saké. We lived together with my grandparents, the parents of my father. My grandfather was called Paul, like me, and my grandmother was called Maria. I was the first child of my parents. I sometimes played with my grandparents. I loved my grandfather a lot and I loved to play with him – he was really funny. When I was two years old Aimé, my little sister was born. Aimé and I played together a lot. Often we played with little pillows inside the house......

The therapist continues with the narration in chronological order and always slows down, when s/he approaches a stick or a stone in the life of the client! This could be a frightening but also a pleasant experience.

Here the therapist must ALWAYS stick to the chronological order!

In one session two symbols (stick or stone; not flowers) should be treated. The sessions can for example be structured as follows (please consider that the hot spot has to be explored until the fear/excitement decreases, though, 30 min is only a generalized approximation).

Figure 3.1: Focus on hot spots!
3.4.1 How to deal with stones and sticks?

During the sessions, the therapist focuses on the most traumatic events and specific perpetrated violent acts, which are connected to strong emotions and positive arousal (e.g. sensation of being powerful) or negative arousal (e.g. fear). The violent acts are commonly the first killing or attack of other humans, rape or looting.

Instructions

1. **Recognizing that you are approaching a stone or stick**
   a) Client becomes impatient
   b) Tries to speed up
   c) Becomes hyperaroused
   d) ...

2. **Slow down**
   Slow down and try to get a clear picture about the situation of the hours before the hot spot happened, so that you have a clear idea of the context of the event.

3. **Connecting hot and cold memory**
   see “Example of the narration of a hot spot”

---

**Cold Memory**

- **Time**: When did the incident take place?
- **Location**: Where did the incident take place?
- **Environment**: Who/What was there?
- **Event**: What happened?
- **Beginning**: What were the exact circumstances at the beginning of the incident?

**Hot Memory**

- **Cognitive**: “I will die” ...
- **Emotions**: Fear, Anger, ...
- **Behavioural Response**: Screaming, ...
- **Verbal Response**: “No, no, no .....”
- **Visceral response**: heartbeat, muscles tense
- **Sensory perception**: Hearing, Seeing, Feeling, Smelling, Tasting
3. Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

1. Stay in the hot spot...

   a) for stones:

   ...until the client experiences at least some relief: Always keep in mind the subjective fear level of the client: Most important: Never stop the session at the peak of fear! You have to stay in the hot spot until the client experiences some kind of relief. Always ask how the client is feeling NOW. As long as there is strong heartbeat or other signs of fear you cannot stop the narration, but continue with questions about the very same situation.

   Figure 3.2: Habituation

   ![Habituation Graph]

   Example of the narration of a hot spot for a stone “On one day, it was on an afternoon in spring, my brother looked out of the window while my father was shouting at us. My father got so angry because of this and he shouted louder and louder. Then suddenly he grabbed my brother. I was so fearful in that moment, because I knew he would hit him. He threw my brother on the bed and stood in front of him. My brother was lying on the bed. He looked fearful and stammered <sorry> all the time. I felt my heart beating fast and at the same time I felt unable to move any more. I felt like being completely frozen. Then my father took his belt and swayed it over his head and grinned at my brother. In that moment I knew what would happen next. All the memories about the situations when my father was hitting my brother and me came into my mind. In that moment I thought I would die. I was so sure this time he would kill us because his face looked so furious. His eyes were huge and he wrinkled his whole face and he shouted and shouted all the time at us. Then he forced my brother to take off his shirt. I saw my brother trembling over his whole body. I wanted to help him and at the same time I wanted to run away – but I couldn’t move. My legs felt numb. I was just standing right next to the door, maybe one meter away from my brother. Even now when I’m talking about it, my legs are feeling numbed, but in my breast I feel hot. Then my father hit him. I heard the loud noise when the belt hit my brother’s back and I heard his scream. I closed my eyes and wished to be far away. I heard the noise of the belt several time and I heard my brother screaming. Then suddenly I did not hear anything anymore. I opened my eyes and saw my brother lying on the bed. His eyes were shut, and he was lying on his belly. My father’s face looked strange. I have never seen this kind of expression on his face.
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

He stood still in front of my brother who did not move anymore. Then he ran away and I was alone with my brother. He still didn't move. I felt a hot flush in my whole body and my heart was beating extremely. My head was hot. Right in that moment I was convinced that he was dead..."

b) for sticks:

...until client experiences at least some reduction of excitement: Always keep in mind the dominant emotions and their intensities. Most important: Never stop at the height of (any) dominant emotion! You have to stay in the hot spot until the client experiences a reduction of excitement (negative or positive). Always ask how the client is feeling in the treatment session. As long as there is strong heartbeat or other signs of hyperarousal you cannot stop the narration, but continue with questions about the very same situation.

2. Reinforce the present
Constantly keep comparing "THEN" and "NOW"

Example
Ask: How did you feel in that situation – how do you feel right now? (emotion)
Ask: How did your body react in that situation – do you also feel this now? (interoception)
Ask: I can see you trembling right now – did your legs also tremble in that situation? (interoception)
Ask: What did you think in that situation – what do you think right now? (thought/cognition)

Be attentive to prevent
a) Avoidance: Never stop during a hot spot – no matter what!
b) Flashbacks/Dissociation: In case of dissociation or flashback occurs re-orient your client and follow the guidelines of Table 3.2: dissociation and flashback.

3. Verbalize behavior, emotions and body reactions
Verbalize what you can see from the client’s behavior or facial expression
For example if you see the client has tears in his eyes, becomes restless, starts to cry, or similar say: "I can see tears in your eyes now, do you feel sad at this moment?” or “I can see you getting nervous, is there a feeling of fear in your body now?”

For the treatment of sticks: During the first killing/injuring, it often happens that the client becomes keenly aware of his/her own vulnerability. Verbalize this cognition ("I am vulnerable"); "Possibly I will be in the same situation the next time”) along with any sensations, including the description of the victim ("What did the victim look like?” "Did s/he scream?” “Did s/he bleed?”)

4. Reach a safe point in the end
Reach a safe point of the story in the past by the end of each session. Do not stop
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

the session when there is still no safe point reached in the story and the client is still experiencing fear, excitement and bodily reactions!

5. For ALL sticks: Summary
   a) What were the circumstances?
   b) What did happen?
   c) How did the client feel before, during and after the act
   d) For the first killing: How did the client overcome his inhibition threshold?

6. For ALL sticks: Question
   a) “What do you think about it right now?”
     !Do not judge! Whatever the clients thinks about it, the role of therapist is a unconditioned acceptance of the clients’ feelings and opinions!!

7. For sticks representing a RAPE: two further questions
   a) “Could you imagine having sex with a woman how also wants to have sex with you?”
   b) “What would be the advantages to have sexual intercourse with someone who also wants to have sexual intercourse with you too?”

Dealing with the first killing/injury

The therapist focuses firstly on the committed killing/injuring. Hereby he fully explores all emotions, both negative and positive, that were potentially linked to the first killing (primary emotions like disgust, fear, or joy and self-conscious emotions like guilt or pride). It is important to go through the first killing/injuring in great detail, to emphasize subsequent changes in the case of repeated violent acts. During the first killing/injuring, it often happens that the client becomes keenly aware of his/her own vulnerability. This cognition should be verbalized during therapy along with any sensations, including the description of the victim. Finally, the therapist and client focus on how the client overcame the inhibition threshold to kill/injure another person. The therapist concentrates on the cognitions (e.g., out-group, enemy) and emotions, which made the client overcome this threshold (e.g., fear, anger, feelings of hatred, or revenge).
3. Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

Subsequently, the client is encouraged to mention his/her current thoughts, feelings about of the event, and the meaning in his/her life.

3.4.2 What are the flowers for?

Although flowers do not necessarily contribute (negatively or positively) to PTSD or appetitive aggression, they are still part of the life, and thus part of the lifeline. During the exposure sessions, flowers are activated very briefly. After the treatment of a stone or stick a following flower (but only if immediately following in the chronological order) can be used to activate positive emotions.

3.5 Group therapy

The individual sessions are followed by two group sessions, which is a tool from client-centered psychotherapy. In the group session, the role change from e.g., combatant to civilian is addressed and reinforced. A group consists of three to four clients who – for the optimal constellation – have different attitudes towards re-recruitment and one or two therapists. The therapist structures and guides the discussion. S/he encourages the clients to share and discuss different views and to be open to the experiences of others. Furthermore, the therapist encourages them to take responsibility for their lives and to develop goals, in order to foster successful reintegration into civil society.

Role changes are commonly from combatant to civilian, but may also be from street-kid to a settled life or other.

Example: role change from combatant to civilian

At first, the clients review their own life as a combatant and discuss the positive and negative aspects of being a combatant. At this point, the old role of a combatant is discussed in a broader sense, as clients might not wish to disclose specific experiences addressed during the individual sessions. Subsequently, the therapist focuses on the role change from combatant to civilian and on the connected feelings and emotions of the clients (e.g., “How difficult was it to
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

hand over your weapon?”, ”How did you feel when you actually did it – how do you feel about it right now?”, etc.). In the following part, the therapist directs the discussion to the current situation. The clients then have a discussion amongst themselves regarding positive aspects and difficulties in their current life as a civilian and collect advantages of being a civilian in comparison of being a soldier. The therapist encourages them to develop strategies together to overcome their difficulties. The group session ends with the future plans and wishes of each client and thoughts about the realization of these plans.

Confidentiality in the group session: The therapist is not allowed to disclose any information of the narration of his/her client during the group therapy. If the client wants to share his view/experience s/he will do it on his/her own initiative!

Summary of the content of the two group sessions (each 2 hours)

1. Group therapy session
   a) Introduction (presentation, explanation of basic rules during the group sessions: confidentiality of therapists, respect, listen when others talk, and no physical violence)
   b) Explanation of the procedure of the group sessions: identification of positive and negative aspects of the role as combatant and civilian (role-change exercise). Start with negative aspects of being combatant, continue with the positive aspects, followed by negative aspects of being civilian and close the treatment session with the positive aspects of being civilian!

2. Group therapy session
   a) Continuation of the role-change exercise
   b) Discussion of problems and identification of possible solutions
   c) Identification of future hopes and wishes of the clients
3.6 Challenging situations

Dissociation and flashback

Depending on the dominant reaction during the traumatic events symptoms of PTSD are often accompanied by dissociation or flashbacks. During dissociation the client may experience dizziness or everything turns black, they may temporarily lose their sight or hearing, or experience sensory distortions, for example, sounds may seem far away, or scenes may appear artificial. Emotional and tactile feelings may be stunted, they may feel emotionally and physically numb, or paralyzed, or incapable of feeling pain. The body may feel heavy and tired as well as becoming warm and limp. During flashbacks the client relives the trauma/combat high situation very vividly in a hyperactive way and acts in the same manner as he did during the event. Table 3.2 presents guidelines on how to detect and how to intervene in case of the two states.

<table>
<thead>
<tr>
<th>COMBATANT</th>
<th>CIVILIAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living separated from family</td>
<td>Loss of respect</td>
</tr>
<tr>
<td>No education</td>
<td>No power</td>
</tr>
<tr>
<td>Sometimes no acceptance by community</td>
<td>Difficult to get what one wants</td>
</tr>
<tr>
<td>Life is difficult</td>
<td>Obligation to follow rules and justice</td>
</tr>
<tr>
<td>No security in present and future</td>
<td>Adaptation to others</td>
</tr>
<tr>
<td>No future hopes</td>
<td>Not always in security</td>
</tr>
<tr>
<td>No moral</td>
<td>Loss of confidence</td>
</tr>
<tr>
<td>No medical treatment</td>
<td>Difficulties of reintegration</td>
</tr>
<tr>
<td>No salary</td>
<td></td>
</tr>
<tr>
<td>Limited freedom</td>
<td></td>
</tr>
<tr>
<td>Exposure to killing and violence</td>
<td></td>
</tr>
<tr>
<td><strong>Positive aspects</strong></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>Realization of own ideas</td>
</tr>
<tr>
<td>Defending and protecting the community</td>
<td>Living with family</td>
</tr>
<tr>
<td>Get easily what one wants</td>
<td>Being a member of the community</td>
</tr>
<tr>
<td>Respect</td>
<td>Opening to the world and development</td>
</tr>
<tr>
<td>No fiscal authority</td>
<td>Security</td>
</tr>
<tr>
<td>Having an own territory and its sovereignty</td>
<td>Possible future</td>
</tr>
<tr>
<td>Patriotism</td>
<td>Access to education</td>
</tr>
<tr>
<td></td>
<td>Freedom</td>
</tr>
<tr>
<td></td>
<td>Authority about its own life</td>
</tr>
<tr>
<td></td>
<td>No violence</td>
</tr>
<tr>
<td></td>
<td>People who help</td>
</tr>
</tbody>
</table>

Table 3.2
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

Table 3.2: Dissociation and Flashback

<table>
<thead>
<tr>
<th>How to detect dissociation or flashbacks?</th>
<th>Dissociation</th>
<th>Flashback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client stops talking</td>
<td>Client is absent minded</td>
<td></td>
</tr>
<tr>
<td>Body looks weak</td>
<td>Body shows alarm state</td>
<td></td>
</tr>
<tr>
<td>No tension</td>
<td>Fast heartbeat, sweating, trembling, muscle tension</td>
<td></td>
</tr>
<tr>
<td>Non-responsiveness and immobility</td>
<td>Acting like during the traumatic event</td>
<td></td>
</tr>
<tr>
<td>Depersonalization/Derealisation</td>
<td>Sensory hallucinations</td>
<td></td>
</tr>
</tbody>
</table>

**Intervention**

<table>
<thead>
<tr>
<th>Dissociation</th>
<th>Flashback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slowly activate body through movement of hands, arms, feet/legs, while still sitting slowly (show your client how to move by doing it yourself)</td>
<td>Reorienting client to reality through calm voice calling client’s name</td>
</tr>
<tr>
<td>Reorienting client to reality through the activation of the senses: look: describe room, surroundings hear: voice, name touch: counsellor’s hand smell: strong smell like lemon or paraffin taste: something spicy</td>
<td></td>
</tr>
<tr>
<td>Standing up when sure eventually walking around while doing</td>
<td>Reassure client of safety</td>
</tr>
<tr>
<td>Reinforce here and now</td>
<td></td>
</tr>
<tr>
<td>Psychoeducation</td>
<td></td>
</tr>
</tbody>
</table>

**Avoidance**

- **Recognize the signs**
  - Client tries to talk about other things
  - Does not answer questions clearly or answers very fast
  - Wishes to talk about something else
3. Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

- **What to do?**
  - Psychoeducation
  - Consider how difficult it is to talk about the trauma/committed acts of violence
  - Ensure confidentiality

**No memory or no emotional activation**

- **Recognize the signs**
  - Says he does not remember
  - Says he doesn’t feel something and never did

- **What to do?**
  - Psychoeducation
  - Role-play: client retakes the position during the hot spot
  - Draw the space and/or the event together with the client (always verbalize!!)

**Group therapy: client is shy/does not contribute**

- **Recognize the signs**
  - The client does not say something
  - The client answers questions very quickly and briefly

- **What to do?**
  - Don’t force someone to talk
  - Ask small easy questions
  - Reinforce answers ("Yes, exactly, this is a very important aspect!")
  - Forward questions of other clients

### 3.7 Educational tools

1. Demonstrations in front of the group
   a) Psychoeducation
3 Narrative Exposure Therapy for Forensic Offender Rehabilitation (FORNET)

b) Explanation of confidentiality to the client

c) Demonstration of a fictive lifeline session

d) Exposure to own and fictive experiences of violence

e) Difficult situations: flashback/dissociation during exposure

2. Role-play with and without supervision is the key tool to teach FORNET procedures

a) Psychoeducation

b) Confidentiality

c) Setting the own lifeline

d) Exposure of own and fictive experiences of violence

e) Difficult situations: flashback/dissociation

3. Definition of own roles in life

a) What is a role?

b) What is a role change?

c) What roles do I have in my life?

d) In which way did I change my roles during my life?

4. Finding positive and negative aspects of life as combatant and civilian in small groups (e.g., having a moderator for each field the groups are rotating from one field to the other)
## 4 FORNET in French or Swahili

**Figure 4.1: Connecting the hot and cold memory**

<table>
<thead>
<tr>
<th>AU NIVEAU DE LA MEMOIRE FROIDE</th>
<th>AU NIVEAU DE LA MEMOIRE CHAUCHE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temps</td>
<td>Quand est-ce que l'événement s'est passé ? <em>(Quelle année, quel mois, quel jour, à quelle heure, quel saison ?)</em></td>
</tr>
<tr>
<td>Localisation</td>
<td>Où est-ce que l'événement s'est passé ? Demandez le plus de précisions possibles.</td>
</tr>
<tr>
<td>Environnement</td>
<td>Qui, quoi était là ?</td>
</tr>
<tr>
<td>Evénement</td>
<td>Qu'est-ce qui s'est passé ?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotions Sens</th>
<th>Cognitions Physiologiques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment vous vous êtes senti ?</td>
<td>Qu'est-ce que vous avez pensé ?</td>
</tr>
<tr>
<td>Qu'est-ce que vous avez entendu ?</td>
<td>Qu'est-ce qui s'est passé au niveau de votre corps ? <em>(battement du cœur, tremblement, vertige, pleur, respiration.)</em></td>
</tr>
<tr>
<td>Qu'est-ce que vous avez vu ?</td>
<td>Ulisikya nini kwa mwili wako ? <em>(kupiga piga kwa roho, kutemeka, kizunguzungu, kuliya, kupumuwa).</em></td>
</tr>
<tr>
<td>Ulisikya nini ?</td>
<td>Ulisikya nini ama uliwaza nini ?</td>
</tr>
<tr>
<td>Ulisikya nini ? (ulinusa nini ?, ulionja nini ? Ulisikya nini kama maumivu ?)</td>
<td>Ulisikya nini kwa mwili wako ? <em>(kupiga piga kwa roho, kutemeka, kizunguzungu, kuliya, kupumuwa).</em></td>
</tr>
</tbody>
</table>
**Figure 4.2: Reinforcing the present**

<table>
<thead>
<tr>
<th></th>
<th>Passé</th>
<th>Présent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensations</td>
<td>Qu’est-ce que vous voyez/écoutez/ maintenant?</td>
<td>Qu’est-ce que vous voyez/écoutez/ maintenant?</td>
</tr>
<tr>
<td>Physiologique</td>
<td>Qu’est-ce que vous sentez maintenant dans votre corps ?</td>
<td>Qu’est-ce que vous sentez maintenant dans votre corps ?</td>
</tr>
<tr>
<td></td>
<td><em>Unasikiya nini ndani ya mwili tako kwa saa hizi ?</em></td>
<td><em>Unasikiya nini ndani ya mwili tako kwa saa hizi ?</em></td>
</tr>
<tr>
<td>Cognitions</td>
<td>Qu’est-ce que vous pensez maintenant ?</td>
<td>Qu’est-ce que vous pensez maintenant ?</td>
</tr>
<tr>
<td></td>
<td><em>Unawaza nini kwa saa hiyi ?</em></td>
<td><em>Unawaza nini kwa saa hiyi ?</em></td>
</tr>
<tr>
<td>Emotions</td>
<td>Comment est-ce que vous vous sentez maintenant ?</td>
<td>Comment est-ce que vous vous sentez maintenant ?</td>
</tr>
<tr>
<td></td>
<td><em>Unajisikiya je kwa wakati huu ?</em></td>
<td><em>Unajisikiya je kwa wakati huu ?</em></td>
</tr>
</tbody>
</table>

**How to translate the final questions for the treatment of a stick?**

**Français – Swahili: Questions supplémentaires pour les bâtons**

Pour le bâton, deux aspects particuliers doivent être faits après la narration:

1. Le résumer de la situation (donner par le thérapeute)

2. On demande: «Qu’en pensez-vous maintenant/aujourd’hui»

   In Swahili: "Kwa wakati huu unafikiriya nini kuhusu jambo hilo"?

Pour le bâton de viol, deux questions particulières doivent être posées après la narration de la situation d’un viol:

1. Pourriez-vous imaginer d’avoir du sexe avec une femme/homme qui en veut aussi?

   In Swahili: “Unaweza kufikiri kufanya kitendo cha ndoa na mwanamuke/mwanaume anayeitaji piya?”

2. Quels seraient les avantages d’avoir du sexe avec celle/celui qui en veut aussi?

   In Swahili: “Kuna mafaa gani ya kufanya kitendo cha ndoa na yule anayeitaji piya?”
### Figure 4.3: Emotions: English-French-Swahili

<table>
<thead>
<tr>
<th>English</th>
<th>Français</th>
<th>Swahili</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>Anxiété</td>
<td>Wofu</td>
</tr>
<tr>
<td>Fear</td>
<td>Peur</td>
<td>Woga</td>
</tr>
<tr>
<td>Sadness</td>
<td>Tristesse</td>
<td>Huzuni</td>
</tr>
<tr>
<td>Shame</td>
<td>Honte</td>
<td>Haya/haibu</td>
</tr>
<tr>
<td>Anger</td>
<td>Colère</td>
<td>Kisirani</td>
</tr>
<tr>
<td>Hatred</td>
<td>Haine</td>
<td>Chucki</td>
</tr>
<tr>
<td>Helplessness</td>
<td>Impuissance</td>
<td>Kukosa</td>
</tr>
<tr>
<td>Horror</td>
<td>Horreur</td>
<td>Woga kali</td>
</tr>
<tr>
<td>Pain</td>
<td>Douleur</td>
<td>Uchungu</td>
</tr>
<tr>
<td>Disgust</td>
<td>Dégout</td>
<td>Kuchukiya</td>
</tr>
<tr>
<td>Hopelessness</td>
<td>Désespoir</td>
<td>Kukata matumaini</td>
</tr>
<tr>
<td>Discouragement</td>
<td>Découragement</td>
<td>Kukata tamaa</td>
</tr>
<tr>
<td>Guilt</td>
<td>Culpabilité</td>
<td>Kujihukumu</td>
</tr>
<tr>
<td>Grief</td>
<td>Chagrin</td>
<td>Huzuni</td>
</tr>
<tr>
<td>Undifferent</td>
<td>Indifférence</td>
<td>Kutojali</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Satisfaction</td>
<td>Kutosheka</td>
</tr>
<tr>
<td>Pride</td>
<td>Fierté</td>
<td>Kujisifu</td>
</tr>
<tr>
<td>Power</td>
<td>Puissance</td>
<td>Uwezo</td>
</tr>
<tr>
<td>Domination</td>
<td>Domination</td>
<td>Kugandamizwa</td>
</tr>
<tr>
<td>Meaness</td>
<td>Méchanceté</td>
<td>Ukali</td>
</tr>
<tr>
<td>Revenge</td>
<td>Vengeance</td>
<td>Kulipisha kisasi</td>
</tr>
<tr>
<td>Courage</td>
<td>Courage</td>
<td>juhudi</td>
</tr>
<tr>
<td>Joy</td>
<td>Joie</td>
<td>Furaha</td>
</tr>
<tr>
<td>Fun</td>
<td>Plaisir</td>
<td>Raha</td>
</tr>
<tr>
<td>Love</td>
<td>Amour</td>
<td>Upendo</td>
</tr>
<tr>
<td>Pride</td>
<td>Fierté</td>
<td>Kujiaminiya</td>
</tr>
<tr>
<td>Relief</td>
<td>Soulagement</td>
<td>Utlivu</td>
</tr>
<tr>
<td>Freedom</td>
<td>Liberte</td>
<td>Uhuru</td>
</tr>
<tr>
<td>Respect</td>
<td>Reconnaissance</td>
<td>Shukrani</td>
</tr>
</tbody>
</table>
Acknowledgments

The present manual (and also its French version) was prepared in collaboration with Emery Ntaneza, Jean de Dieu Kambale, and Ben Cigolo Ombeni (Swahili translation), your contributions are highly appreciated. In addition to the published book chapter on FORNET cited at the beginning of the manual (see Evidence), the description of the procedure of FORNET was modified on the basis of the internal NET manual compiled for Ugandan counselors by Anett Pfeiffer and Verena Ertl and selected parts were accustomed from the “intervention” section published later by Katharin Hermenau and colleagues. Many thanks also to Susanne Schaal for valued revisions as well as James Moran (English version) and Julie Jankovic (French version) for the language check.

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