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The Pitfalls and Potential of the Systematic Collection of Data on Child Soldier Recruitment

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ABSTRACT

The recruitment of children to be used as soldiers by conflict actors continues to be a regular occurrence globally and is associated with numerous negative effects. The debatable efficacy of current efforts to combat child recruitment gives rise to the idea that scholars and policymakers should cultivate preventive tools, including the development of early warning systems. However, such development has been hampered by the difficulties associated with collecting precise and systematic large-scale data. In this study, we discuss three important pitfalls related to data collection and provide several potentials for overcoming these challenges in the development of early warning alerts.

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Introduction

The recruitment and use of girls and boys in armed conflict is a grave violation of children's rights. It has devastating and long-lasting effects on children, their families, and their communities. Former child soldiers often suffer from mental and physical health problems, have difficulty establishing social relations, and receive less education, often influencing their future earning capabilities (e.g., Brett and McCallin 1998, Wessells 2006, Blattman and Annan 2010). In addition to the individual-level effects, child recruitment also has direct implications on the dynamics of conflict and the post-conflict environment, influencing the stability of the entire region. For instance, recent research has suggested that child soldier recruitment contributes to the endurance and recurrence of armed conflicts (Haer and Böhmelt 2016, 2017) and increased violence against civilians within armed conflicts (Mehrl 2021).

The vast majority of efforts to combat their recruitment by armed actors – governments and rebel groups alike – have focused primarily on the post-conflict setting and have done so through the provision of aid and relief. For instance, Disarmament, Demobilisation, and Reintegration (DDR) programs

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are regularly established after conflict to help former child soldiers reintegrate back into society while perpetrators of child recruitment are occasionally punished in national and international courts (e.g., Knight and Özerdem 2004, Rivard 2010, Drumbl 2012a, Liefländer 2012, Haer 2019, Wessells 2019). However, the persistent recruitment of children in armed conflicts raises serious concerns about the effectiveness of these measures.

The debatable efficacy of current efforts gives rise to the idea that scholars and policymakers should additionally focus on developing and implementing preventive tools, i.e., tools that allow them to intervene before children are recruited on a large scale, or at all. As noted, to the degree that these preventive resources exist, they function as deterrent threats such as accountability after conflict (i.e., Special Court for Sierra Leone and now the International Criminal Court), naming and shaming by United Nations, or threats of foreign aid restrictions through legislation such as the U.S. Child Soldier Prevention Act (e.g., Francis 2007, Drumbl 2012b, Carmody 2012). While these tools might influence and deter some would-be perpetrators, they offer little in terms of a tool for proactive intervention.

The basis of any preventive tool should be the development and implementation of early warning systems. These systems try to forecast or – at a minimum – detect the early escalation of negative social phenomena (e.g., Matveeva 2006, O'brien 2010, Chiba and Gleditsch 2017, Hegre *et al*. 2017, 2019). Currently, such systems are in place when it comes to the onset of armed conflict and/or anticipating natural disasters (e.g., Garcia and Fearnley 2012, Maxwell 2020, Hegre *et al*. 2021). Existing systems, however, pay little attention to how the recruitment of children might exacerbate existing crises, ultimately leading to violent conflict. More importantly, when it comes to forecasting the recruitment of children in the lead-up to or during armed (intrastate) conflict, these systems are at best underdeveloped, and at worst, non-existent.

One of the first steps in developing an early warning system is the collection of precise and systematic large-scale information on child soldier recruitment across actors, across locations, and over time. However, as with many other forms of human rights abuses, such information is quite difficult to systematically collect and at times, necessary information is simply not available. In this article, we identify three important interrelated pitfalls connected to this data collection process that requires attention and critical reflection to improve the prospects for effective early-warning systems for child soldier recruitment. We introduce these below.

First, due to difficulties with the definition of child soldiering, collecting systematic and comparative information on the characteristics of recruited children is hampered. Second, we currently lack fine-grained data on both temporal patterns and geographical locations where these children are recruited. Lastly, there might be significant biases in reporting on the perpetrators of child recruitment, which introduces an important bias in data

collection that needs to be considered and overcome in efforts to develop effective early warning systems.

In the sections that follow, we offer a review of current datasets on child soldiering before turning to a discussion of the 'pitfalls', where we provide several examples to demonstrate the difficulties for precise data. Following this discussion, we highlight several potential avenues for future research with recommendations on how researchers might overcome the difficulties in systematic data collection. We conclude this article with a tentative analysis of the establishment of early warning systems and the development of preventive tools.

Assessing Available Tools

Systematic data gathering on child recruitment by armed groups over time and across space has been notoriously difficult. As with most attempts to cultivate new datasets on issues related to human security and violent political events, efforts to accurately compile data on child soldiering have suffered from several issues. Early data collection efforts on child recruitment included work by Høiskar (2001) who developed a binary measure capturing whether any actor, state or non-state, used child soldiers in a given year. While this novel data included a delineation between the use of children under 15 years of age and those under 18 years of age, the coverage included only 45 countries between 1994 and 1998. Tynes (2011) and Tynes and Early (2015) followed a similar strategy, recording a dichotomous indicator on the use of child soldiers focusing on 198 government-rebel dyads between 1987–2007. However, unlike Høiskar (2001), their definitional criteria of a child soldier focused exclusively on the recruitment of those under the age of 15. Achvarina and Reich's (2006) study included a narrower geographic focus, examining child soldier recruitment across 59 intrastate conflicts in Africa between 1975–2002. Their work extended earlier efforts by introducing a measure for the ratio of child soldiers used in these civil conflicts. However, while providing a novel perspective by considering the scale of child recruitment in African civil wars, reliable reporting only allowed for estimations in 12 of the 59 conflicts. Beber and Blattman (2013) similarly developed a measure on the scale of child recruitment. In addition to their detailed within-group data on child soldiering within the Lord's Resistance Army (LRA), they collected data on the percentage of recruits under the age of 18 in a randomly selected set of 40 sub-Saharan African armed groups active between 1980 and 2004. Their investigation also included the first systematic attempt to code forced child recruitment across rebel groups.

These aforementioned studies established a crucial foundation for recent data collection efforts. Most notably is the work of Haer and Böhmelt (2016) who developed the Child Soldier Dataset (CSDS), at present the most expansive cross-national dataset on child soldiering.[1] The CSDS

covers more than 200 rebel groups in civil conflicts between 1989 and 2010. and was constructed by mining annual reports from the United Nations (UN), Human Rights Watch (HRW), Amnesty International, and a host of additional Intergovernmental Organizations (IGOs) and Non-governmental Organizations (NGOs), along with journalistic and academic resources in different languages. Through this process, the CSDS introduced two important measures related to child soldier recruitment. First, a binary measure identifying whether non-state armed groups recruited child soldiers during a specified conflict. Second, an ordinal measure that considered the scale of child recruitment within these conflicts per non-state actor. This dataset provides scholars and policymakers alike with a comparative tool that is geographically diverse and has been used in numerous academic studies and policy reports since its release (e.g., Bakaki and Hinkkainen 2016, Haer and Böhmelt 2017, Faulkner *et al*. 2019, Haer *et al*. 2020, Faulkner and Doctor 2021, Mehrl 2021). Several extensions to the CSDS have since followed. First, new data on the recruitment of girl soldiers in rebel organisations is included (Haer and Böhmelt 2018). Second, data has been collected on forced child recruitment and recruitment efforts by government actors during civil wars (Haer *et al*. 2020). And most recently, efforts are made to increase the temporal and spatial precision by coding the recruitment per state and non-state actor per year (Østby *et al*. Forthcoming).

In addition to the CSDS, several NGOs have also developed child soldiering databases that map patterns of child recruitment across countries, including data on states' status as they relate to various international conventions on child recruitment. Examples include World Vision's *Child Soldier Global Recruitment Index* and the Dallaire Institute's *Child Soldier World Index* (World Vision 2019, Dallaire Institute for Children, Peace & Security 2020).[2] The introduction of these novel tools has been crucial in identifying patterns of child soldiering. They have also enabled researchers to develop a 'typology' of rebel groups that are most prone to recruit child soldiers and identify general trends across conflicts. Such resources serve as important foundations for future data collection efforts. Yet, there are limitations within these existing datasets with several opportunities for refinement and expansion. Identifying the challenges for data collection can aid in assessing the most appropriate and effective means for improving data generating techniques and allows for the innovation necessary for the development of an effective early warning system.

Pitfalls

Early warning systems are designed to forecast negative social phenomena such as child soldier recruitment or, at minimum, to detect early escalation with the objective of alerting policymakers. Policymakers, in turn, can develop

and establish early response instruments to prevent its occurrence or escalation (Governance and Social Development Resource Centre 1996). Famous early warning systems include the Früh-Analyse von Spannungen und Tatsachenermittlung (FAST) from Swisspeace and the Integrated Conflict Early Warning System (ICEWS) supported by the Defense Advanced Research Projects Agency (DARPA) in the United States (O'brien 2010). Additional efforts include the Violence Early Warning System (ViEWS) at Uppsala University (Hegre *et al*. 2019), the US Holocaust Memorial Museum's mass atrocities early warning project (USHMM 2020), and One Earth Future Foundation's monthly forecasting system on coup activity known as CoupCast (OEF 2020). As O'brien (2010, p. 98), founder of ICEWS put it, these systems are 'fundamentally concerned with identifying those perhaps seemingly benign, policy-relevant factors that when combined with other factors, systematically precede crises in a probabilistic way'.

The key for early warning systems is to forecast accurately and precisely (O'brien 2010, p. 88). For such systems to be effective, comprehensive, and analytically based data on the phenomenon of interest need to be collected. Without such data, early warning mechanisms cannot function properly (Governance and Social Development Resource Centre 1996). In other words, early warning systems are only as good as the input data. Many of these forecasting programs rely on readily accessible data and/or event data, drawing from a range of sources including newspapers, regularly updated datasets, primary source materials, and so on. For instance, ICEWS draws from over 45 million news stories in English, Spanish, Portuguese, and Arabic dating back to January 1991. ICEWS aggregation strategy uses Dow Jones Factiva and Open Source Enterprise to generate its repository of these events. Similarly, the ViEWS project draws its event data from the Uppsala Conflict Data Program (UCDP), which also utilises the Dow Jones Factiva aggregator to identify instances of political violence based on its specified parameters. Although data on factors conducive to armed conflict is present across many of these large event repositories, data on child soldier recruitment suffers from some problems that are generally not present when collecting data on armed conflict.

In similar fashion to identifying other forms of political violence, data on child soldier recruitment during times of armed conflict also comes primarily from open-source materials including newspapers, reports of NGOs and IGOs, scholarly journals, books, etc. However, relying on these sources creates several problems, which might create difficulties for the establishment of an early warning system focused on the prevention of large-scale child recruitment.

Difficulties in Gathering Information on the Characteristics of Children

The basis of any collection of data on a specific phenomenon should be a clear, consistent, and commonly used definition of the phenomenon under

scrutiny. One important problem troubling data collection effort on the recruitment of children to be used as soldiers stems from inconsistency regarding the definition of child and childhood both over time and across countries. The United Nations Paris Principles (UNICEF 2007), for example, defines child soldiers as 'any person below 18 years of age who is, or who has been, recruited or used by an armed force or armed group in any capacity'. This definition sets a distinct age and is inclusive of all forms of child recruitment (i.e., forced or voluntary) regardless of whether children actively participate in combat. In short, this operational definition considers all children associated with armed groups including and not limited to those used as spies, messengers, cooks, or those exploited for sexual purposes.

Earlier protocols and conventions add a level of complexity to data gathering that must be reconciled. The Geneva Convention (1949), the Statue of the International Criminal Court (1998), and the Convention of the Rights of the Child (CRC) (1989), for example, have each emphasised the endpoint of childhood as it relates to one's participation in conflict as 15 years of age.[3] Moreover, the Optional Protocol to the Convention on the Rights of the Child on the Involvement of Children in Armed Conflict (OPAC) (2002), sought to increase the minimum age for participation in direct hostilities to 18 years of age.[4] This 'straight 18' policy is reflected in the recent datasets on child recruitment (e.g., Haer and Böhmelt 2016) though, as noted, some datasets retain the 15 or younger threshold (e.g., Tynes and Early 2015). For reporting purposes, this has led to difficulties in consistency and accuracy on who constitutes both a child and what constitutes a child soldier.

The debate concerning the age of recruitment is also mirrored in societal debates. For instance, many define the boundaries of childhood and adulthood in social terms rather than by chronological age (e.g., Rosen 2007, Abebe and Ofosu-Kusi 2016, Onapajo 2020). In Afghanistan, for example, a girl becomes an adult with her marriage and particularly after the birth of her first child, while a young man may not attain his social adulthood until he becomes the head of a family after the death of his father and assumes responsibility for relatives and households (De Berry *et al*. 2003, p. 6). Similarly, most traditional African societies do not use age as social criteria for distinguishing children from adults and instead rely on social status and initiation rituals to define age (McNee 2004, p. 25, Ndofirepi and Shumba 2014). This explains the refusal to accept a fixed age as the end of childhood across and within certain countries (Andvig 2006, Lee 2009, Quenivet and Shah-Davis 2013, Onapajo 2020).

The discussion on the endpoint of childhood has a significant influence on the systematic data collection on child soldier recruitment. For example, early reporting on child recruitment in armed conflict often used vague terminology when discussing child soldiering – frequently omitting any details on the specific age of the recruits. A Washington Post article in the late 1980s titled

'Children Khomeini's Cannon Fodder', for instance, notes that 'no one … knows how many teenagers and children Khomeini has pulled out of school to go to the front with Iraq … possibly hundreds of thousands' (Anderson and Van Atta 1988). Similar issues persist today. If a newspaper or an NGO report publishes an article on child soldiers, do they talk about children below the age of 15, below the age of 18, or do they talk about the more local definitions of childhood? Relying on the straight-18 approach circumvents this problem to a large extent. First, it does not require in-depth knowledge about childhood across many different societies around the world over time. Second and related, the straight-18 approach can combat against the exclusion of cases where the age of a child is disputed. Third, it allows for aggregating information from many different local and international sources rather than relying on one source with one type of definition. In other words, using this threshold gives us the best chance to identify child recruitment.

Besides the difficulties related to age, effective monitoring and forecasting require accurate data on the patterns of child recruitment across other characteristics. For instance, the roles children undertake within armed groups can be diverse so effective reporting must consider which cases proverbially 'count' as child soldiering. Some organisations, for example, may employ children to assist in the exploitation of lootable natural resources (e.g., Haer *et al*. 2020). Others employ them as spies, messengers, or for sexual purposes, in addition to using them as combatants (e.g., Martuscelli and Villa 2018). Importantly, researchers have shown that children can enhance organisational capacity regardless of the roles they undertake (e.g., Haer and Böhmelt 2016).

An additional important characteristic concerns the gender of child recruits. For instance, recent estimates suggest that upwards of 30 per cent of armed groups recruit and use girl soldiers (e.g., Haer and Böhmelt 2018). However, establishing the gender of the children is as difficult, if not more difficult, than the issues of uniformity with age. This in large part, is due to past reporting on child soldiers which either focused exclusively on boys or failed to distinguish children's gender. Tynes (2011), for example, specifically noted that girl soldiers fell outside of the scope of his investigation while Lasley and Thyne (2015) did not distinguish recruits' gender in their data collection efforts. There are several reasons for this lack of attention, including the widely held presumption that war is 'men's work' (e.g., McKay 2005, Park 2006, Denov 2010). Related is the often-held belief that those girls that are recruited into an armed group are primarily working in support functions or recruited for sexual purposes rather than being used as combatants. Consequently, they are often neglected in data collection efforts.

Recent inquiries, however, have established that a significant proportion of recruited girls serve as active combatants (Haer and Böhmelt 2018). The Shining Path in Peru, the Revolutionary Armed Forces of Colombia, and the Tamil Tigers

in Sri Lanka are just some of the groups that not only recruited girls but used them in direct hostilities (e.g., Mazurana and McKay 2001, Martuscelli and Villa 2018). This oversight is consequential for many reasons, including the tendency for DDR programs to overlook and/or ignore the experiences of girl soldiers (e.g., Fox 2004, Haer 2019). In short, there may be reporting issues in how child soldiering is covered by various outlets, and adopting a too narrow definition may overlook important instances of child recruitment. For early warning systems, this is especially problematic as there may be different motivations for rebel groups to recruit particular types of children.

While we identify several hurdles related to the definitions of what constitutes a child and/or child soldiers, we can observe some significant improvements in data collection efforts over the years. For one, reporting has become more uniform across sources and there is also more access to information on a wide range of conflicts. This includes more precision in the qualitative details on child recruitment where many of today's reports on child soldiers include at least a cursory discussion of the age of child soldiers, along with narratives of their experiences within armed groups. There is also more attention given to the issue of child recruits' gender, though much work remains. Annual reports from the UN Secretary-General (UNSG) on Children in Armed Conflict, for instance, include more specificity on particular instances of child usage during armed conflict. In its 2020 report on Myanmar, specific age brackets are listed for children recruited by the national army as well as details on the gender of those recruits (UNSG 2020). The provision of such information, if consistently denoted across countries, would significantly improve prospects for effective early warning systems. Indeed, recent data gathering efforts offer a useful template for how scholars might consider structuring future data collection procedures including looking at both the gender of child recruits as well as categorical indicators for whether they serve as combatants, in auxiliary roles, both, or neither (e.g., Haer and Böhmelt 2018).

Along these lines, international organisations that are explicitly devoted to child protection, such as the UN Office of the Special Representative of the Secretary-General for Children in Armed Conflict, have sought consistency and precision in their annual reports. Created in 1996 and issuing its first annual report on children in armed conflict in 2000, this Office has provided important detail on child recruitment patterns and practices in armed conflicts around the world. In addition, in 2005 with the adoption of resolution 1612, the UN Security Council (UNSC) established a Monitoring and Reporting Mechanism (MRM) which serves as an important resource for systematically gathering new and refined data (UN 2005). The MRM utilises in-country teams to monitor grave violations against children including their recruitment and use by armed groups. As a result, the annual reports produced by the UN contain more reliable details on child recruitment patterns and are not narrowly focused on only instances in which children are active

combatants.[5] Importantly, these annual reports use a standard definition of a child – below 18 years of age – and are specifically designed to monitor and report on incidents of child soldiering and other abuses against children. Reliance on one source is insufficient for an effective early warning system, however, the standardisation of reporting by the UN can then be applied to other watchdog groups including major organisations such as Human Rights Watch and Amnesty International.

Difficulties in Gathering Information on the Time and Space of Recruitment

To accurately forecast and establish an effective early warning system for child recruitment, we need to collect not only information on the characteristics of children but also need so-called 'hard data' on the location and time of child recruitment. Geographical and temporal information on such recruitment can help us to identify the dynamics leading to the practice and will greatly improve our forecasting abilities. For instance, knowing the timing of recruitment events will allow us to examine the action-reaction dynamics between actors. As Tynes and Early (2015) emphasise, child recruitment may in fact occur in response to the recruitment patterns of an adversary. However, our understanding of *when* child recruitment takes place during the conflict is very limited. The reliance on cross-sectional data on child soldiering leaves us with several competing assumptions about when armed groups will recruit children i.e., whether such recruitment is reactive or proactive. In addition, all current datasets cannot account for the pre-rebellion stage, making it difficult to identify if child recruitment happens before the onset of conflict. Knowing when an armed actor chooses to pursue child recruits can better inform us of when another actor may make a similar decision. At the same time, these recruitment decisions may simultaneously be a consequence of conflict dynamics such as a conflict's length or intensity. Thus, it is equally important to understand the dynamic nature of child recruitment as it unfolds over the course of hostilities. For example, the People's Protection Units in Syria claim that their recruitment of children, a practice they claimed was not a systematic policy, was a direct consequence of the nature of the conflict where extreme brutality by the Islamic State left the group with little option but to protect civilian populations, at times leading to the inclusion of children into their rank-and-file (HRW 2015a).

Likewise, spatial (geographic) data is also crucial as knowing where recruitment events take place is necessary for the effective monitoring and deployment of resources to thwart child recruitment. For instance, some groups may recruit from schools as seen in cases in Nepal while others may abduct children in remote villages as was the practice of the Lord's Resistance Army in Uganda (e.g., Becker 2010, Beber and Blattman 2013). Preferably, we need a very high

precision level of both space (geographical coordinates) and time of such events. Precise information can increase the probability that necessary preventive resources are deployed both in time and at the right locations.

One important problem troubling current effort in the collection of these high-precision data is the so-called selection problem (e.g., Earl *et al*. 2004, Weidmann 2015, 2016). This problem arises because only particular incidents show up in newspapers and policy reports. Their coverage is, among others, determined by supply-factors and demand-factors (for more information see Weidmann 2015, 2016). Supply-factors relate to the idea that the remoteness of an event might influence its coverage and the precision of the information. We have, for instance, much more detailed information about incidences of child recruitment that occurred closer to a town or closer to the location where NGOs and IGOs are present than about recruitment occurring in remote rural areas (Andvig 2006, Weidmann 2015). This is largely because such recruitment events are more likely to have direct observers or the reports of such incidents travel much quicker. Geographical location and the timing of the recruitment incidents can then also be easily verified. Achvarina and Reich (2006), for example, find that the degree of protection against military intrusion of the refugee camps in an area is an important predictor of child recruitment. While refugee camps can offer armed groups an accessible pool of child recruits, the events connected to the camps are generally more likely to be covered in reports and newspaper articles, making it easy to overstate or overestimate their empirical importance (Andvig 2006).

Related is the idea that reporting on human rights abuses has improved over time. As a consequence of access to more and better information as well as changes in the evolution of human rights, the qualitative details of reports such as the UN's or HRW's report on child soldiers have improved. This can generate an 'information paradox' where previously 'overlooked' violations of human rights are reported in more recent reports – leading to the false perception that such phenomenon has increased in prevalence" (Keck and Sikkink 1998, 194, Clark and Sikkink 2013, p. 542). This is almost certainly the case for data on child soldier recruitment. For example, a cursory look at the US State Department's 1977 Country Reports on Human Rights Practices, the second year such a report was published, does not mention child soldiers despite groups like the Revolutionary Armed Forces of Colombia (FARC), the Khmer Rouge in Cambodia, and the Moro National Liberation Front in the Philippines employed those under 18 in their insurgencies (US Department of State 1978, Mertha 2014, Jo 2015). Meanwhile, the same report in 2019 includes detailed information on armed groups' recruitment of child soldiers as well as links to the State Department's Trafficking in Persons Report which includes additional information on child soldiering practices by governments and non-state armed groups (US Department of State 2020).

Coverage is also determined by so-called demand-factors, i.e., the idea that small-scale events may not be sensational enough to be reported, thus never making it into the plethora of source material that researchers mine for information on events (Weidmann 2015, 2016). For instance, certain armed groups or events may garner a disproportionate amount of media attention. The Chibok schoolgirl kidnapping was prominently featured across many major media outlets, appearing on the front pages of international newspapers, articles, and reports (BBC 2020). During this horrendous event, 276 Nigerian schoolgirls were kidnapped by Boko Haram. Their abduction generated an international uproar and condemnation, manifesting in the form of a globalised campaign known as 'Bring Back Our Girls'. There are, however, many underreported cases of abduction by Boko Haram from both before and after the April 2014 kidnapping that did not reach the international headlines (Onapajo 2020). While having an abundance of data on specific armed actors is beneficial for developing a typology of child soldier perpetrators, researchers and policymakers must be cautious in not conflating their behaviour because of high-profile events, nor neglect the potential that other armed actors engage in similar practices.

Reporting biases also exist in other ways that make accurate data on the scale of child recruitment challenging. Perhaps the most well-known example was illustrated by investigative reporting on the 'zombie' claim that over 300,000 children are participating in active conflicts around the globe (Kessler 2016). While promoted as a UNICEF figure and circulated as part of a UNICEF fact sheet as recently as 2016, very little 'hard' evidence offered any support for this figure (Human Security Report 2005). Nonetheless, the 300,000-child soldier claim and ones like it, have been circulated in countless scholarly and journalistic publications over the years without verification.

Difficulties in Gathering Information on Those Recruiting Child Soldiers

Besides the lack of information on the characteristics of the child and issues in identifying the time and space of the recruitment, difficulties arise when collecting information about those armed groups or state forces that recruit children. To forecast recruitment, we must gather precise information on the actors involved and their past behaviour. Gathering information on the identity of those that recruit children, however, is difficult for a couple of reasons. Among others, it is difficult because of the so-called problem of the veracity of reporting (Earl *et al*. 2004, Weidmann 2015). This problem might be caused, for instance, by failing to accurately distinguish the perpetrators (e.g., Dulic 2010, Eck 2012) or the result of the political orientation of reporting sources that may either exaggerate or conceal such incidents (Davenport 2010). First, it is not always clear which armed actors recruit children and sources, may at times, either remain vague in identifying perpetrators, or even conflate the

recruitment of children across groups. This becomes all the more likely given the nature of conflict. For instance, not every armed group has recognisable uniforms, and some groups may steal and wear uniforms from the opposition for strategic purposes. Rebel groups in the Eastern DRC, for instance, have worn military uniforms as camouflage (Wambua-Soi 2020). In Nigeria, Boko Haram insurgents have disguised themselves as members of the national army during several attacks (Mantzikos 2014). Moreover, children sometimes simply do not know which group they joined or which group abducted them. It may also be the case that in instances where there is a high prevalence of child recruitment by all sides, the identification of perpetrators becomes quite difficult.

Second, even when there are clear indications about the identity of the group, some armed groups deny they recruit children, fearing the possible negative consequences attached to it. For instance, in Angola, the very existence of child soldiers was denied for a long time by both the government and the former opposition armed group Union for the Total Independence of Angola (Coalition to Stop the Use of Child Soldiers 2003). Also, the use and recruitment of children were denied by both the South Sudanese government and opposition leaders after they signed the peace agreement in August 2015 (HRW 2015b). Some groups, like the Islamic State, flaunt their recruitment of children (Bloom *et al*. 2015) while at other times, groups might exaggerate their involvement to boost their standing at the negotiation table. Third, reporting of incidents of child soldier recruitment might also be hampered by the political orientation of the sources. It is highly likely, for instance, that state-sponsored newspapers are less inclined to cover recruitment by government actors. This lack of transparency, or false signalling, renders some outlets less credible and can limit the number of sources accessible to researchers. This is especially challenging when researching past conflicts that were not covered in-depth by different news outlets.

Reporting biases aside, those studies that have collected information on which armed groups recruited children in particular years (e.g., Lasley and Thyne 2015, Haer and Böhmelt 2016, Østby *et al*. Forthcoming), often lack detailed information on group characteristics, which might be helpful to develop an effective early warning system. For instance, Østby *et al*. (Forthcoming), have estimated the risk of children being recruited based on the proximity of armed groups that are known to have recruited children. Although these efforts, increase our understanding of where recruitment might occur, it does not consider group characteristics. Ideology, group size, financial capacity, and popular support, might be crucial in motivating the armed group to recruit children (or not). This lack of information is partly due to the number of armed groups that are active in a particular conflict and the fact that these characteristics might significantly change over the years. While there may be very real trade-offs between obtaining precise data on the actors involved in child recruitment and spatial/temporal patterns of such recruitment, advancements in either direction would

substantively increase our understanding of child soldiering and the development of effective early warning systems.

Potentials

Identifying the challenges for data collection can aid in assessing the most appropriate and effective means for improving data generating techniques and allows for the innovation necessary for the development of an effective early warning system. Although the above-described challenges are seriously hampering for the development of an early warning system, there are several opportunities for ingenuity that can improve the prospects for the data aggregation necessary to forecast child recruitment. We highlight a few of them.

First, we need to ensure uniformity in operational definitions of child soldiering. As noted earlier, this is already happening to some degree but ensuring consistency will be crucial. For instance, while having specific data on the roles of children in armed groups might be a long-term goal for data collection efforts, of critical importance is ensuring that ongoing data collection efforts take a holistic approach in defining child soldiers – incorporating reporting on children used in direct hostilities as well as those used in more auxiliary roles. Data collection that discriminates on the specific roles of children at too granular a level might miss important cases of child recruitment. Indeed, children's experiences within armed groups is rarely uniform and/or linear – children often fulfill many roles within a group.

Second, another potential solution to counter some of the mentioned biases is to rely on Latent Variable Models (LVM). They enable scholars to estimate the associated uncertainty with the collected data by bringing together different sources of information and assess how well each piece of information works together. These models have been used over the years to estimate various important social phenomena that are of interest to conflict scholars, such as respect for human rights (Farris 2014, Schnakenberg and Fariss 2014), and conflict behaviour such as one-sided violence against civilians (Farris *et al*. 2020) and sexual violence (Krüger and Nordås 2020). Applying these models to child soldier recruitment will enable researchers to statistically account for limitations and biases in the underlying data-generating processes and potentially improve measurement accuracy.

However, while these models mitigate uncertainty in the observed data, they are not designed to quantify the number of violent practices that are entirely omitted from reports (i.e., unobserved child soldier recruitment events). One important way to counter the problem of unobserved child soldier recruitment events is to rely on and integrate different sources of information. For instance, one can rely on more local sources of information. Local newspapers and local social media outlets might report more often, and more accurately, on incidents of child recruitment in areas that are not covered by international

media companies. To be able to get access to these resources, it is essential to collaborate with local researchers that have access to local sources of social media, speak local languages, and can perhaps even access areas that are not accessible or monitored by international observers.[6]

Additionally, one can use more information provided by non-media sources. For instance, Dietrich and Eck (2020) recently showed that media sources severely underreport events in African states, and they suggest how engagement with non-media sources, such as interviews or reporting from local human rights organisations can significantly improve the prospects of gaining a more accurate picture of various social phenomenon. For example, testimonies from former combatants (children and those that recruited them) might provide information on many more recruitment incidents that are not covered by other outlets. However, this method of data collection is subjected to some important methodological and ethical challenges (e.g., Cameron 2005, Haer and Becher 2012).

Researchers might also find value in the use of new technology including the use of social media. Across the social sciences, a digital and computing revolution is well underway, where algorithms make use of an abundance and growing amount of data, text, images, sound bites, and video to identify and analyse patterns of social phenomenon. As Park *et al*. (2020, p. 909) note, 'the influence of social media, satellite imagery, internet adoption, and smartphones has changed the density of available information'. With these changes come unique opportunities for innovative approaches to gathering data on child soldier recruitment including the prospects of verification of events in real-time. It is equally important that researchers are mindful of the issue that more data does not simultaneously mean better data and important quality control checks are necessary.

A good example of such an application is the Kivu Security Tracker,[7] which maps violence by state security forces and armed groups in the eastern Democratic Republic of Congo (DRC). Although not specifically focused on child soldier recruitment, the instrument makes use of a network of researchers based throughout Eastern Congo to provide timely information on violence. A similar setup is used by the Crisis Tracker[8] which reports armed group activity and conflict-related incidents in the remote regions of the Central African Republic, and the DRC. Of course, not all conflict zones will have sufficient internet coverage, and social media is ripe with misinformation, so researchers must consider the most effective ways to filter through large amounts of data and be cautious about the information generated. Still, as technology continues to expand and improve, there are prospects for unique opportunities that can contribute to an effective early warning system.

Integration and the triangulation of these methodological strategies (i.e., the merging of new technological approaches along with global data collecting efforts and fieldwork-based methods) are admittedly difficult. Researchers

might then also benefit from adapting these tactics in single or select country-level studies as a first step; reflecting the efforts of earlier scholarship (e.g., Beber and Blattman 2013, Vargas and Restrepo-Jaramillo 2016). Moreover, certain triangulation techniques might be more appropriate than others (see Kern 2018, for an overview). Triangulating information is, however, a worthwhile starting point, even if difficult given the payoffs in preventing child recruitment.

Conclusion

Child soldier recruitment by state and non-state actors is a human rights abuse with devastating effects for the children, and their communities (e.g., Blattman and Annan 2010, Betancourt *et al*. 2010, Crombach *et al*. 2013, Haer and Böhmelt 2016). Child recruitment also dramatically impacts the characteristics of conflicts, increasing conflict duration and likelihood of recurrence (Haer and Böhmelt 2016, 2017). The recruitment of children has also been associated with an increased level of violence against civilians, including patterns of conflict-related sexual violence (Mehrl 2021, Faulkner and Welsh 2022). The result is a critical need for the academic and policy community to include information on child recruitment in existing early warning systems and to develop new early warning systems that can alert the national and international community when there is an increased likelihood of child recruitment. Doing so has the potential to not only counter child recruitment before it starts but can also enhance our understanding and ability to forecast a variety of conflict dynamics.

To develop such a system, we need precise, comprehensive, and systematic data on current practices of child soldier recruitment, historical patterns of such recruitment, and specific attention on the characteristics of child recruits, the location and timing of their recruitment, and the perpetrators. Current efforts of data collection rely heavily on secondary sources and while these suffer from three major problems, there are strategies that with time, innovation, and investment, can be addressed. First, problems occur with identifying the children that are recruited and their characteristics. This, as we note, is partly due to definitional problems and the simple fact that age, roles, and gender are not always reported in secondary reports. However, existing datasets on child soldier recruitment have relied exclusively on hand coders which limits the number of materials that can be searched and scrutinised. Data mining and machine learning offer opportunities to not only comb more materials to identify trends and patterns but also cover more armed groups. While issues related to unreported age and gender will persist, these strategies provide an opportunity to develop more, and potentially more precise, data in route to early warning systems. Second, and related to the reporting issues above, geographical and temporal information on recruitment incidents is not always reported nor are available reports always reliable. As we

stress, those events occurring in the periphery of a country are often not covered in newspapers or reports of international organisations. Instead, spatial data is often deciphered post-hoc via interviews with former child soldiers or family members. At times, this may be years after the event. Still, there are creative ways that researchers can tap into the strategies of existing data-gathering efforts to increase the chances of developing more refined data on child recruitment. This includes engagement with more localised sources and interviews with victims, perpetrators, and witnesses. While it may be rare that a local source reports on the recruitment of children in the same ways that they may report on a lethal attack on a local community, this model can complement additional data collection strategies. Third, there are also problems with gathering reliable information on the characteristics of the perpetrator. Not only is it not always readily apparent which group is responsible for child recruitment, but certain groups also have the incentive to deny their complicity, while others may see value in promoting/exaggerating their involvement. These barriers will remain a fixture in data gathering efforts. Critical appraisal of accessible data and consultation with subject matter experts can help parse through misinformation and disinformation. However, as with all data collection, some missingness is to be expected and imperfections are always a potential. Such hurdles should not deter researchers, particularly given the ability to leverage new technologies and tap into social media and various messaging applications for event identification and verification. Most of all, paralysis in the pursuit of perfect information should be avoided. Even if we improve only slightly the degree of confidence in knowing where and when armed groups might strike, such data can lead to more effective and successful interventions.

While data compilation and analysis are necessary for effective forecasting, it means little if a rapid and effective response is unavailable or under-resourced. It is therefore crucial that as researchers continue to contend with the issues and problems related to the systemic collection of data on recruitment so too should policymakers work to establish specific response plans and tools that can be quickly implemented once an early warning is given. This can include efforts to educate local populations about threats of child soldier recruitment as well as attempts to negotiate with armed groups to convince them to refrain from engaging in the practice. Such strategies should work in unison with the deployment of physical protection of vulnerable communities.

Notes

1. The foundation of the CSDS is the Non-State Actor (NSA) dataset by Cunningham et al. (2009, 2013). The NSA provides detailed information on the characteristics of rebel organisations such as estimates on group size, fighting capacity, the presence of foreign support, and so on.

2. The Child Soldier World Index was originally developed by Child Soldiers International (CSI) and is now being maintained by the Dallaire Institute following the closure of CSI in 2019 June.
3. For more info see: https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule136.
4. It is worth noting that language of OPAC speaks directly to the compulsory (forced) recruitment of children into state militaries. Voluntary recruitment of those under 18, but over 15 is still permissible under OPAC guidelines (though parties are expected to refrain from sending those under the age of 18 into direct combat). However, while these distinctions exist for government recruitment there is no such distinction for child recruitment by non-state armed groups. The language of OPAC fully prohibits the recruitment of those under 18, voluntary or otherwise, by non-state actors.
5. It is important to acknowledge the potential for political biases in such reports. For instance, the Eminent Persons Group's most recent report, examining the UN Secretary-General's annual reports from 2010–2020, highlights biases where the Secretary-General has failed to list some parties in the annual report even when clear violations against child recruitment are evident (e.g., the delisting of the Tatmadaw Kyi in 2020 despite their continued usage of children as human shields as recently as October 2020) (Eminent Persons Group 2021, p. 26).
6. At the same time, it is vitally important that researchers consider the ethical risks associated with this approach to ensure that local sources' safety and well-being are not jeopardised.
7. https://kivusecurity.org/.
8. https://crisistracker.org/.

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