

The Economic Impact of Psychological Distress on Former Child Soldiers

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Abstract—While previous research demonstrates a significant negative relationship between post-traumatic stress disorder and earnings among adult veterans in the United States, a similar connection for children in developing nations has not been established. The literature indicates that both endogeneity and sample-selection biases are inherent in this relationship. This paper used ordinary least squares, two-stage least squares, Heckman selection, and instrumental variable Heckman selection models to progressively control for these biases, and is the first statistical analysis to explore the impact of psychological distress on the income and employment status of former child soldiers. Violence witnessed and feelings of helplessness during abduction were used as instruments for distress. The results indicate that distress significantly diminishes income but has no significant effect on employment status. This study helps to bridge the gap between psychological and economic research on former child soldiers by demonstrating that interventions focused on mental health that reduce psychological distress can positively impact income as well.

I. INTRODUCTION

Forty percent of the world's armed organizations employ child soldiers, counting a staggering 800,000 children among their ranks. While the majority of youth combatants are involved with groups not currently engaged in warfare, an estimated 300,000 children were active in over thirty conflicts across the globe (Kaplan 2005). Many international organizations, including UNICEF, USAID, and the Red Cross, aim to reduce these numbers through disarmament, demobilization, and reintegration (DDR) programs. DDR programs attempt to reintegrate former combatants by minimizing the impact of soldiering on their physical and mental health, as well as fostering economic and social inclusion (United Nations Disarmament, Demobilization, and Reintegration 2010). With millions of former child soldiers across the globe, this work is particularly important due to the long-term political, economic, and security consequences of failing to successfully reintegrate these young ex-combatants into society — which could lead to continued conflict, economic depression, and reductions in productivity for entire generations (Blattman & Annan 2010).

While aid organizations have been effective at treating psychological and physical trauma among former child soldiers, they have been comparatively ineffective at improving economic opportunity and social capital among recipients of reintegration assistance (T. Betancourt 2005; Humphreys & Weinstein 2007; Kaufmann 2016). This may occur because, while much is understood about the physical and psychological consequences of child soldiering, there is a dearth of

literature — and an even greater paucity of data — exploring the economic impact of war on children. Scholars have examined the effects of post-traumatic stress disorder (PTSD) on post-conflict employment and earnings for adult veterans in the United States, which has supplemented knowledge about the economic impact of war on participants and may be instructive in this case (Smith, Schnurr, & Rosenheck 2005; Vogt et al. 2017). This article aims to bridge the gap between the psychological and economic literature on war-affected youth by examining the effect conflict-related psychological distress has on the income and employment status of former child soldiers.

The data for this analysis comes from the Survey for War-Affected Youth (SWAY) Phase One, a survey including 462 male former child soldiers in Northern Uganda, which was conducted in 2006 (Blattman & Annan 2010). SWAY is a particularly compelling data source due to the tragic quasi-natural experiment created by the indiscriminate abduction practices of Joseph Kony's Lords Resistance Army. The major limitation of SWAY in its application to this question is that roughly 35% of respondents earned no income, introducing sample-selection bias into the models. Additionally, a wealth of literature suggests two-way causality between the explanatory and dependent variables. To control for these sources of bias, four models were constructed — an ordinary least squares regression, a two-stage least squares regression, a Heckman selection model, and an instrumental variable Heckman selection model — which indicate a negative relationship between psychological distress and income at the 90%, 95%, 99%, and 95% confidence level, respectively.

While psychological distress did have a significant negative effect on income for employed former child soldiers in the models, it did not affect the likelihood of employment in the first stage of either Heckman model. This finding adds to the literature on the impact of war on conflict participants, particularly in developing regions, and may be instructive to aid organizations seeking to successfully reintegrate children into society. This paper demonstrates how certain services — such as mental health counseling — can improve the welfare of the child in multiple domains, highlighting the importance of treating the symptoms of psychological trauma.

II. LITERATURE REVIEW

A. *Children in Conflict*

Tragically, hundreds of thousands of children are affiliated with over 85 different armed groups — including

governments — in dozens of countries across the globe (Theresa Stichick Betancourt et al. 2010). The term child soldier does not exclusively refer to those directly engaged in combat, but also includes porters, cooks, spies, and children in sexual slavery, according to the Paris Principles (UNICEF 2007). In northern Uganda, an astounding 46% of all male youth may have been abducted (Annan, Blattman, Mazurana, & Carlson 2011), though exact estimates are difficult to derive. Disturbingly, many organizations have recruited youth voluntarily. The Islamic State of Iraq and the Levant (ISIL) frequently recruited children from religious schools, orphanages, and willing parents. Dubbed the Cubs of the Caliphate, ISIL uses these children to commit gruesome terror attacks, including suicide bombings (Anderson 2016). The majority of child soldiers are under fifteen, with an average age of twelve. The youngest known child soldier was documented in Uganda at just five years of age (Singer 2006).

Though there are millions of former child soldiers estimated to be in the world today, little is known about the consequences of child soldiering. One landmark study, conducted by Blattman and Annan (2010), demonstrates that the greatest consequence of child soldiering is a reduction in human capital due to time removed from the labor market and educational system. Other studies have documented social stigma, including rejection by families and communities, who, in some contexts, believe socializing with the former child soldier may contaminate other children (Tonheim 2014). And while several studies have found former child soldiers experienced discrimination or stigma upon returning to their communities — including 73% of former child soldiers in Sierra Leone — there is virtually no stigma against former child soldiers in Uganda due to the disturbingly common abductions that took place in the northern region (Annan, Brier, & Aryemo 2009; T. S. Betancourt, Agnew-Blais, Gilman, Williams, & Ellis 2010).

Female former child soldiers, representing an estimated 24% of the total population (Spitzer & Twikirize 2013), face particular challenges to reintegration. Many are considered no longer qualified to be wives, rendering them destitute. Those who become pregnant during their experience face extreme discrimination, directed at both them and their children (Tonheim 2014). Female child soldiers also suffer up to twice as much psychological distress as their male counterparts as a result of their ordeal. While an astounding 26% of all female youth were estimated to have been abducted in northern Uganda, this paper unfortunately cannot examine the effects of psychological distress on economic opportunity among female child soldiers. Studies in northern Uganda show no impact of child soldiering on female employment or earnings due to an utter lack of economic opportunity for women in the labor market (Annan et al. 2011).

Disarmament, Demobilization, and Reintegration (DDR) programs aim to both reduce the number of children in armed conflict as well as facilitate their reintegration into society. Studies demonstrate that DDR is effective at improving mental and physical health outcomes for former child soldiers

(T. Betancourt 2005). However, some scholars have called into question the use of psychotherapy, noting that it may be culturally inappropriate (Machel 2001). Rather, they suggest promoting community participation and acceptance, which has been shown to decrease psychological distress.

Humphreys and Weinstein (2007) found that DDR did not improve economic outcomes for adult ex-combatants. Kaufmann (2016) extended this finding to children and noted that societal interventions, such as the education of women and the promotion of traditional cleansing ceremonies, were more effective than individually-focused aid. Other studies similarly suggest the effectiveness of societal interventions, including widespread community desensitization efforts that increased social acceptance in Sierra Leone (Shepler 2014). More recent interventions, including microfinance loans and vocational training, have shown promise at increasing economic opportunity for former child soldiers. However, some failures should temper optimism, as widespread vocational training for hundreds of child soldiers in a single profession can result in an oversaturated market, depressing wages for all.

These failures highlight the importance of research to understand both the consequences of child soldiering and the effectiveness of specific interventions. This paper bridges the gap between economic and psychosocial literature on the effects of conflict on youth participants. Armed with a more complete appreciation of the economic externalities of the psychosocial consequences of war, policy makers will be better able to construct well-informed interventions that improve reintegration outcomes.

B. Income, Employment, and Mental Health

While no studies have examined the relationship between socioeconomic status and mental health in high-conflict regions, a wealth of literature indicates the increased prevalence of psychiatric disorders and psychological distress among impoverished individuals in the United States compared to their wealthier peers. One scholar even asserts that the negative relationship between socioeconomic position and psychological distress is one of the most firmly established associations in epidemiology (R.C. Kessler 1982), highlighting the potential for endogeneity in this study. Langner and Michael (1963) were the first to demonstrate this relationship. Over the last fifty years, numerous studies have supported this finding, which has been replicated using many alternate metrics for income and psychological distress.

McMillan, Enns, Asmundson, and Sareen (2010) explored the relationship between income quartiles and psychological distress, suicidal ideation, mood and anxiety disorders, and substance abuse using data from the early 2000s. Those in the lower quartiles of income experienced a significant increase in suicidal ideation, suicide attempts, anxiety disorders, substance abuse, and psychological distress, based on the Kessler Psychological Distress Scale K10 (R. C. Kessler et al. 2002). Gresenz, Sturm, and Tang (2001), by contrast, utilized the Mental Health Inventory-5 and the Composite International Diagnostic Interview from the 1990s Healthcare

for Communities survey, which measured psychological distress and probability of psychiatric conditions in the subjects. The study showed a clear and consistent relationship between family income quintile and distress and anxiety or depressive disorders. R.C. Kessler (1982) performed sixteen replications using eight different measurements of psychological distress and came to the same conclusion, additionally finding that income was the strongest determinant of psychological distress among employed males. Jarvis (1971) even found evidence for this relationship dating back to 1855; Massachusetts records indicated that the pauper class was 64 times more likely to be insane than the wealthy.

The literature shows that the negative association between income and psychological distress is consistent across a multitude of time periods and operationalizations, providing robust support for the theory. One explanation for this relationship is that the stress of being impoverished and the associated disadvantages — including crime victimization, illness, and death of children — increases psychological distress. Poverty can also render fulfilling social roles difficult, limit social capital, and otherwise erode social support networks, thereby decreasing psychological resilience (Belle 1990).

The presence of this relationship has substantial implications for this paper. The literature, however, is limited in its application to this context. No study could be found which replicated these findings among developing or conflict-laden regions. Additionally, the literature focuses on common mental health conditions or general psychological distress rather than the extreme forms of psychological trauma present among former child soldiers, which are more likely due to abduction-related experiences than poverty. Several studies have suggested an alternative theory for the relationship between income and distress, focusing on selection: an argument that individuals who are less emotionally or psychologically resilient are more likely to drift towards lower socioeconomic status and less likely to rise out of poverty (R.C. Kessler 1982). This claim provides support for the direction of the association posited in this paper. All the literature found utilized cross-sectional datasets; none used time-series or instrumental variable approaches which would refute this theory.

The negative association between income and distress may also be inapplicable due to the close to uniformly low income levels of northern Uganda, where the data for this study was collected. The abject poverty of the region may nullify the differential impact of socioeconomic status, as virtually no individuals can be labeled high-income — which constituted the control group in the aforementioned studies. However, Gresenz et al. (2001) found no difference in the impact of income on distress between states in America, regardless of average income or income inequality. Additionally, Barnett, Marshall, Raudenbush, and Brennan (1993) found substantially similar effects of income on distress on male and female partners, dispelling the theory that the discourse — which often focuses exclusively on women — does not apply to men. While the above arguments highlight the limitations

of previous studies, they do little to refute the robust association demonstrated by the literature. It is therefore reasonable to assume the relationship explored in this paper is inherently endogenous, highlighting the importance of controlling for two-way causality between the explanatory and dependent variables using an instrumental variable approach.

C. Veterans and PTSD

While this paper is the first statistical analysis of the impact of psychological distress on income and employment status for former child soldiers, other studies have examined the same relationship in the United States for veterans of the Vietnam and Iraq wars. Although the literature is somewhat conflicted and limited in its ability to generalize to the context studied in this article, it is useful to examine as a related case.

Though scholars have long explored the effects of a variety of mood disorders on occupational function and income, Zatzick et al. (1997) was the first to examine this association for PTSD. The authors utilized the Mississippi Scale for Combat-Related Post-Traumatic Stress Disorder (Keane, Caddell, & Taylor 1988) to diagnose subjects with PTSD in a nationally representative sample of male Vietnam veterans. The results indicated that psychological distress significantly reduces the probability of employment and increase functional impairment, though the study did not explore effects on income. Savoca and Rosenheck (2000) confirmed and extended this conclusion by demonstrating a 50% reduction in the probability of employment with a lifetime diagnosis of PTSD, as well as a decrease in hourly wages based on a diagnosis of PTSD and major depression — which are often comorbid — of 16% and 45%, respectively.

Smith et al. (2005) identified a significant correlation between distress and the probability of employment, but no relationship with earnings: a finding consistent across three different metrics of distress. However, their sample size was small, consisting of only sixty full-time workers. Nonetheless, McCarren et al. (1995) found that in a study of monozygotic twins involved in the Vietnam war, PTSD affected only employment probability and not education, income, or occupational status. Vogt et al. (2017) further complicates the discourse by finding that while PTSD negatively impacts the probability of working for female veterans, it had no effect on males, which conflicts with prior research. This study additionally indicated that PTSD negatively impacts occupational functioning among both male and female veterans, a result which may imply lower productivity levels.

This theory is supported by Schult (2011), who found that PTSD had no impact on employment probability but was significantly negatively associated with reported occupational functioning among a sample of National Guard and Reserve veterans who were deployed to Iraq, nearly all of which were male. Similarly, Adler et al. (2011) demonstrated that PTSD and psychiatric conditions significantly increased work-related impairments and decreased productivity. These findings support the theory that PTSD negatively affects

income through the mediating effect of a reduction in productivity.

While this literature does bolster the posited relationship between psychological distress and economic outcomes, it may not be applicable to the context of this study. United States veterans and Ugandan former child soldiers have obvious differences, both in their conflict experiences and in the labor markets they seek to enter. None of the literature used an instrumental variables approach to the problem, failing to account for the potential for endogeneity supported by previous research. Additionally, Smith et al. (2005) indicated that one explanation for the effects of distress on employment probability was that American veterans who experienced increased symptoms of PTSD — and therefore a higher disability rating — could receive progressively more financial assistance from the Department of Veterans Affairs, and that their disability rating may be reduced if they choose to work full- or part-time. The authors found that higher disability ratings significantly reduced the probability of employment at the 99.9% confidence level, illustrating the strength of this relationship. As Ugandan former child soldiers receive no such assistance, it is possible that psychological distress will have no impact on employment status.

III. DATA

The data used for this research is from the Survey for War-Affected Youth Phase One (SWAY)¹, a simple random sample of 741 males between 2005 and 2006. The survey was conducted primarily in two districts in Northern Uganda, Kitgum and Pader, which were heavily affected by the conflict between Joseph Kony's Lords Resistance Army (LRA) and the Ugandan government that devastated the region for decades. Among the respondents were 462 former child soldiers, who represent the sample for this study.

SWAY is a cross-sectional dataset constructed through the random selection and tracing of numerous abducted and non-abducted children, and is compelling due to extensive interviews with the subjects, as well as the nature of the conflict with the LRA. The gruesome tactics of the LRA rendered recruitment impossible, so the group abducted approximately 60,000 children during the war. Due to the lack of volunteers and the LRAs arbitrary abduction practices, child soldiers in Northern Uganda represent a tragic quasi-natural experiment, in which there are no significant differences between abductees and their peers other than year of birth (Blattman & Annan, 2010).

Of the 462 former child soldiers surveyed in this study, 169 — or 36.6% — earned no income. It is highly unlikely that the decision to work is random, and so the models are probably biased by individuals non-randomly selecting out of the sample population. New models must thus be constructed to control for this expected bias.

¹Survey conducted by Chris Blattman and Jeannie Annan (Blattman & Annan, 2010)

A. Variables

In this study, psychological distress was operationalized as an additive index of 15 indicators of traumatic stress, scaled for intensity. Employment status was indicated by a lack of earnings, and income was defined as earnings per month in Ugandan Shillings. While hourly wages would have been preferable, most respondents do not work on an hourly wage system, and are paid through selling products they produce or by the day. A logarithmic transformation of income was performed to make interpretation more meaningful.

This article proposes two instrumental variables to control for the endogeneity likely present in the models, as described by the literature review. The first instrument is violence witnessed during the abduction, defined as an additive index of six violent acts the respondents may have witnessed while involved with the LRA. The second instrument was a binary variable indicating if, during abduction, the child soldier ever felt their experiences were a result of a lack of courage or strength on their part. In effect, this variable measures self-blame and feelings of helplessness during the abduction. While these variables are clearly linked to psychological distress, as they are a root cause of trauma, they are unlinked to current employment status or income. Because the only reasonable avenue through which these variables would affect income or employment status is through the development of psychological distress, these instruments were selected for use in this study.

IV. EMPIRICAL MODELS

To analyze this data, four models were constructed. ² first model, an ordinary least squares regression, was constructed using only the uncensored, or nonzero, observations of a logarithm of earnings per month in Ugandan Shillings, which was used as the dependent variable. The independent variables in this model include psychological distress, years of education, age, and a binary variable indicating if the individual is employed by the military.

$$\log(EPM) = \beta_0 + \beta_1 DISTRESS + \beta_2 EDUC + \beta_3 AGE + \beta_4 MILITARY \quad (1)$$

Of the independent variables, only distress is expected to be negatively associated with income; all others are expected to be positively correlated. However, the coefficients in the model are likely to be biased due to the reasons enumerated in the literature review and data sections of this paper. For that reason, additional models were formed to minimize the influence of these biases.

The second model constructed was a two-stage least squares regression (2SLS). In the first stage of this model, violence witnessed and feelings of helplessness during abduction, along with education, age, and military-based employment, were used to predict psychological distress. These predictions were then substituted for the observed values

²All models in this paper additionally utilize Huber-White standard errors or gmm methods to correct for heteroskedasticity

of distress in the 2SLS second stage, which is identical from the first model apart from this substitution, to compute the impact of psychological distress on income without the potential for two-way causality.

$$\begin{aligned} DISTRESS = & \gamma_0 + \gamma_1 WITNESS + \gamma_2 EDUC \\ & + \gamma_3 AGE + \gamma_4 MILITARY + \\ & + \gamma_5 SELFBLAME \end{aligned} \quad (2.1)$$

$$\begin{aligned} \log(EPM) = & \beta_0 + \beta_1 DISTRESS + \beta_2 EDUC \\ & + \beta_3 AGE + \beta_4 MILITARY \end{aligned} \quad (2.2)$$

However, the nonrandom selection out of the labor market — and therefore out of the sample — presents additional concerns, since these censored observations are not represented in the previous models. Heckman (1976, 1979) described a two-step model designed to counteract this bias. In the first stage, a probit model is used to predict the probability of employment. Explanatory variables in this stage included psychological distress, education², age, age², and marital status. The predictions of employment status are used to form the inverse Mills ratio (IMR)³, which is then added to the second stage, an OLS regression, as an explanatory variable. The second stage is identical to the first model, except it includes the IMR as an additional explanatory variable, where the coefficient of the IMR will demonstrate sample-selection bias is present if it is significantly different from zero. The use of the two-step Heckman procedure should correct for the sample-selection bias expected to be present in the previous models.

$$Prob(EMP = 1|Z) = \Phi(Z\gamma) \quad (3.1)$$

$$\begin{aligned} \log(EPM) = & \beta_0 + \beta_1 DISTRESS + \beta_2 EDUC \\ & + \beta_3 AGE + \beta_4 MILITARY \\ & + \beta_5 IMR \end{aligned} \quad (3.2)$$

However, because both reverse causality and sample-selection are likely to be present in the sample, these models may still be inconsistent, as they do not account for both sources of bias simultaneously. For this reason, an instrumental variable Heckman selection model was constructed, a procedure described by Wooldridge (2010). In the first stage, a probit model is formed, where the instrumented variable (distress) is replaced with the instrumental variables (violence witnessed and feelings of helplessness during abduction). The IMR is calculated from this model. The second stage mirrors the first stage of 2SLS but includes the IMR as an explanatory variable. In the third stage, observed psychological distress is replaced with the predicted values and the IMR is included as an additional explanatory variable, and an endogeneity chi-square test — which is numerically equivalent to the Wu-Hausman test but robust

under heteroskedasticity (Hayashi, 2000) — can be used to confirm the presence of endogeneity. However, because of the high multicollinearity of the instrumental variables and the absence of the explanatory variable in the probit model, the first stage is uninterpretable. The interpreted first stage is therefore constructed as an instrumental variable probit model, which mimics 2SLS by predicting values for distress using the instruments, and then replacing the observed values with these predicted values in the probit model, which can be evaluated for effect. The use of the instrumental variable Heckman procedure should remove both endogeneity and sample-selection bias from the results.

V. ANALYSIS

A. Comparative Statistics

In order to understand the variables and their division based on employment status, Table 1 sets out descriptive statistics and descriptions of all variables used in this study. According to the World Bank (World Development Indicators: PPP Conversion Factor, GDP, 2006), US\$ 512.18 was equivalent to \$1 (USD) at the time of this survey. The average respondent earned US\$ 17,200.54 per month, which can purchase the equivalent of \$33.58, placing the population well below the poverty line. Employed respondents earned an average of US\$ 27,121.67, equivalent to \$52.95. Only 58 respondents earned more than the World Bank international poverty line of \$1.90 per day, representing a mere 19.8% of those employed and 12.6% of total respondents, illustrating the deep poverty of the region.

Similarly, there is a dearth of education among the population. Nearly half (48.7%) of respondents did not complete primary school, the end of traditional schooling in Uganda. Just 30.7% of the sample attended secondary school, and 80.9% of those individuals dropped out before completing all four years, staying an average of just over two. Together, these metrics serve to demonstrate the impact of conflict on traditional economic measures of individual wellbeing, and highlight the importance of research and well-informed interventions in these regions.

B. Results

The results of the analysis can be found in Table 2, where the probit and instrumental variable probit results of the Heckman models are reported under selection. In the first model, an ordinary least squares regression, there is a negative relationship between distress and income ($p = 0.053$). This model, however, is likely to be biased due to endogeneity and sample-selection, necessitating further analysis.

In the second model, a two-stage least squares regression, there is a significant negative relationship between psychological distress and income ($p = 0.033$). A Kleibergen-Paap under-identification test and the Hansen J-statistic reveal that the instruments are not underidentified and do not violate overidentification restrictions. The Cragg-Donald F-statistic for the first stage was 13.565, above the threshold for relevance suggested by Staiger and Stock (1994). These

³The IMR was calculated using STATA: <https://www.stata.com/support/faqs/statistics/mills-ratio/>

tests indicate the instruments were both strong and relevant. However, the endogeneity chi-square test reports a p-value of 0.105, which does not permit a conclusion that endogeneity is present.

In the third model, a Heckman selection model, no relationship was observed between psychological distress and employment status in the first stage. While education and education² were not individually significant in the model, an F-test indicates they are jointly significant. In the second stage of the model, psychological distress significantly diminishes income ($p = 0.009$), but this result is potentially confounded by two-way causality between explanatory and dependent variable. Additionally, the inverse Mills ratio (IMR) was significant ($p = 0.018$), permitting a conclusion that sample-selection bias is present, and that the Heckman model more accurately describes the trends in the data.

In the fourth model, an instrumental variable Heckman selection model, very similar results were produced between the instrumental variable probit and the first stage of the third model. Once again, psychological distress did not significantly affect employment status, and education and education² were jointly significant. In the final stage, there is a significant negative relationship between psychological distress and income ($p = 0.021$). A significant coefficient of the IMR ($p = 0.019$) indicates sample-selection bias. While age was no longer significant in this model ($p = 0.159$), this may be due to the dominance of low-skill and unskilled labor in the population, whose income would not significantly grow with experience. Like the 2SLS model, a Kleibergen-Paap underidentification test and the Hansen J-statistic reveal that the instruments are not underidentified and the overidentification restriction is not violated, and an F-statistic of 11.932 is still above the threshold for relevance. In this model, however, the endogeneity chi-square test reveals a p-value of 0.0789, which indicates endogeneity is present at a 90% confidence level.

C. Discussion

The first stages of the Heckman models show that distress has no significant effect on employment status, which conflicts with the findings of McCarren et al. (1995), Zatzick et al. (1997), Savoca and Rosenheck (2000), and Smith et al. (2005), but is supported by more recent research, including Schult (2011) and Vogt et al. (2017). These studies, however, focused on veterans in the United States, who have substantially different conflict and return experiences than the population explored in this study. Veterans suffering from PTSD in the United States may choose not to work and instead receive support from the Department of Veterans Affairs, other government programs, and their families or spouses. The finding of Smith et al. (2005) and Rosenheck et al. (1995) that increased disability rating — and the monetary compensation that accompanied it — reduced the likelihood of employment may explain the difference between the results in this article and prior research.

Additionally, these studies postulate that a reduction in employment may be partially caused by stigma against

psychiatric disorders, causing employers to reject distressed applicants or fire employees who exhibit symptoms of distress. However, because of the high frequency of abductions and displacement in Uganda, it is likely that the population is understanding and inclusive of those involved in the conflict. Supporting this view, Annan (2009) found that only 7% of returnees reported any social exclusion in Northern Uganda, because the community — whose family members had often also been abducted — recognized that these children were forced to commit violence, and therefore did not stigmatize them for it. However, this is not the case in other contexts, such as Sierra Leone, where Betancourt et al. (2010) found that 73% of former child soldiers had experienced some level of discrimination. It is possible that in these contexts, where the community is far less understanding, the results would be different. These findings cannot be generalized to such a case, and more research is required to determine the relationship between distress and employment in regions where stigma associated with conflict participation is more prevalent.

The significance of the inverse Mills ratios in both Heckman models strongly indicates the presence of sample-selection bias in the data, indicating that the Heckman models more accurately reflect the true nature of the relationship between psychological distress and income. However, this is where clarity on model selection ends. The endogeneity chi-square test for the fourth model did not produce a conclusive result, offering a subjective model choice. The substantial body of literature demonstrating the presence of endogeneity bias would reasonably lead to a conclusion that endogeneity is present, even if the statistical support is only weakly significant. It is unclear, however, if the literature applies in this context, and given the ambiguous result of the endogeneity test, one cannot conclude with a high degree of confidence that the fourth model most accurately describes the population.

For this reason, it is difficult to determine the magnitude of effect that distress has on income. Since this paper is the first study to examine this relationship in this or any related context, no instruction can be drawn from the literature on the magnitude of effect that should be observed. However, even the lower bound presented by this article's third model — a seven percent decrease in earnings per symptom of psychological trauma — is substantial. Under this assumption, an individual one standard deviation above the mean, with 2.6 more symptoms of distress, would experience more than an 18% reduction in income when compared to the average case. This decrease rises in severity using the upper bound found in the fourth model — a 24% reduction in income per symptom. Regardless of which model is more reflective of the population, these effects clearly demonstrate a sizeable impact of distress on earnings. Both models also identify a significant negative relationship between the explanatory and dependent variable, permitting a conclusion this relationship exists without requiring a definitive selection between models. The finding is further supported by the results of the OLS and 2SLS models, which show a similar

direction and magnitude of effect.

This relationship is likely explained by the findings of Vogt et al. (2017), which suggested that psychological distress decreases occupational functioning. Similarly, Schult (2011) and Adler et al. (2011), provide support for the theory that this decrease in income stems largely from losses in productivity, rather than hours worked. While it was impossible to evaluate differences in hours worked because of the Ugandan model of employment, there was no significant difference in days worked per month in those above the median in distress and those below (8.4 vs 8.3 days worked, respectively), which persisted after removing those who did not work (11.9 vs 12.4 days worked, respectively). The apparent lack of difference in time spent working bolsters the theory proposed in the literature, and suggests that the observed negative relationship between psychological distress and income is a result of losses in productivity on the job, rather than fewer hours performing the job.

VI. CONCLUSION

This paper further explores the consequences of child soldiering and extends research that examines the relationship between psychological distress and employment outcomes among veterans to new populations. While the finding that distress did not significantly affect the probability of employment conflicts with the literature, this may largely be explained by contextual differences stemming from VA benefits dis-incentivizing for employment among high-disability American veterans. The observed negative relationship between psychological distress and income, which is likely due to losses in productivity, further demonstrates the importance of psychosocial post-conflict interventions in these contexts and describes the positive externalities these interventions can have in other domains. This paper also shows that the posited relationship is robust for sample-selection and endogeneity biases, which no study has demonstrated to date.

While SWAY has been generalized to the entire population of child soldiers before (Blattman & Annan, 2010), largely due to its robustness as a dataset and the quasi-natural experiment presented by the conflict in Northern Uganda, such a claim would be inappropriate in this case. The same arbitrary abduction practices which make Uganda a compelling case study also serve a mediating role in the communities relationships towards former child soldiers — attenuating the stigma associated with forcible participation in the conflict that is present in many analogous regions. This fact limits the generalizability of this papers findings. Further research should aim to replicate this study in populations where higher stigma associated with child soldiering is present to determine the differential effects of this stigma on the proposed relationships between psychological distress, employment, and income. These findings may also be applicable to the consequences of psychological distress among former youth gang members or abused children in the Western world — a relationship which should be examined in the future.

This study has substantial implications for aid organizations seeking to successfully reintegrate millions of former child soldiers into society. While DDR programs have largely been ineffective at improving the economic outcomes of former combatants in the past, this paper identifies new avenues for intervention. Based on this analysis and the supporting literature, even small reductions in warfare-related psychological traumas can have a substantial positive impact on the wages of a former child soldier, highlighting the importance of treating the mental — and not just the physical — scars of war.

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APPENDIX

Table 1

Variable	Description	Range	Employment Status		
			All	Employed	Unemployed
			Observations		
EPM	Earnings Per Month in Uganda Shillings	Continuous	17200 (2166)	27121 (3280)	— —
EMP	1/0 Employment Status	0 – 1	0.634 (0.022)	— —	— —
DISTRESS	0-15 Additive Index of Traumatic Stress	0 – 15	4.352 (0.121)	4.506 (0.148)	4.085 (0.206)
WITNESS	0-6 Additive Index of Violence Witnessed	0 – 6	4.026 (0.067)	4.018 (0.107)	4.031 (0.086)
HELPLESS	1/0 Feelings of Helplessness, Self-Blame	0 – 1	0.818 (0.018)	0.857 (0.021)	0.749 (0.034)
EDUC	Years of Education	Continuous	6.820 (0.130)	6.594 (0.159)	7.213 (0.221)
AGE	Years Since Birth	Continuous	21.366 (0.233)	22.58 (0.280)	19.26 (0.361)
MIL	1/0 Employment in Military	0 – 1	0.017 (0.006)	0.024 (0.009)	— —
MARRIED	1/0 Marital Status	0 – 1	0.437 (0.023)	0.573 (0.029)	0.201 (0.031)
Observations			462	293	169

Standard Errors in Parentheses

Table 2

VARIABLES	(1)	(2)	(3)	(4)
	OLS Log(Income)	2SLS Log(Income)	Heckman Log(Income)	IV Heckman Log(Income)
Distress	-0.0513* (0.0264)	-0.201** (0.0945)	-0.0702*** (0.0265)	-0.240** (0.104)
Education	0.136*** (0.0272)	0.132*** (0.0281)	0.155*** (0.0277)	0.155*** (0.0293)
Age	0.0832*** (0.0145)	0.0757*** (0.0161)	0.0440** (0.0220)	0.0346 (0.0245)
In Military	1.339*** (0.444)	1.504*** (0.482)	1.300*** (0.461)	1.491*** (0.531)
Mills Ratio			-0.930** (0.391)	-0.978** (0.417)
Constant	6.710*** (0.431)	7.582*** (0.707)	8.032*** (0.714)	9.021*** (1.043)
Observations	293	292	293	292
R-squared	0.189	0.108	0.203	0.081
SELECTION				
Distress			0.0270 (0.0260)	0.0778 (0.133)
Education			0.0715 (0.0879)	0.0648 (0.0889)
Education ²			-0.00748 (0.00568)	-0.00705 (0.00594)
Age			0.404*** (0.134)	0.377** (0.171)
Age ²			-0.00829*** (0.00303)	-0.00767** (0.00385)
Married			0.687*** (0.191)	0.686*** (0.194)
Constant			-4.739*** (1.430)	-4.666*** (1.538)
Observations			462	459

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1