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# Violence predicts physical health consequences of human trafficking: Findings from a longitudinal study of labor trafficking in Ghana

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ABSTRACT

Research consistently finds high rates of both poor physical health and violent victimization among survivors of human trafficking. While this literature documents the immediate effects of human trafficking on health, no published literature has compared short- and longer-term physical health consequences of trafficking or examined the role of violence in shaping physical health outcomes across the period of reintegration. Here, we utilize longitudinal data to document the prevalence of various forms of violence experienced by women and girls trafficked for labor in Ghana, as well as examine the effects of violence on self-reported physical health conditions at two time points following exit from trafficking. Consistent with the stress process model, we find a higher prevalence of physical health complaints during the second wave of data collection, suggesting a delayed somatization effect. We also find that while psychological violence has a strong effect on the number of physical health complaints in the period immediately after exit from trafficking, sexual violence experienced while being trafficked is most predictive of physical health complaints later in the reintegration period. These findings have implications for understanding the role of violence, more generally, in shaping physical health. Our research also suggests the importance of monitoring the physical health of trafficking survivors beyond the immediate post-trafficking period and of providing on-going access to healthcare.

Labor trafficking, which is the procurement of labor through force, fraud, or coercion (United Nations, 2018), is a global social problem with significant implications for health (Zimmerman and Kiss, 2017). The International Labor Organization (ILO) estimates that 24.9 million people were trafficked for labor in 2016, with victims coming disproportionately from the developing world, where high rates of poverty not only increase the risk of trafficking victimization, but also exacerbate the effects of trafficking on well-being (ILO, 2017). Labor trafficking typically involves long hours spent performing physically demanding and dangerous work, putting victims at high risk of bodily harm.

Trafficking victims also commonly experience violence, which results in physical health problems through both injury and traumatic stress. Injury can create new physical health problems, as well as exacerbate existing problems. Violence-related traumatic stress is associated with somatization, immunosuppression, and inflammation, which underlie a variety of physical health conditions (e.g., Kendell--Tackett, 2007; Lipowski, 1988), and can affect physical health decades after the violence has occurred (e.g., Ferraro et al., 2016; Springer, 2009). Though the violence that labor trafficking victims experience has clear implications for physical health, there is limited research on the topic. Most of this research focuses on male victims, despite the fact that recent estimates indicate that 57% of victims of labor exploitation worldwide are female (ILO, 2017). The available research also focuses exclusively on physical health in the period immediately after exit from trafficking, thus failing to capture longer-term effects of trafficking violence on physical health (for overview, see Cannon et al., 2018; Zimmerman et al., 2011).

The extent and nature of physical health complaints among labor trafficked women and girls is not well understood, nor do we know how particular forms of violence that co-occur with labor trafficking affect physical health outcomes. Given the documented effects of exposure to violence on health outcomes in the general population (e.g., Gonzalez et al., 2018; Norman et al., 2016) and the suspected high incidence of violent victimization among trafficked women, it is important to

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examine how violence shapes the physical health outcomes of labor trafficking victims in both the short- and longer-term. In particular, researchers call for investigations of the health consequences of labor trafficking among girls and young women, given research overemphasis on sex trafficking in this population (e.g., Cannon et al., 2018) and the fact that labor-related violence and deprivations in adolescence occur during a key developmental stage consequential for long-term health (Turner-Moss et al., 2014).

Here, we examine the effects of violence on physical health complaints among young women who experienced labor trafficking in Accra, Ghana. To our knowledge, this is the first longitudinal study of physical health among survivors of human trafficking. We are able not only to document experiences of violence among this group of labor-trafficked women, but also to examine the relationship between violence and short- and longer-term health outcomes. We begin by reviewing previous research on trafficking and physical health and on trafficking and violence before presenting our theoretical framework. We then describe the prevalence of self-reported health complaints at two time points, one year apart, and present count models to document how various forms of violence lead to an accumulation of physical health complaints at multiple time-points after exit from trafficking.

## 1. Literature review

### 1.1. Trafficking and physical health

In order to understand how trafficking-related violence may affect physical health, it is important first to understand patterns of physical health issues among trafficking survivors. Several studies have examined health outcomes immediately after exit from trafficking, though most of these do not focus on women trafficked for labor. This larger body of research typically involves clients of social service agencies that assist trafficking survivors and utilizes data collected at or near the time of intake. One of the largest such studies, which surveyed clients of a human trafficking social service agency in Southeast Asia, found that headaches, dizzy spells, exhaustion, and back pain were the most common physical health complaints, with between 18% and 22% of victims reporting each condition. Survivors also reported memory problems, weight loss and stomach conditions, though at lower levels (Kiss et al., 2015). Data from smaller-scale studies conducted immediately after exit from trafficking reveal a similar range of physical complaints. For example, in a study of recent survivors of labor trafficking in the UK, most of whom were male, over 80% had at least one physical health problem and almost a third reported five physical health problems (Turner-Moss et al., 2014). It is not known, though, whether these complaints are short-term or longer lasting, since data are cross-sectional and collected just after trafficking has ended; nor is it clear whether women trafficked for labor have similar physical health issues as do the men in these studies.

While most research on trafficking-related health has considered health issues immediately after trafficking has ended, a few studies have examined physical health during the initial months of reintegration. These studies also find high rates of physical health complaints. Ninety-six percent of women in a study of recently trafficked Moldovan women who had been trafficked abroad and returned to Moldova an average of 5.9 months prior to data collection reported experiencing at least one physical health complaint in the previous two weeks. A third of these women reported six or more physical symptoms (Oram et al., 2012). The most common symptoms were headaches, stomach pain, memory problems, and back pain, which is consistent with symptoms reported by women in the immediate aftermath of trafficking, as well as with other small-scale studies of health during the period of reintegration (e.g., Stanley et al., 2016). Some research also finds that women have higher rates of physical health problems than do men in the initial reintegration period, though research that reports this finding includes both women trafficked for labor and for sex, and health complaints were not broken down by type of trafficking experience (Oram et al., 2016). In addition, since these studies gather data at only one point in time a few months after trafficking exit, it not possible to know when the complaints emerged or the state of the survivors' health once they are no longer receiving social services.

Injury is another common health condition reported by trafficking survivors, which is not surprising given that trafficked labor often involves dangerous work performed without safety equipment or training. Almost a quarter of trafficking survivors interviewed at intake as part of Kiss et al.'s (2015) large study of human trafficking in Cambodia, Thailand, and Vietnam reported a serious injury caused by the work performed while being trafficked. A third of those reporting an injury had been injured at least twice. Using a subset of the data used in Kiss et al. (2015), Pocock et al. (2016) studied only trafficked men and found that over one-third had experienced at least one injury during the trafficking period and almost half of these reported injury-related pain at the time of the interview. One of the few studies that compared women's and men's experiences with trafficking-related injury found that twice as many women as men reported an injury (Oram et al., 2016). Because a large number of the women in this study were victims of sex trafficking, however, it is unclear what these findings say about women trafficked for labor.

### 1.2. Trafficking and violence

The high rates of violence reported in the extant literature indicate the overall violent nature of trafficking. Most of the research on labor trafficking and violence, however, either combine data for women trafficked for labor and for sex in the same analyses or involve only men. For example, in Kiss et al.'s (2015) study of approximately three hundred women, almost half of whom were victims of labor trafficking, 41% of women experienced physical violence, 44% experienced sexual violence, and 60% experienced both types of violence. Research consistently finds that labor trafficked men also experience high rates of violence. One of the largest studies to date of trafficking victimization found that almost half of the men experienced physical violence and 58% had been threatened with violence (Kiss et al., 2015). Similar results are found in smaller studies of male trafficking victims, (Oram et al., 2016; Pocock et al., 2016), as well as in studies that focus primarily on men but that report aggregate analyses that include some female trafficking victims (e.g., Turner-Moss et al., 2014).

Similarly high rates of violent victimization are found in studies of female victims of sex trafficking. These women experience particularly high rates of sexual violence, even beyond the day-to-day sexual violation that they experience through forced engagement in commercial sex (e.g., McCauley et al., 2010; Oram et al., 2016). Women who are trafficked for sex are at an even higher risk of violent victimization during the first few months of trafficking, especially when compared to rates of violence for non-trafficked female sex workers (Ottisova et al., 2016). This suggests that traffickers are using violence to control victims of sex trafficking in the early stages of their victimization. The use of violence – and especially sexual violence – as a means of control may also apply to female victims of labor trafficking, given the widespread use of sexual violence as a means of controlling women more generally (e.g., Moffett, 2006; Riger and Gordon, 1981).

Sexual victimization is also much more common among women victims of trafficking than among men victims. Kiss et al. (2015) reported that just over 1% of men in their study experienced sexual violence while, as already noted, 44% of women experienced sexual violence. Findings are similar in a study of exploited migrant workers whose experiences overlap with trafficking. Here, women were significantly more likely to experience sexual violence than were men, regardless of whether they were exploited in the sex trade or other sectors (Meyer et al., 2019). Non-trafficked women also experience substantially higher rates of sexual violence than do men (e.g., Tjaden and Thonnes, 2006). Thus, while it is perhaps the case that high rates of

sexual victimization are limited to sex trafficking, it is more likely that sexual victimization is also an all too common experience among women trafficked for labor.

### 1.3. Current study

In order to understand how violence affects short- and longer-term health outcomes among labor trafficked women, we analyze longitudinal data collected from female victims of labor trafficking in Accra, Ghana. These data allow us not only to document the types of physical health problems and forms of violence that female victims of labor trafficking may experience, but also to examine how violence experienced during trafficking shapes physical health outcomes across time. By studying experiences of trafficking survivors in Ghana, we also contribute to literature on trafficking in low-resource countries, where rates of trafficking are high and access to services to assist trafficking victims is limited.

Our research is informed by the stress process paradigm and related perspectives that recognize violence as a traumatic event that contributes to chronic stress (Pearlin et al., 1981). Chronic stress manifests not only in psychological problems but also in physical health problems via somatization and weathering (e.g., Geronimus, 1992; Kelly et al., 1997; Lipowski, 1988; Pearlin, 1989). Empirical findings support this claim, as violent victimization is associated with a wide variety of physical health diagnoses, from digestive disorders to cancer, (e.g., Gonzalez et al., 2018; Norman et al., 2006), as well as subjective assessments of poor health among women in the general population (e.g., Coker et al., 2003). These effects appear to be long-lasting, as research finds that violence experienced in childhood predicts the number of physical health diagnoses in middle age (Springer, 2009). There is also evidence that the full effects of violence on physical health may not manifest until several years after the violent event (Friis et al., 2019), which suggests that violence is part of a cumulative stress process in which allostatic load produces wear and tear on the body (McEwen, 2008).

While violence, overall, is linked to physical health problems, findings point in particular to the effects of sexual violence on physical health. In their meta-analysis of the relationship between violence against women and cancer, Gonzales et al. (2018) find that when type of violence is disaggregated, sexual violence, but not physical violence, predicts cancer diagnoses. Norman et al. (2006) found this to be the case not only with cancer but also with digestive disorders. Research focusing only on sexual assault victimization finds a wide array of physical health conditions associated with sexual trauma, including heart disease, high cholesterol, and asthma, as well as gastrointestinal, muscular, and neurological symptoms (Smith, S.G. & Breiling, 2011; Smith, B.N. et al., 2011). Some of these findings can be explained by the physical effects of sexual violence, such as exposure to HPV during forced sex resulting in increased risk of cervical cancer (Gonzalez et al., 2018). However, the physiological basis of the link between sexual violence and other types of cancer, as well as to non-cancer related physical symptoms, is less clear. To explain these effects, researchers point to traumatic stress processes that make victims of sexual violence more susceptible to a variety of maladies due to increased allostatic load (Norman et al., 2006).

We expect to find high rates of violent victimization among study participants, though the lack of research on violent victimization among female victims of labor trafficking makes it difficult to predict how rates of violence in our study are likely to compare to rates of violence committed against female victims of sex trafficking documented in other research. We also anticipate widespread use of sexual violence, in addition to physical violence and threats, and that sexual violence will have particularly strong effects on physical health, as suggested by previous literature (e.g., Norman et al., 2006). Because our data are longitudinal, we can investigate the ways in which experiences of trafficking-related violence affect symptom count at two points in time, one year apart. We expect to find that trafficking related violence continues to exert effects at the second time point, in line with previous research on the on-going effects of injury and traumatic stress on physical health. If we do find that violent victimization continues to be consequential for physical health outcomes at the second time point, it would be a strong statement, given the youthful nature of the study population and the relatively short time frame of the study.

## 2. Methods

### 2.1. Participants

Data were collected in 2016 and 2017 from clients of a registered residential facility in Accra, Ghana. The clients are girls and young women who are being trafficked or are at risk of being trafficked. The program provides on-site housing in a dormitory setting, job training, recreational activities, and psychosocial support. Clients typically remain in the program for six to nine months, after which time they are matched with a mentor in the community who pledges to provide additional training in the client's selected occupational sector and to pay the clients for their work during the training period (for program details, see Okech and Danikuu, 2017).

In order to be eligible for participation in our research, clients must have entered the program between 2010 and 2015 and completed the residential portion of the program by the time of first data collection in summer 2016. They also must have met at least one of the following criteria, which indicates trafficking: travelled to Accra and offered a job as a Kayeyei (female street porter), in a house, or elsewhere with no pay; offered a job but not allowed to leave; or offered a job that involved forced sexual services. Though the inclusion criteria allowed for sex trafficking, all those who agreed to participate were trafficked for labor and not for sex. This is not surprising given the local economy and location of the agency near a large market where street portering – carrying heavy objects for low pay – is a common form of labor exploitation. Indeed, many young women who live in outlying areas to travel to Accra, Ghana's capital city and economic center, to seek employment in the market or similar sectors (Balfour et al., 2020).

Of the 311 women who met the inclusion criteria, 144 agreed to participate in the research. Participants ranged in age from 23 to 34 at the time of data collection, with an age range of 17–28 at the time in which they entered the program. There were 116 women who participated in both waves of data collection. The educational and age characteristics of the two-wave sample do not differ significantly from those who only participated in the first wave of data collection.

### 2.2. Data collection

Data were collected in the summer of 2016 (wave 1) and the summer of 2017 (wave 2). Participants returned to the social service agency in Accra, where local female research assistants collected data via face-to-face surveys. Travel expenses were paid for participants who lived outside of Accra. In addition, participants received $30 for each round of data collection.

Survey instruments were constructed in English and translated into Twi, which is the most commonly spoken language in Ghana. A translator who had not seen the original version of the survey then translated the survey back into English. This version was then compared to the original instrument and differences were reconciled. Finally, one of the co-authors, who is a native Ghanaian, reviewed the documents and conducted final translation checks with the local bi-lingual research assistants who went on to collect the data. This co-author also trained the research assistants in data collection per the *World Health Organization Ethical and Safety Recommendations for Interviewing Trafficked Women* protocol (Zimmerman and Watts, 2003). This is a trauma-informed approach to data collection that provides researchers with detailed information about trafficking victimization so that they understand the experiences of the research participants and are able to

conduct interviews in way that does not re-traumatize them. IRB approval was received from both the University of Georgia and the University of Ghana.

### 2.3. Measures

The survey instruments contained a variety of questions and instruments designed to assess experiences before, during, and after trafficking. Below we focus on the items used in the current study.

*Physical health* was measured with a symptom checklist completed at both wave 1 and wave 2. The dependent variable is the count of the following physical health conditions: memory problems, feeling completely exhausted, dizzy spells, headaches, weight loss, nausea or indigestion, diarrhea, persistent coughing, and back pains. The use of a symptom count is consistent with previous research on health of human trafficking survivors, and these particular physical health conditions are the ones most commonly reported by trafficking survivors (e.g., Kiss et al., 2015; Oram et al., 2012).

At wave 1, we collected data on four types of violence via a self-report checklist of experiences that women had during their time "working outside the home," which is a local euphemism for trafficking. Participants were asked if, during that time, they experienced *sexual violence*, *physical violence*, *verbal violence*, and *emotional/psychological violence*. We created a dichotomously coded variable for each type of violence.

We controlled for a number of variables that could be associated with physical health and violence. *Harsh living conditions while trafficked* is an additive scale of negative conditions the respondent experienced while being trafficked: living and sleeping in overcrowded rooms, sleeping in dangerous conditions, nowhere to sleep or sleeping on the floor, poor basic hygiene, inadequate water for drinking, insufficient food, and overexposure to sun or rain. We measure length of time in trafficking with a dichotomous variable coded "1" for those who were *trafficked more than* 12 months. Length of time since the end of the trafficking experience is measured with a continuous variable, *years since trafficking*. We also control for *childhood vulnerability* with a retrospective self-report measure of adverse childhood events collected at wave 2. Participants were asked to assess their childhood experiences with the following prompt, "growing up as a child in your family and before working outside the home, please state to what extent you (0) don't agree at all, (1) agree somewhat, or (2) agree a lot with the following statements." There are 22 statements, which include both risk and protective factors. Risk factors include poverty, violence, problems at school and problems in the community. The risk factors were combined into a scale (alpha = .66). *Marital status* (married vs. never married, separated, widowed) is also included as a control variable.

We considered including controls for age and education, given the association between these variables in the general population. Our small sample size, however, limits the number of control variables that can be included in the regression models. Neither age nor education level were significantly correlated with the count of physical health symptoms at either wave. This is not surprising given the overall low education level of respondents and the limited variability in age. Thus, we did not include these variables in the multivariate models. Nonetheless, we present descriptive data on these variables in Table 1 in order to provide complete information on the sample population. We present data on age as a continuous variable measured in years and information on the percent of participants who had completed junior secondary school, which roughly corresponds to junior high school in the United States.

### 2.4. Analytic strategy

We begin by presenting data on the percentage of participants reporting various physical health conditions at wave 1 and at wave 2. We then present negative binomial regression models that examine how physical, sexual, verbal, and psychological violence experienced while being trafficked predicts the total number of self-reported physical health complaints, controlling for living conditions, childhood vulnerability, marital status, time since leaving trafficking, and time spent in trafficking. The negative binomial model, presented in mathematical form below, is the appropriate estimation strategy when dealing with over-dispersed count data (Hilbe, 2011).

$$f(y_j|v_j) = \frac{(v_j\mu_j)^{y_j} e^{-v_j\mu_j}}{\Gamma(y_j+1)}$$

In the model predicting the count of wave 2 physical health symptoms, we also control for the count of wave 1 symptoms. Missing data are an issue for the variable measuring time since leaving trafficking (13 missing cases). We imputed values on this variable by utilizing a Gaussian normal regression imputation method in Stata, which allows us to retain a sample size of 107 after listwise deletion of a small number of cases due to missing data on other variables. We also constructed wave 2 models without imputing data for the time since trafficking measure using listwise deletion, for comparison. Patterns of significance were the same as in the models using imputed values.

**Table 1**
Descriptive statistics (n = 107).

| Variable | Wave 1 Mean (SD) or % | Wave 2 Mean (SD) or % |
|---|---|---|
| Prevalence of Physical Health Conditions | | |
| Memory Problems | 7% | 25% |
| Exhaustion | 29% | 62% |
| Dizziness | 15% | 22% |
| Headaches | 39% | 70% |
| Weight Loss | 25% | 42% |
| Nausea/Indigestion | 12% | 19% |
| Diarrhea | 10% | 8% |
| Persistent Coughing | 8% | 8% |
| Back Pains | 22% | 39% |
| Physical Health Symptom Count | 1.79 (2.43) | 2.96 (2.17) |
| Physical Violence | 43% | N/A |
| Verbal Violence | 64% | N/A |
| Emotional Violence | 50% | N/A |
| Sexual Violence | 16% | N/A |
| Harsh Living Conditions During Trafficking Scale | 2.26 (2.06) | N/A |
| Childhood Vulnerability Scale | N/A | 0.92 (0.38) |
| Junior Secondary School or Higher | 63% | N/A |
| Age | 23.31 (2.84) | N/A |
| Marital Status | | |
| Single, never married | 84% | N/A |
| Married | 13% | N/A |
| Divorced/Separated | 2% | N/A |
| Out of Trafficking more than 12 months | 56% | N/A |
| Years Spent in Trafficking | 4.18 (1.90) | N/A |

## 3. Results

### 3.1. Descriptive statistics

Table 1 presents descriptive statistics for the full two-wave sample of 107 women. The average age of participants was just over 23 years old at the time of initial data collection. Approximately 63% of women had completed junior secondary school, and the vast majority had never been married (84%). Trafficking ended for just over half of the women more than 12 months prior to wave 1 data collection, and the average time spent in trafficking was 4.18 years.

Women reported high rates of violence while being trafficked, with verbal violence as the most common form (64%), followed by emotional violence (50%), and physical violence (43%). Approximately 16% of women reported sexual violence. Women also experienced an average of 2.26 of the harsh trafficking conditions included in the survey. The standard deviation of 2.06 on this variable indicates wide variation on

the number of harsh trafficking conditions experienced. The average score on the childhood vulnerability scale, which has a possible range of 0–2, was 0.92 (sd = 0.38), suggesting overall high levels of childhood adversity in the sample.

### 3.2. Prevalence of physical health complaints

Also included in Table 1 is information on the prevalence of specific physical health conditions at each wave. As seen in Table 1, the most common physical health complaint at wave 1 is headaches (39%). The second most frequently reported health condition is exhaustion (29%), followed closely by weight loss (25%), and back pains (22%). This is consistent with previous data gathered either immediately after the period of trafficking has ended or in the very early stages of reintegration (e.g., Kiss et al., 2015). The majority of participants in our study, however, had already been out of trafficking more than a year when the wave 1 data were collected, putting them more than two years from the trafficking experience at wave 2 data collection. Further, because the two waves of data were collected a year apart, all participants were out of trafficking for mroe than more than a year at the time of wave 2 data collection. This means that participants in this study were much farther past the trafficking event than those interviewed in previous studies. They have also received substantial post-trafficking assistance. Despite this, we find high rates of physical health complaints at wave 1.

Table 1 also shows high prevalence of physical symptoms at wave 2. As in the first wave, the most frequently reported complaints are headaches (70%), exhaustion (62%), weight loss (42%), and back pains (39%). The prevalence of these complaints, however, is substantially higher in the second wave. For example, while 39% of the sample report headaches in wave 1, 70% report headaches one year later at wave 2. Likewise, 29% report exhaustion at wave 1, but this number more than doubles to 62% by wave 2. Notably, there is only one health condition (diarrhea) with a lower reported prevalence in wave 2 than in wave 1. At the very least, this points to the durability of physical health issues well after trafficking has ended. It also may indicate the delayed onset of symptoms, consistent with somatization.

### 3.3. Violence and physical health: negative binominal regression models

Our primary research question concerns the role of violence in shaping physical health at different points in the reintegration period. Because our dependent variable is a count of reported physical health conditions, we construct estimates using negative binomial regression. Table 2 presents the model predicting the number of physical health complaints in wave 1, while Table 3 presents wave 2 results.

Results from the first multivariate model (Table 2) indicate that emotional violence experienced while being trafficked is a significant predictor of the number of physical health conditions reported at wave 1. Specifically, participants who report experiencing emotional violence have a rate of physical health symptoms 2.6 times greater than those who did not report experiencing emotional violence during trafficking ($p < .01$). Experiences of physical, verbal, or sexual violence were not significant indicators of the number of physical health conditions reported at wave 1. Time since leaving trafficking is also significant ($p < .05$). None of the other control variables were significant or marginally significant predictors of the count of physical health complaints at wave 1.

**Table 2**
Negative binominal regression model predicting count of physical health conditions at wave 1 (n = 107).

| | Incidence Rate Ratio (IRR) | Std. Error |
|---|---|---|
| Physical Violence | 1.40 | 0.49 |
| Verbal Violence | 1.10 | 0.46 |
| Emotional Violence | 2.60** | 0.86 |
| Sexual Violence | 0.78 | 0.34 |
| Additive Scale of Harsh Living Conditions | 1.10 | 0.11 |
| Childhood Vulnerability | 0.69 | 0.28 |
| Marital Status | 0.44 | 0.21 |
| Time Since Leaving Trafficking (wave 1) | 0.84* | 0.07 |
| Time Spent in Trafficking | 1.30 | 0.46 |

**p < .01; *p < .05

**Table 3**
Negative binomial regression model predicting count of physical health conditions at wave 2 (n = 107).

| | Incidence Rate Ratio (IRR) | Std. Error |
|---|---|---|
| Physical Violence | 0.73 | 0.12 |
| Verbal Violence | 0.87 | 0.15 |
| Emotional Violence | 0.84 | 0.13 |
| Sexual Violence | 1.50* | 0.27 |
| Additive Scale of Harsh Living Conditions | 1.00 | 0.04 |
| Childhood Vulnerability | 2.30** | 0.38 |
| Marital Status | 1.19 | 0.23 |
| Time Since Leaving Trafficking (wave 2) | 0.95 | 0.03 |
| Time Spent in Trafficking | 0.96 | 0.13 |
| Wave 1 Physical Health | 1.04+ | 0.03 |

**p < .01; *p < .05; +p < .10

The negative binomial regression model predicting the count of physical health problems at wave 2 shows a different pattern of findings (see Table 3). When all forms of violence are included in the model, sexual violence significantly increases the number of reported physical health conditions by a rate of 1.5 ($p < .05$). Physical, emotional, and verbal violence are not significant. Among the control variables, only childhood vulnerability significantly increases the symptom count ($p < .01$). We included wave 1 physical health both as a control and as a way to examine continuity of poor health over time. The count of wave 1 physical health conditions is positively related to the count of physical health conditions at wave 2 but is only marginally significant ($p < .1$), suggesting that factors other than pre-existing conditions are driving physical health at wave 2.

Having experienced sexual victimization while being trafficked, however, is a significant predictor of physical health at wave 2 even when controlling for previous health ($p < .05$) and other forms of violence. Interestingly, sexual victimization was not a significant predictor of wave 1 physical health. Instead, it was emotional violence that predicted an increase in count of physical health symptoms at wave 1. In combination, these findings suggest that exposure to sexual violence during trafficking has delayed effects on physical health. This is likely a result of a traumatic stress process, since the physical health conditions included in our count variable do not include physical health conditions related to the physical aspects of sexual violence, such as STI exposure, vaginal injuries, or cervical cancer.

## 4. Discussion and conclusion

In this paper, we have investigated physical health effects of labor trafficking among a sample of trafficked women in Accra, Ghana across two time points and documented the role that trafficking-related violence plays in the count of physical health symptoms. This research is unique in several respects. As one of the few studies of women trafficked for labor, we advance research on this understudied population, as most research on trafficking among women focuses on sex trafficking (see Ottisova et al., 2016). We similarly advance the research on both prevalence of physical health problems and violence experienced during labor trafficking, where research typically focuses either exclusively on victims of sex trafficking or does not break down experiences with violence by trafficking sector (e.g., Kiss et al., 2015; McCauley et al., 2010; Oram et al., 2016). Finally, we present results of the first research, to our knowledge, that examines prevalence of physical health complaints across two time-periods during reintegration, as well as the first research to study the effects of trafficking-related violence on physical

health at two time points.

Our findings indicate the high prevalence of a variety of physical health conditions during reintegration. The types of physical health conditions most frequently reported by our participants are generally the same as those reported by other trafficked populations (e.g., Kiss et al., 2015). Though the prevalence of physical health complaints is high among our participants, and particularly so during the second data collection period, we find overall lower prevalence rates of physical health complaints than do other studies (e.g., Turner-Moss et al., 2014; Oram et al., 2012). Direct comparisons with previous research are difficult, however, since these studies do not focus on labor trafficked women and also collected data much sooner after the exit from trafficking than our data were collected.

The high rate of physical health complaints in this sample is notable for several reasons. First, all of the participants in this study had completed a residential program designed to assist trafficking victims, which logically should reduce somatization. Not only does the program provide job training and social support, it also continues to work with survivors once they leave the program and re-enter their communities. Therefore, we would expect better than average outcomes for this group of women. Second, it is quite likely that the women who elected to participate in our research have had more successful reintegration experiences than other program participants. Only those program graduates for whom administrators had contact information could be recruited, which selected out those who were living on the street. In addition, the program administrators chose not to contact graduates who were from, and subsequently returned to, the rural area in the north of Ghana, due to the difficulty traveling from this region. However, this is the most impoverished part of the country and, thus, it is likely that the women returning to this region have poorer outcomes, overall, than residents of other areas. As a result, the counts of physical health conditions reported by the participants of this study likely underestimate the extent of physical health problems experienced by women trafficked for labor under similar circumstances.

Notably, we find that the average count of physical health complaints increases over time. This speaks to the on-going effects of trafficking experiences on the body. It is particularly informative that we found these sustained effects in a sample of young women whose age might afford them a high degree of protection from trafficking harms, given the overall strength of young immune systems and bodily resilience (Miller, 1996). Instead, these results indicate that severe trauma experienced during adolescence and young adulthood has significant, sustained consequences on physical health, leading us to wonder what long-term effects might exist among those trafficked later in the life course. While it may be that adolescent experiences with trafficking have a greater effect on the body than later trafficking experiences, consistent with the idea of adolescence as a formative life stage (Turner-Moss et al., 2014), it may also be that trafficking experiences in later life are more impactful, given that inflammation naturally increases with age (Chung et al., 2009).

Our findings on the relationship between violent victimization and physical health reveal different patterns across the two waves. Interestingly, it was emotional violence, which includes attempts to manipulate emotions, denial of victimization, victim blame, and humiliation, that was associated with increases in count of physical health complaints at wave 1. The fact that emotional violence was significant net of the effects of physical and sexual violence strongly suggests that traumatic stress – and not physical injury – is the mechanism that links emotional violence and poor physical health. This is consistent with research finding that emotional abuse in childhood predicts physical symptoms in adulthood (e.g., Spertus et al., 2003). Participants in our study, however, were in late adolescence, suggesting that emotional abuse also has real consequences for physical health later in the life course.

In contrast, sexual violence, but not other forms of violence, predicted the count of physical health complaints at wave 2, even when controlling for other forms of violence and the count of physical health complaints at wave 1. This indicates a delayed effect of sexual violence on physical health. Given the markedly higher prevalence of physical health conditions at the second wave, these findings also suggest a relationship that is substantively significant, indicative of the high toll that sexual violence takes on the body. Other research has found that sexual violence predicts physical health problems, though much of this research focuses on cervical cancer diagnoses, which may be related to STI exposure during forced sex (e.g., Gonzalez et al., 2018). Consistent with our research, however, previous findings that sexual violence is predictive of digestive and cardiovascular disorders indicate broader effects of sexual violence on health (e.g., Norman et al., 2006). Our focus on common somatization disorders, as well as our finding that the effects of sexual violence manifest later, leads us to interpret our findings as evidence of traumatic stress consonant with the stress process paradigm.

The findings of this study have a number of practical implications. Most centrally, the results indicate the importance of monitoring physical health of trafficking victims throughout the period of reintegration. Not only is poor physical health, itself, a negative outcome that deserves attention, but poor health may also increase risk of re-trafficking, given the effects of poor health on labor market participation (e.g., Cai and Kalb, 2006). This is true even in high resource settings and so is likely to be particularly important in the developing world. Attention to health issues, therefore, may lead to better opportunities for successful reintegration.

Our study, of course, is not without limitations. Our small sample size limits the number of variables that can be included in multivariate models, and we are unable to test possible mechanisms linking trafficking violence to physical health. Because we gathered data from clients at a single social service agency, all of whom were trafficked in the nearby area, we cannot generalize our findings broadly. It is also likely that sexual victimization is underreported in our study, as it is in many surveys (Koss, 1993), so additional research should be conducted to verify the link between sexual victimization during trafficking and longer-term physical health problems that we identified here. Finally, we used a simple symptom checklist for determining physical health, as there is no appropriate scale validated in this population. Future research would benefit from the development of validated scales.

Our research represents one of the few studies of women trafficked for labor and the only one published to date that collected longitudinal data on physical health outcomes. In documenting the effects of different forms of trafficking violence at different time points after exit from trafficking, our findings speak to a significant gap in the research literature. In doing so, this study provides a foundation for future research to understand the mechanisms through which trafficking affects health – a necessary precursor to the development of programs to address the long-term consequences of trafficking victimization.

## Author credit statement

Jody Clay-Warner: Conceptualization, Methodology, Writing- Original Draft. Timothy G. Edgemon: Formal analysis, Writing- Reviewing and Editing. David Okech: Investigation, Funding acquisition. John Anarfi: Investigation, Resources

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