Primary education and adult women's experience of intimate partner violence: Quasi-experimental evidence from sub-Saharan Africa

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Abstract

Although education is often found to have a protective association with intimate partner violence victimization in resource poor settings, there are few studies which are able to identify a casual relationship. We use the implementation of Universal Primary Education policies in Uganda and Malawi in the mid-nineties as natural experiments to identify casual impacts of schooling on physical and sexual intimate partner violence among women ages 22 to 29 using population based data from the Demographic and Health Surveys. Results suggest that education has an overall protective effect on experiencing partner violence in Uganda, reducing the probability of victimization by 7 percentage points, however is a risk factor for victimization in Malawi. This effect in Malawi is due to an inverted U-shaped relationship between education and violence, where women at lower education levels experience backlash to increases in education. This is the first study to our knowledge to examine causal impacts of basic education on violence in adulthood. Results have the potential to contribute to the evidence base on the effectiveness of human capital investments for primary prevention of victimization.

Keywords: Intimate partner violence, adolescent girls, education, Africa

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1. Introduction

Intimate partner violence (IPV) is a major barrier to development and health, with one in three women aged 15 and over experiencing physical or sexual IPV violence in her lifetime and large societal costs resulting from decreased productivity and increased health-related expenditures (Devries et al. 2013; Morrison & Orlando 1999; Brown et al. 1999; Duvurry et al. 2004; Duvurry et al. 2012; Vyas 2013; Sabia et al. 2013). While IPV and other forms of gender-based violence (GBV) permeate all socioeconomic strata, existing evidence is mixed with respect to the relationship between education and GBV. Generally, the empirical evidence from observational studies suggests that as educational attainment of women and their partners increases, particularly to secondary levels or higher, the less likely a woman is to report IPV and this relationship is stronger for recent IPV as compared to lifetime IPV (Kishor & Hindin 2004; Kishor & Johnson 2006; Hindin et al. 2008; Abramsky et al. 2011). This same trend is observed on the macro level, as countries with high proportions of female secondary school enrollment have lower prevalence of physical IPV in the last 12 months (Kaya and Cook 2010). However, this relationship is not universal. In fact, there is some evidence of an inverted U in the relationship between education and experience of IPV, whereby risk of IPV is lower at the lowest and highest ends of the education distribution (Jewkes 2002, Cools & Kotsadam 2013). An inverted U relationship suggests that up to a certain point, there is backlash to increasing education, whereby IPV may initially increase among women with low education when male-dominated power balances are threatened. Relatedly, inequality in education between a woman and her partner has been shown to increase the risk of IPV in some settings (Jewkes 2002; Abramsky et al. 2011).[1] Finally, there is some evidence that education is a risk factor for

[1] Abramsky and colleagues (2011) report associative findings from the WHO Multi-Country study where they find that inequality in education level between partners was associated with increased risk of reporting IPV in nine out of 15 study sites when women had higher levels of education. However, associations were weak and only one achieved statistical significance.

IPV (Stockl et al. 2011), however evidence is largely from developed countries. Therefore, we can conclude that although increasing education of women appears to be a protective factor, this is not a consistent finding, and may vary by level of education of the woman, her partner, the relationship between the two, and the development setting.

Based on the conflicting evidence, is likely that the relationship between education and IPV is confounded by unobserved heterogeneity, which cannot be accounted for in observational and cross-sectional studies. For example, attitudes and preferences may vary, whereby parents in developing countries who place higher intrinsic value on their daughter may be more likely to send her to school for longer periods of time and invest in her human capital. These same parents may be more likely to allow their daughter to choose her own marriage match (or choose more benevolently on her behalf), as well as allow her to wait until she is at an older age to marry, thus likely decreasing her chance of a entering into a forced abusive partnership. In this case, if we simply look at the relationship between education and IPV, we may mistakenly attribute the protective relationship to education alone, when at least part of the relationship is due to the parents' preferences related to both their daughter's education and the quality of her marriage. Thus, in general, observational or cross-sectional studies, including the ones previously discussed may overestimate the negative or inverse relationship between education and IPV if we assume that the main drivers of increases in education also lead to healthier and more equitable marriage matches.

A clear understanding of the education and IPV relationship is important, as recent calls to action in the global fight against GBV and research efforts focus squarely on prevention to decrease prevalence and incidence of IPV (Garcia-Moreno et al. 2014). In particular, there has been emphasis on the education and empowerment of women as fundamental and promising aspects of prevention efforts (Ellsberg et al. 2014; Garcia-Moreno et al. 2014). However, in systematic reviews of what works to prevent violence against women, education refers primarily to behavior change and communication interventions or broadly as an indicator of increased empowerment, rather increased investment in public sector education, as there are no existing rigorous long-term impact evaluations of this nature. When expanding the scope of interventions, is possible that policies which target structural drivers and have widespread uptake, such

as education, may have a larger impact on GBV prevention than dedicated GBV programming. In addition, there is increasing evidence that both perpetration and experience of violence begins early in young peoples' lives (Fulu et al. 2013; Decker et al. 2013; Jewkes et al. 2013; Peterman et al. 2014), and thus an imperative to invest in primary prevention efforts and interventions in early adolescence. Education is an obvious target if there is a causal link between increased schooling and decreased IPV, particularly given other positive externalities of increased levels of schooling.

One way to provide casual evidence on the linkages between education and IPV would be to conduct a program evaluation and follow girls who have similar education before an intervention, and subsequently randomize half to receive a program which increases schooling over time, perhaps as a demand or supply side school-based intervention. Thereafter, we could observe differences in experience of IPV as girls' age into adulthood between the two groups. Unfortunately, investment or interest in this type of long-term study has not been made until recently, and thus we have virtually no impact evaluations to date evidencing this relationship. Another way to infer causality is to use a randomized policy change as an exogenous 'shock' to girls who initially have the same probability of schooling attainment, or to use other quasi-experimental methods to net out the effect of unobservable characteristics which could positively or negatively bias results. Given the mixed existing evidence and a lack of studies that can infer causality, more research on this relationship is needed using creative methods.

In this paper, we use the implementation of Universal Primary Education (UPE) policies in Uganda and Malawi in the mid-nineties as natural experiments to identify casual impacts of education on IPV using an instrumental variable (IV) approach. We use a sample of women ages 22 to 29 in Malawi and Uganda from population-based Demographic and Health Surveys (DHS). UPE policies aimed at increasing primary school enrollment principally through the elimination of school fees, and have largely been deemed a success in accomplishing this objective across the African continent, leading to a massive increase in the number of children attending primary school and shrinking the gender gap in primary school enrollment and achievement (Deininger 2003; World Bank 2009). Although the impacts of UPE

have been explored among a number of development outcomes including pregnancy and HIV risk across African countries (Pradhan & Canning 2013; Behrman 2014), there has been no analysis linking education increases to subsequent IPV risk.

The current study is important and innovative in a number of ways. First, it is the only paper we know of that uses an experimental design to identify long-term casual impacts of education on IPV in developing countries. Second, it utilizes an innovative natural experiment, which contributes to the literature methodologically through an IV approach. Additionally, we investigate pathways through which education affects IPV outcomes, such as delaying age at marriage, delaying sexual debut or though inequalities within marriage matches. Finally, by examining nationally representative data, our results provide evidence from which many other small or large-scale interventions which seek to affect GBV outcomes can draw.

2. Background and context

2a. IPV in Malawi and Uganda

Although global averages indicate one in three women aged 15 and over will experience IPV in her lifetime, the regional prevalence is highest at 65.64% in Central sub-Saharan Africa (Devries et al. 2013). Eastern Africa is also above global average at 38.83%. Although both countries have taken political steps to combat IPV, for example, with the signing of the Prevention of Domestic Violence act (2006) and the National Response to Combat Gender-Based Violence (2008-2013) in Malawi, and the Domestic Violence Act (2010) in Uganda, recent population-based DHS in both countries confirm that the prevalence of IPV is high. In Malawi, 22% of ever-married women aged 15 to 49 have experienced physical IPV from their current or most recent partner; 19% report sexual IPV and 25% report emotional IPV (NSO 2011). In addition, the Malawi DHS asks about six forms of marital controlling behaviours, to which 63% of women indicated that their spouses or partners exhibited at least one behaviour. The most common behaviours were insisting on knowing where they were all the time (51%), followed by being jealous or angry if they talked to other men (43%). In Uganda, 43% of ever married women aged 15 to 49

have experienced physical IPV from their current or most recent partner, 23% report sexual IPV and 43% report emotional IPV (UBOS & IFC 2012). Similar to Malawi, there are high levels of marital controlling behaviours, where 39% of women indicated that their current or former partner exhibited three behaviours, led by jealousy or anger if they talked to other men (59%), partners insisting on knowing where they were at all times (56%) and accusing them of being unfaithful (34%). Both countries require large investments in policies and programs that have the ability to prevent primary occurrence as well as address needs of current IPV victims.

2b. Schooling and UPE policies in Malawi and Uganda

In Malawi, primary school is eight years (aged 6 to 13), followed by four years of secondary schooling (ages 14 to 17, broken into basic and advanced). In Uganda, there are officially seven years of primary (ages 6 to 12), six years of secondary (ages 13 to 18, broken into basic and advanced). Starting in 1991, Malawi adopted a sequential approach to elimination of school fees, which entailed provision of free waivers for grade one in the first year of implementation and for grade two in the second year (Kattan 2006; World Bank 2009). In 1994, this plan was replaced by a "big bang" approach in which primary school fees were eliminated across all grades effective starting September 1994. In contrast, Uganda adopted a "big bang" approach from the start, whereby all fees were eliminated at all levels for all primary school children effective January 1st 1997 (Deininger 2003; Grogan 2006; Kattan 2006). In 1990, the primary school Gross Enrollment Ratio (GER), the number of children who are actually in school divided by the number of children who are of school age, was 70 percent for Uganda and 71 percent for Malawi (UIS 2015). By 2011 these figures had risen to 110 percent for Uganda and 140 percent for Malawi (ibid).[2] Over the same time period, the GER for females rose from 66 percent in Malawi and 63 percent in Uganda to 144 percent and 108 percent respectively. Nonetheless, considerable changes remain in improving overall attainment, particularly at the secondary level. For example, in sub-Saharan Africa,

[2] The GER can be greater than 100 because students outside of the primary school age range may still be in school.

approximately 22 million adolescents are out of school, and addressing this issue is complicated by the fact that the school-age population is soaring, in contrast to other regions where the school-age population has been declining (UNESCO & UNICEF 2015). UNESCO and UNICEF recently identified conflict, gender discrimination, and child labor as three of the major barriers to decreasing the number of out-of-school adolescents. While both countries in the current study face issues related to gender discrimination and child labor, Uganda has also had to confront the aftermath of conflict, particularly in its northern regions. The GER for lower secondary school in Malawi stood at 45 percent in 2013 and 31 percent in Uganda in 2008 (the most recent year with available data) (ibid). Over the same time period, the GER for upper secondary school was 19 percent in Malawi and 14 percent in Uganda (ibid), indicating that both countries struggle to maintain basic enrollment for girls and boys post-primary.

3. Theoretical framework

Our analysis of the causal impact of basic education on women's experience of IPV is grounded in economic theory regarding women's economic and social empowerment and GBV. The contribution of economics to evidence on the relationship between a woman's empowerment and GBV has been fairly recent and typically modeled within a household bargaining setting. In classic household bargaining models, an individual's control of resources matters because bargaining outcomes depend on outside options and threat points such as divorce (Manser & Brown, 1980; McElroy & Horney, 1981) or non-cooperative equilibriums (Lundberg & Pollak, 1993). The more promising an individual's opportunities are outside the household, the more credible the threat point, and therefore, the more likely that the intra-household distribution of resources will align more closely with that individual's preferences. In these bargaining models, an increase in a woman's education might decrease IPV by improving her threat point and thus her bargaining power within the household (Farmer & Tiefenthaler, 1997). Alternatively, when violence is instrumental and used to control the victim's behavior or allocation of resources within the household (Eswaran & Malhotra, 2011; Tauchen, Witte, & Long, 1991), or extractive and used to extract resources from the victim or her family (Bloch & Rao, 2002), IPV may increase. Therefore, according to

economic bargaining models, the theoretical direction between IPV and women's economic empowerment (as signaled by her education level) is ambiguous. The empirical literature, particularly surrounding diverse forms of economic empowerment is also mixed (for example see review in Hidrobo et al. 2013).

We hypothesize that increased human capital accumulation in the form of schooling will affect women's subsequent experience of IPV through at least three key pathways: 1) increased outside options while she is in a partnership, which will in turn increase the woman's bargaining power in the household; increased hypothesized options prior to marriage formation, and thus 2) delays in the age of marriage and 3) increased quality of marriage match. With respect to pathway 1, as noted above, the relationship with IPV is ambiguous. In the case of pathway 2, delayed age of marriage, we hypothesize that this will on average decrease risk of IPV, as young women have been shown to consistently have a higher risk of IPV. In the case of pathway 3, we might suspect that on average women who secure a higher quality matches will be more equal matches, thus decreasing IPV risk. In addition, there is evidence that increases in male education has overall protective effects on perpetration; therefore, we might expect a negative relationship between IPV and higher quality marriage matches, regardless of equity considerations (Abramsky et al. 2011). Therefore, drawing on economic theory, the expected impact of education on IPV is ambiguous and may depend on the overall level of women's educational attainment, as well as the inequities and overall education of her partner.

4. Data and methodology

4a. Demographic and Health Surveys and treatment assignment

Data used in this study come from the 2004 and 2010 DHS in Malawi and the 2006 and 2011 DHS in Uganda. The DHS are cross-sectional household-based surveys, nationally representative of women aged 15 to 49 collected by ICF International in collaboration with host country governments. DHS routinely implement a standard GBV module with valid and reliable measurement of GBV with some variation across countries, allowing for cross-country comparisons (Hindin et al. 2008). These GBV modules are

administered to a random sub-sample of all women in the DHS. Malawi and Uganda were chosen based on the rollout and timing of UPE, in conjunction with timing of DHS and inclusion of GBV indicators. Treatment (exposure to UPE) is assigned to respondents based on birth cohort. In Malawi, respondents who were ages 13 and younger at policy implementation in 1994 (born in 1981 or later) are assigned treatment status and respondents who were 14 and older at policy implementation (born in 1980 or earlier) are assigned control status, aligning with the official years of primary education in the country. Similarly, in Uganda, girls who were ages 12 and younger at policy implementation in 1997 (born in 1985 or later) are assigned treatment status and girls who were ages 13 and older at policy implementation (born in 1984 or earlier) are assigned control status.

For this analysis we limit the GBV sample to women aged 22 to 29 at survey in both countries. We focus on this age range for a number of reasons. First, this provides a tight enough age range to assuage concerns about the confounding influence of age in predicting IPV, particularly since IPV rates are lower among adolescent women and higher among women over 30. Furthermore, this age range maximizes variation in policy exposure for the sample (Table 1). Since we merged multiple rounds of DHS for each country some respondents who were assigned treatment status were the same age at survey in 2010 and 2011 as respondents assigned control status and surveyed in 2004 and 2006 (Malawi and Uganda, respectively). This variation works to our advantage because treatment and control respondents are similar ages at survey. Presentation of descriptive statistics in subsequent sections shows that on average, treatment respondents were aged 24.5 and 24.2, while control respondents were aged 25.9 and 25.9 in Malawi and Uganda respectively (Table 2). This similarity in age between treatment and control respondents helps to mitigate the concern that effects on IPV are driven by differences in age between treatment and control respondents.

Table 1. Frequency and percent of the sample exposed to UPE while aged 12/13

	Malawi		Uganda	
	Freq.	Percent	Freq.	Percent
Exposure to UPE at age 12/13	2,993	58.02	363	35.41
No Exposure to UPE at age 12/13	2,166	42.98	662	64.59

Total	5,159	100	1,025	100

Note: Females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011).

4b. Key indicators

We define experience of IPV as any physical or sexual IPV as an aggregate measure. IPV is separately created for lifetime and past 12 months.[3] Questions regarding IPV were asked about the current or most recent partner among ever married or ever co-habiting women (i.e., everyone except never married women). We define education as the self-reported highest grade attained.[4]

4c. Methodology

We adopt an IV approach to estimate the causal effect of schooling on IPV. This empirical strategy offers a number of advantages over Ordinary Least Squares (OLS) or logistic regression. As previously discussed, it is likely that there are characteristics such as intrinsic parental value, socio-economic status, or personal preferences/attitudes that predict both schooling and likelihood of experiencing IPV. If so, then OLS or logistic regression estimates may overstate the schooling impact because schooling is partially proxying for these omitted characteristics.

In this case, assignment to treatment (exposure to UPE) is decided solely based on values of one measured variable, Z (birth cohort), which acts as an IV for grades of schooling attained (Angrist & Pischke 2009; Morgan & Winship 2007). The IV approach then takes advantage of the fact that girls and their households are essentially randomly exposed (the policy change is beyond their sphere of influence) to UPE and are comparable on both observed and unobserved characteristics from those who are not

[3] Lifetime IPV is asked consistently across DHS rounds, however experience of IPV in the last 12 months was not asked consistently. The 2004 Malawi DHS and 2011 Uganda DHS included a "yes/no" question about experience of IPV in the last 12 months, whereas the 2010 Malawi DHS and 2006 Uganda DHS asked about the frequency of experiencing IPV in the last 12 months. For the 2010 Malawi DHS and 2006 Uganda DHS respondents who reported experiencing IPV "frequently" or "often" were coded as having experienced IPV in the last 12 months.

[4] Results are robust to use of total years of schooling instead of grade attained.

exposed. Thus, we expect that girls who are still in primary school when UPE is implemented may be more likely to continue or extend their schooling thanks to elimination of fees, however girls who have just finished may not have this opportunity.[5]

The resulting model is a two stage least squares regression where the outcome is a dichotomous indicator of IPV and the treatment is a continuous variable that measures number of grades attained. The treatment is instrumented using a dichotomous indicator of exposure to UPE while age 12/13 or younger (the age at which girls would complete primary school if they were on track in terms of grade for age). In equation (1), the first stage, we regress *D*, the treatment, on *Z*, the randomly assigned IV. In equation (2), the second stage, we regress *Y*, the IPV outcome, on the predicted value of *D* from the first stage.[6]

(1) $D_i = \alpha_0 + \alpha_1 Z_i + \ldots \alpha_k X_k + v_i$

(2) $Y_i = \beta_0 + \beta_1 D_i + \cdots \beta_k X_k + \mathcal{E}_i$

In both equations (1) and (2) we control for indicators of religion and ethic group which vary by country (Table A1).[7]

[5] An alternative approach used in similar methodology would implement a regression discontinuity design (RDD) taking advantage of the fact that girls just above primary school age and just below primary school age at the year of policy implementation will be comparable on both observed and unobserved characteristics and differ only in their exposure to the UPE policy. Although this has been utilized successfully in other analyses (Behrman 2014), in our case, the sample sizes were not large enough to convincingly determine that birth cohort, rather than variation in age was driving the relationship between education and IPV.

[6] Models are run using the 'ivreg' command in stata, however are robust to use of probit models in the second stage.

[7] Controlling for additional socio-economic factors such as urbanicty, household size and wealth are not appropriate, as it is unlikely that the current information collected reflects the same situation of girls when they were exposed to UPE. Results are robust to addition of an indicator for wave of survey.

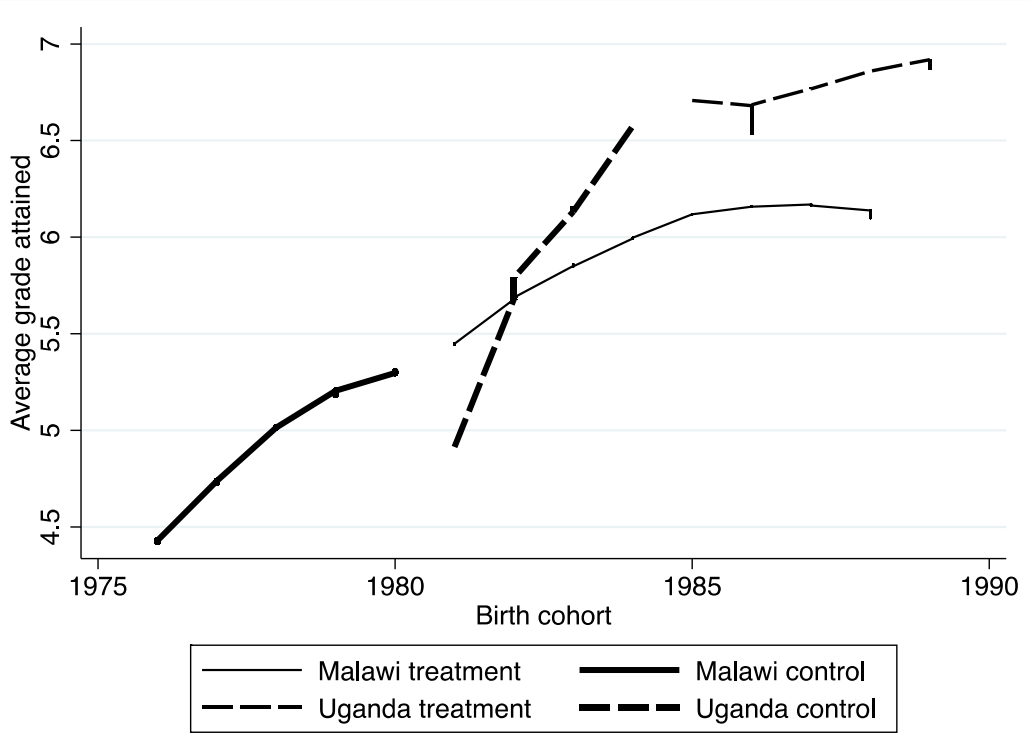
The plausibility of the IV approach depends on a number of assumptions. First we must believe in the ignorability of the instrument, in other words that exposure to UPE is random and determined only by birth cohort. Second, there must be a non-zero correlation, or strong predictive power of the instrument (UPE) and the treatment (increased schooling). The plausibility and support of this assumption is discussed in the section showing first stage results. Finally, the exclusion restriction assumes there are no additional pathways through which exposure to UPE could affect IPV, other than through increased education. That is to say, Z_i is uncorrelated with both ε_i and v_i. Since we do not have multiple IVs, we are unable to conduct standard over-identification tests to further explore this assumption. However, it is unlikely to think of alternative pathways through which a policy change such as UPE could affect a health outcome such as IPV more directly than through education dynamics. Standard errors are clustered at the primary sampling unit (PSU) level according to DHS sampling methodology. All analysis was conducted in Stata version 12.0.

5. Results

5a. Descriptive results

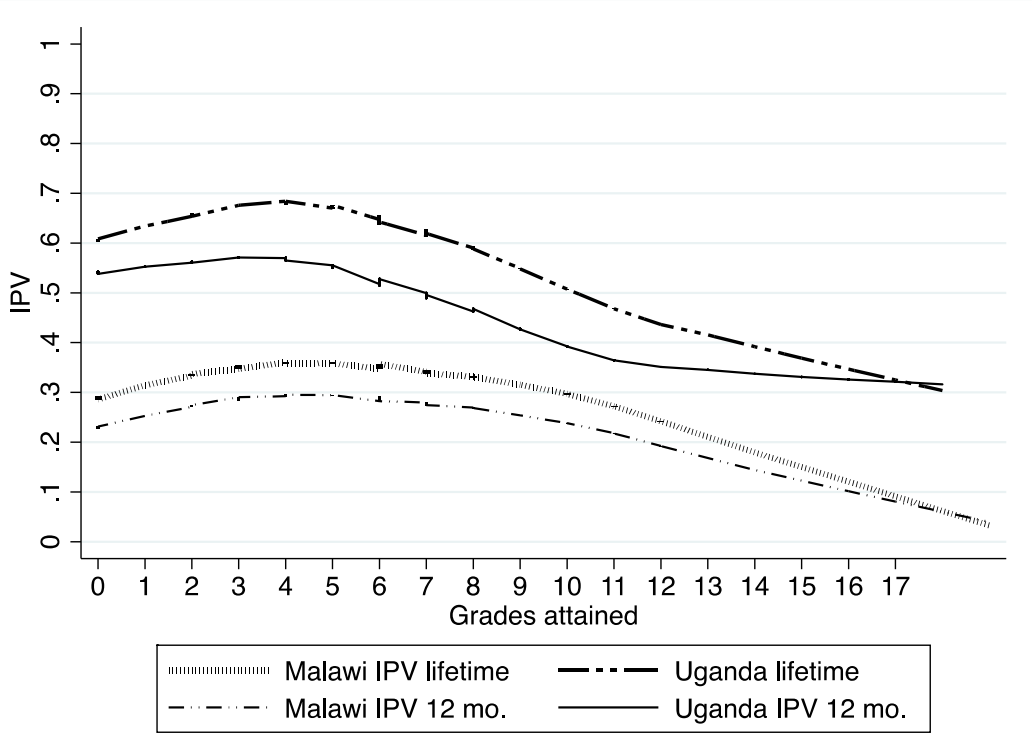
We focus on the sub-sample of women aged 22 to 29 who were administered IPV modules in 2004 and 2010 in Malawi and in 2006 and 2011 in Uganda (n=5,063 in Malawi and n=1,085 in Uganda). We start by visually examining the distribution of education and IPV within the samples. Figure 1 plots the distribution of education among our sample of women, modeled as average grade attained between the UPE partially or fully exposed cohort and no exposure groups by country. Although both the UPE partial or fully exposed and no exposure groups experienced upward trends in average grade attained in relation to age, as we would expect, there is an exogenous shift in these trend lines that occurred due to UPE (starting with those born in 1981 in Malawi and 1985 in Uganda).

Figure 1. Lowess plot of average grade attained by birth cohort for Malawi and Uganda, females aged 22 to 29



Next, we present lowess plots between years of education and IPV, modeled as reporting for both lifetime and 12-month measures. We observe that in both countries there are similar trends across IPV measures, where lifetime and 12-month experience is high and increases with increasing education until approximately four to five grades of education and subsequently decreases, forming an inverted U shape relationship. At approximately six grades of education in Uganda, and approximately nine years of education in Malawi, levels of IPV are lower than women with no years of formal schooling. Levels of overall IPV are generally higher in Uganda as compared to Malawi.

Figure 2. Lowess graph of lifetime IPV and IPV in the last 12-months by grade attained in Malawi and Uganda, females aged 22 to 29



Descriptive statistics presented in Table 2 confirm that, compared to those not exposed to UPE, those fully or partially exposed have higher grade attained (5.75 versus 4.98 years in Malawi; 6.40 versus 5.33 in Uganda). In addition, girls who were exposed are significantly more likely to have completed primary school and attended some secondary or higher both countries. IPV descriptive statistics confirm that rates are high among the analysis sample. Lifetime rates in Malawi are 36% and 30% in the UPE exposed and non-exposed samples respectively, while in Uganda lifetime rates are 57% and 66% in the UPE exposed and non-exposed samples. Although percentages vary, 12-month rates of IPV are typically 7% to 13% lower than those reported for lifetime, indicating that there is substantial persistence in victimization.

Table 2. Descriptive statistics of key outcomes of the analysis including bivariate analysis

	Malawi Treatment	Malawi Control	Malawi T vs. C	Uganda Treatment	Uganda Control	Uganda T vs. C
	Mean (SD)	Mean (SD)	Pr(|T| > |t|)	Mean (SD)	Mean (SD)	Pr(|T| > |t|)
Schooling variables						
Age at survey	24.42 (2.27)	25.91 (1.54)	0.00	23.89 (1.33)	25.52 (2.34)	0.00
Grade attained	5.75 (3.75)	4.98 (3.99)	0.00	6.4 (3.89)	5.33 (3.91)	0.00
Years of schooling	5.73 (3.69)	4.96 (3.93)	0.00	6.34 (3.76)	5.29 (3.8)	0.00
Completed primary	0.32 (0.47)	0.27 (0.45)	0.00	0.47 (0.5)	0.34 (0.47)	0.00
Attended some secondary	0.23 (0.42)	0.19 (0.39)	0.00	0.33 (0.47)	0.23 (0.42)	0.00
IPV variables						
IPV lifetime	0.36 (0.48)	0.30 (0.46)	0.00	0.57 (0.50)	0.66 (0.47)	0.00
IPV last 12 mo.	0.29 (0.46)	0.23 (0.42)	0.00	0.47 (0.50)	0.53 (0.5)	0.02
	2993	2166		363	662	

Note: Females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). Mean values are weighted according to weights provided in the DHS.

5b. Naïve regressions of association between education and IPV

Before presenting the IV results, we first present naïve probit regressions of the association between years of schooling and IPV in Table 3. In both countries, we observe a negative and significant relationship between years of schooling and experience of IPV, although this relationship stronger in Uganda. In Uganda, an increase in one year of schooling is associated with a two percentage point decrease in the lifetime and 12 month experience of IPV. In Malawi, an increase in one year of schooling attainment is associated with less than one percentage point decrease in the lifetime and 12 month experience of IPV.

Table 3. Probit (marginal effects) association between grades of schooling and lifetime experience of IPV and experience of IPV in the last 12 months in Malawi and Uganda.

	(1) Malawi	(2) Uganda	(3) Malawi	(4) Uganda
VARIABLES	IPV lifetime	IPV lifetime	IPV last 12 mo.	IPV last 12 mo.
Grades attained	-0.00*	-0.02***	-0.00*	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Observations	5,159	1,025	5,159	1,025

Sample is among females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). All models include controls for religion and ethno-linguistic background. Robust standard errors are clustered at the cluster level.
*** p<0.001, ** p<0.01, * p<0.05

5c. IV estimates of the impact of education and IPV

Table 4 shows the impact estimates of schooling attainment on experience of IPV by country. The top panel shows the first stage regressions, which indicates that the instrument of exposure to UPE is highly significant in both countries ($p<0.001$), and F-statistics high at 45.07 for Malawi and 22.14 for Uganda. The second stage shows that a one year increase in schooling leads to 9 and 10 percentage point increase in the probability of lifetime and 12-month experience of IPV, respectively, in Malawi ($p<0.001$). Conversely, increasing one year of schooling leads to a 10 and 7 percentage point decrease in the probability of lifetime and 12 month experience of IPV in Uganda ($p<0.05$; $p<0.01$).

Table 4. First stage results for the association between exposure to UPE at age 12/13 and grades attained in Malawi and Uganda (panel A) and second stage results for the effect of grades attained on lifetime IPV and IPV in the last 12 months (panel B).

Panel A	(1)	(2)		
	Malawi	Uganda		
VARIABLES	Grade attained	Grade attained		
Exposure to UPE at age 12/13	0.68***	1.15***		
	(0.10)	(0.25)		
Observations	5,159	1,025		
R-squared	0.08	0.19		
Panel B.	(1)	(2)	(3)	(4)
	Malawi	Uganda	Malawi IPV 12	Uganda IPV 12
VARIABLES	Lifetime IPV	Lifetime IPV	mo.	mo.
Grades attained	0.09***	-0.10**	0.10***	-0.07*
	(0.02)	(0.03)	(0.02)	(0.03)
Observations	5,159	1,025	5,159	1,025

Sample is among females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). All models include controls for religion and ethno-linguistic background. Robust standard errors are clustered at the cluster level.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$

5d. Heterogeneous effects and exploration of pathways

To further explore the differences in impacts, based on the inverted U-shaped relationship found in the Figure 2, we re-estimate the main analysis using samples of women split between those who have: 1) no

education or incomplete primary, and 2) those who have completed primary or above. First stage results of the impact of UPE on schooling attainment is insignificant among the Uganda (not reported). Thus, we conduct the robustness check split by education level only in Malawi. In the second stage, we show that among the sample who have incomplete primary education or less, increasing education is associated with a higher risk of IPV. The magnitude of these impacts are similar to those found in the full sample (an 8 and 9 percentage point increase in experience of IPV for lifetime and 12-month measures with an additional year of schooling attained, respectively). However, when we consider the sample of women who have achieved secondary or higher the impact of schooling is protective against IPV, consistent with the inverted U-shaped relationship. These results indicate that an additional year of schooling attained result in a 9 percentage point decrease in the probability of experiencing lifetime IPV, and a 12 percentage point decrease in the probability of experiencing IPV in the last 12-months, however only the later achieves statistical significance.

Table 5. First stage results for the association between exposure to UPE at age 13 and grades attained in Malawi disaggregating by completion of primary school (panel A) and second stage results for the effect of grades attained on lifetime IPV and IPV in the last 12 months disaggregating by primary school completion in Malawi (panel B).

Panel A	(1)	(3)
	Malawi	Malawi
	Incomplete primary	Complete primary
VARIABLES	Grade attained	Grade attained
Exposure to UPE at age 13	0.84***	-0.54***
	(0.08)	(0.13)
Observations	3,789	1,370
R-squared	0.09	0.02

Panel B	(1)	(2)	(3)	(4)
	Malawi	Malawi	Malawi	Malawi
	Incomplete primary	Incomplete primary	Complete primary	Complete primary
VARIABLES	Lifetime IPV	IPV 12 mo	Lifetime IPV	IPV 12 mo.
Grade attained	0.08***	0.09***	-0.09	-0.12*
	(0.02)	(0.02)	(0.05)	(0.05)
Observations	3,789	3,789	1,370	1,370

Sample is among females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). All models include controls for religion and ethno-linguistic background. Robust standard errors are clustered at the cluster level.

*** p<0.001, ** p<0.01, * p<0.05

To further explore dynamics, we conduct robustness checks on outcomes which we believe are possible pathways for impacts of education on IPV (Table 6). We utilize the same identification and methodology as in the main analysis for IPV outcomes. Although sample sizes vary for some of the pathways outcomes due to missing data, the first stage results are highly significant across models and the F-statistic ranging from 16 to 32 (results of the first stage are available upon request). The indicators of pathways are: 1) woman works for cash wage[8], 2) woman has say either solely or jointly in how to spend her earnings, 3)

[8] This includes women who work for cash wage and women who work for cash wage and in-kind payment.

age at first sex, 4) age at first marriage, 5) partners grade attainment, 6) partners age in years. The first two indicators relate to pathway 1, increased bargaining power inside the household, while indicators 3 and 4 relate to pathway 2, delays in the age of marriage. Finally, indicators 5 and 6 relate to pathway 3, or increased quality of marriage matches. The means for these indicators are available in Appendix Table A1. Table 6 shows that in general, we find evidence for pathways 1 and 3, while we find no evidence for pathway 2. Increasing grade attainment has highly significant impacts on women's work for cash (Malawi and Uganda, $p<0.001$) and her say in decision making around earnings (Malawi, $p<0.001$). In addition, increasing grade attainment leads to significant increases in partners' grade attainment and decreases in partners' age in years in both countries, which are both indicators of higher quality marriage matches. Conversely, we find no evidence of pathway 2, delays in age at first sex or marriage due to increase in grade attained. In fact, in Malawi, we find the counter intuitive finding that increase in grade attainment lead to a decrease in the age at first marriage.

Table 6. Second stage results for the effect of grades attained on impact pathways for Malawi (panel A) and Uganda (panel B).

Panel A	(1) Malawi	(2) Malawi	(3) Malawi	(4) Malawi	(5) Malawi	(6) Malawi
VARIABLES	Works for cash	Say in earnings	Age first sex	Age first marriage	Partners grade attainment	Partners age in years
Grades attained	0.18***	0.72***	-0.27	-0.51**	0.45**	-2.64***
	(0.04)	(0.12)	(0.14)	(0.17)	(0.16)	(0.50)
Observations	3,443	5,159	4,722	5,070	4,430	4,451

Panel B	(1) Uganda	(2) Uganda	(3) Uganda	(4) Uganda	(5) Uganda	(6) Uganda
	Works for cash	Say in earnings	Age first sex	Age first marriage	Partners grade attainment	Partners age in years
Grades attained	0.11***	-0.01	0.17	0.06	0.81***	-1.59**
	(0.03)	(0.02)	(0.15)	(0.19)	(0.20)	(0.49)
Observations	842	1,025	971	1,025	888	925

Sample is among females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). All models include controls for religion and ethno-linguistic background. Robust standard errors are clustered at the cluster level.

*** p<0.001, ** p<0.01, * p<0.05

6. Discussion and conclusion

Results from this study suggest that education, as measured by primary school attainment, has a protective effect on experiencing IPV in some contexts. However, this simplistic relationship hides an underlying complexity indicating a backlash against increasing education at lower ends of the education distribution. The differences between the naïve (correlative) associations and the IV estimates underscore the importance of using rigorous methodologies which can infer causality when examining the relationship between schooling and IPV. To our knowledge, rigorous quantitative research at the micro level showing causality on this relationship is virtually non-existent. Evidence around this relationship in diverse settings is essential as recent calls for understanding of what works to prevent partner violence focuses squarely on primary prevention. In addition, analysis of 29 DHS examining age of first physical

and sexual violence victimization of women in intimate partnerships and found that primary prevention for IPV must take place prior to union formation, while women are still adolescents, or on average before age 19, to be effective at the population level (Peterman et al. 2014). Thus, structural interventions such as government primary and secondary schooling are essential programming and policy consideration for reduction of GBV.

Despite promising evidence in Uganda that grade attainment leads to decreases in IPV, particularly through increases in women's bargaining power within the households, and higher quality marriage matches, there are clear heterogenous impacts in Malawi. The inverse U relationship observed means that women at the lower spectrum of education levels, face a backlash when challenging power dynamics within their households. This same relationship is hypothesized by economic theory and has been observed in several cash transfer and labor force participation studies, when women's relative economic power within the household shifts, and subsequently an uptick in IPV is observed (Bobonis et al. 2013; Hjort & Villanger 2011). In addition, in Malawi, we observe an unexpected impact on the relationship between increased grade attainment and age at marriage, where increased schooling leads to decreased age at marriage. It is not clear what is creating this dynamic. It is possible that sudden abolishment of fees at the primary level incentivized disadvantaged girls to return to school, or that the increase in enrollment lead to decreases in school quality such that the benefit of additional years attainment is diluted. Unfortunately, we cannot test these assumptions with our data, and therefore these are only hypotheses.

There are a number of additional limitations of our study, include underreporting of IPV (DeKeserdy & Schwartz 1998; Kishor & Johnson 2004); however, we have no reason to believe that women with different exposures to UPE policies underreport at different rates, and thus our impact estimates should not be affected. Second, our lifetime IPV indicator refers only to lifetime experience of IPV with the current or most recent partner, and does therefore not pick up IPV experience with additional, previous partners. Finally the sample size in Uganda does not allow us to conduct heterogeneity analysis by level of educational attainment of the woman as in Malawi. Ideally we would

be able to track women over time who received exogenous increases in schooling to net out individual level heterogeneity, however in the absence of field experiments, rely on natural experiments such as the implementation of UPE.

Despite the limitations in the current methodology, a number of emerging studies use educational policy change in Africa, typically to analyze the relationship between schooling and early fertility outcomes. Ozier (2011) used performance on the national Kenyan secondary school entrance exam to conduct a RDD analysis, finding that secondary schooling leads to a reduction in adolescent pregnancy for females. Also in Kenya, Ferre (2007) used a 1985 education reform as an instrument for years of schooling and found a one-year increase in schooling led to an 8 percent decrease in the probability of adolescent pregnancy. In nearby Ethiopia, Pradhan and Canning (2013) used elimination of school fees as a natural experiment. Using a regression discontinuity approach, they found each additional year of schooling lowered the probability of adolescent pregnancy by 6 percent. To date, there is only one known use of UPE and the RDD approach to examine outcomes among adult women, and this focused on HIV biomarkers and risky sexual behavior (Behrman 2013).

In this study, we have provided evidence that basic schooling can be a policy instrument to affect later experience of IPV, and has potential for primary prevention policies in particular. Malawi and Uganda were among the earliest adopters of UPE in sub-Saharan Africa. Since then, school fees have also been eliminated in Ethiopia (1994); Cameroon (1999/2000); Lesotho (2000); Tanzania (2001); Zambia (2002); Kenya (2003); Mozambique (2004); and Ghana (2005) (Kattan 2006; World Bank 2009). Governments should continue and increase current efforts to increase access to schooling, including elimination of fees as well as address other barriers such as lack of supplies and uniforms. This is the first study to our knowledge to examine causal impacts of education on IPV, and these results greatly contribute to the evidence base on the effectiveness of human capital investments for primary prevention of IPV. It is important for the research community to invest in additional studies to provide further casual evidence on this relationship. In particular, it is important to examine the potential backlash of increasing education in the lower distribution of education as observed in Malawi, and to implement creative

interventions which protect women and girls in the vulnerable lower distributions of education or empowerment. The dialogue around women's education, empowerment and IPV must move beyond using this uptick as a reason to delay or refrain from implementing programs and policies that have potential to move girls and women further along the curve towards lower rates of IPV. As governments across the region look to scaling up social policy interventions to effect change in a range of outcomes (sometimes as secondary objectives) related to women's and adolescent's health and well-being (Handa & de Milliano 2014), this study provides evidence of the importance of schooling and its potential to have widespread and lasting impacts.

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Table A1. Descriptive statistics of background characteristics and pathways outcomes

	Malawi	Uganda
Pathways outcomes		
Works for cash earnings (0-1)	0.43 (0.5)	0.65 (0.48)
Control over earnings (0-1)	0.3 (0.46)	0.81 (0.39)
Age first sex	16.68 (2.51)	16.3 (2.56)
Age first marriage	17.49 (2.75)	17.54 (3.11)
Partner grade attainment	7.79 (3.49)	8 (3.86)
Partner age	30.51 (5.16)	31.36 (5.77)
Background characteristics		
Christian (0-1)	0.65 (0.48)	0.4 (0.49)
Catholic (0-1)	0.22 (0.41)	0.42 (0.49)
Muslim (0-1)	0.13 (0.33)	0.14 (0.35)
Other religion (0-1)	0.01 (0.11)	0.03 (0.18)
Chichewa ethno-linguistic (0-1)	0.58 (0.49)	
Tumbuka ethno-linguistic (0-1)	0.09 (0.29)	
Other ethno-linguistic Malawi (0-1)	0.33 (0.47)	
Luganda ethno-linguistic (0-1)		0.17 (0.37)
Ateso-karamojong ethno-linguistic (0-1)		0.1 (0.3)
Luo ethno-linguistic (0-1)		0.14 (0.35)
Runyankole-Rukiga ethno-linguistic (0-1)		0.18 (0.39)
Other ethno-linguistic Uganda (0-1)		0.41 (0.49)
N	5159	1025

Note: Females aged 22 to 29 in DHS (Malawi 2004 and 2010; Uganda 2006 and 2011). Mean values are weighted according to weights provided in the DHS.