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Smartphones and attitudes to intimate partner violence: Evidence from Africa

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Abstract

This paper, using data from the Afrobarometer surveys, examines the potential for smartphones to influence attitudes to intimate partner violence (IPV). Controlling for ownership of television and radio, we find that those living in areas with a higher incidence of smartphone ownership are more likely to state that it is never justifiable for a man to beat his wife. This is the case for both male and female respondents. We find that the strength of the association between regional smartphone proliferation and attitudes to IPV is similar for those who frequently get news from social media and those who get news from elsewhere. This suggests that our results are not driven entirely by personal social media use. Finally, we only find a statistically significant relationship for those who are socially conservative.

1 | INTRODUCTION

It is estimated that globally more than one in four (27%) women between the ages of 15 and 49, who have had an intimate partner, have experienced physical or sexual intimate partner violence (IPV) within their lifetime (Sardinha et al., 2022). The data show that this is not just a problem confined to certain types of countries. The lowest incidence of lifetime IPV victimisation occurred in central Europe, with 16% of women experiencing IPV within their lifetime (Sardinha et al., 2022). IPV is clearly a pervasive issue and one that disproportionately impacts women (WHO, 2012). Men are more likely to be victims of violent acts perpetrated by strangers (Krug et al., 2002), whereas women are more commonly victims of violence caused by intimate partners or ex-partners (Heise et al., 1999). In the United States alone, roughly 42.4 million women (35.6%) are victims of rape, physical violence and/or stalking by an intimate partner (Stockman et al., 2015).

The significant direct and immediate costs of such violence are exacerbated by increased risk of adverse mental and physical health outcomes amongst victims. This is true for both male and female victims of IPV. Victims of physical IPV are at greater risk of current poor health, depressive symptoms and substance abuse (Coker et al., 2002; Kim & Lee, 2013). Kim and Lee (2013) also found that the resultant increased likelihood of depression further increases the victim's likelihood of further IPV victimisation. Yilmaz (2018) presents evidence from Turkey that points to a negative effect of IPV on female autonomy.

Understanding the underlying economic, social and cultural causes of IPV is therefore of key importance in terms of targeting resources and developing policy. Existing research has pointed to factors such as the certainty of sanction (Song et al., 2017) as an effective legal deterrent, whereas Sherman and Berk (1984) suggest that mandatory arrest for suspected IPV cases was a successful deterrent of recidivism. Sherman et al. (1992) found that the impact of this intervention was highly dependent on the detainee's 'stake in conformity'. Evidence also points to an increase in IPV arising from COVID-19 lockdowns (Gibbons et al., 2021).

Technology is also an important factor that shapes IPV norms and outcomes. In a seminal study, Jensen and Oster (2009) argue that the spread of cable television in India provided information about the world and the ways that others lead their lives and show that the spread of this technology led to less support for the idea that domestic violence is acceptable. In a similar vein, Hornuf et al. (2023) find that exposure to West German television reduces xenophobia in those born in the former East Germany and the level of hate crimes against refugees. Smartphone technology resembles the cable television rollout studied by Jensen and Oster (2009) in terms of providing access to information and the experiences of others but also offers scope for conversations and educational opportunities.

Two recent studies have examined the relationship between internet access and attitudes to domestic violence. Viollaz and Winkler (2022) in their study of the effect of the roll out of mobile internet access in Jordan on female labour outcomes find that internet access reduces women's likelihood of expressing the view that it is acceptable for a man to use violence against his wife. However, using data for Benin, Ghana, Kenya, Namibia and Nigeria, Frezza (2021) finds to the contrary that the arrival of fast internet led to those living in connected areas being more likely to express the view that such violence is justifiable.

We contribute to this literature in several ways. To the best of our knowledge, we are the first to analyse how the proliferation of smartphone technology is associated with changing attitudes to IPV in a large sample of 34 African societies. We show that the increased availability of the technology is associated with changes in the views of both men and women. We also provide evidence on the mechanisms that link smartphone proliferation to domestic violence norms.

Using Afrobarometer data, we find that a greater incidence of smartphone ownership in the respondent's region is associated with a lower likelihood that they express permissive attitudes towards a man beating his wife. This effect is evident for both women and men. Importantly, we control for ownership of television and radio, both of which have been argued to be powerful shapers of norms. An increase in the ownership rate of smartphones is a statistically significant predictor of attitudes for both those who get their news from social media and those who get it from elsewhere, suggesting that our results are not driven purely by social media. Finally, we explore the influence that holding strong conservative views has on how effective smartphone technology is in changing attitudes to IPV. Using an index of social conservatism that is built on expressed views on gender roles, politics, religion and people of other racial and ethnic backgrounds and sexual orientations, we show that smartphone proliferation is only associated with attitudes to IPV for those who are relatively socially conservative.

Understanding the factors that shape attitudes to IPV is important in terms of developing policy. Norms are powerful forces that shape our behaviour. When we transgress a social norm, we incur a social cost. If people regard domestic violence as an unacceptable act, then they will be less likely to engage in or tolerate it. Clark et al. (2018) who find that norms strongly predict Nepalese women's risk of physical and sexual IPV provide evidence for this important role of norms. Banyard et al. (2020) come to a similar conclusion in their survey of rural communities in New England in the United States. In this case, stronger social norms relating to prevention in the community predicted active involvement in helping prevent domestic and sexual violence. Mookerjee et al. (2022) who find that beliefs relating to the justifiability of wife beating are important determinants of IPV risk provide causal evidence from India.

In the next section, we discuss the mechanisms through which widespread smartphone ownership could change norms relating to IPV. We then present our data and describe our quantitative approach. Our results are presented in Section 4 and discussed in Section 5. We summarise our findings and conclude in Section 6.

2 | SMARTPHONES AND ATTITUDES TO DOMESTIC VIOLENCE

Jensen and Oster (2009) theorise that increased exposure to the ideas, outcomes and experiences of others can shape one's own expectations and behaviours. In addition to their own results linking exposure to cable television to changes attitudes and behaviours related to domestic violence (Jensen & Oster, 2009), they point to studies linking television exposure in Muslim countries to attitudes towards the West (Gentzkow & Shapiro, 2004) and to voting behaviour in the United States of America (DellaVigna & Kaplan, 2007). To this, we can add recent work linking exposure to television to reductions in xenophobia and racism (Hornuf et al., 2023).

The proliferation of smartphone technology and mobile internet access has allowed people around the world to access information and opinions cheaply and regularly. As noted by Ochoa et al. (2022), mobile broadband technology is the primary way in which people in developing countries access the internet. In addition to promoting economic development (Hübler & Hartje, 2016), access to this technology has been shown to have the potential to foster civic engagement (Ingrams, 2015) and the empowerment of women (Rotondi et al., 2020). The combination of smartphones, mobile broadband and video streaming services and social media resembles the expansion of television coverage in that the internet offers access to vast quantities of information and entertainment content. However, there are additional mechanisms through which smartphones can change norms.

Social media is a medium through which people can be exposed to information and the experiences of others. As of quarter two of 2021, Facebook had roughly 2.895 billion active monthly users (Facebook, 2021). The nature of social media allows for almost instantaneous communication and interaction with countless individuals throughout the world. It is well documented that smartphones and social media increase social comparison opportunities (Vogel et al., 2014; Yang, 2016). For instance, social media allows for easier upward social comparison to celebrities and others of perceived high status (Ho et al., 2016). This is often discussed in negative contexts such as the effect of social media on depression or loneliness. However, it is possible that these new social comparison opportunities may play a role in changing attitudes towards IPV. Although social comparisons were traditionally limited to immediate geographic neighbours, smartphones and social media now allow individuals to compare themselves to a wider array of people, including those living in countries with different norms and behaviours relating to domestic violence. Exposure to successful women may change the normative status of female empowerment, which Schuler and Nazneen (2018) argue to be an important factor in the decline of IPV in Bangladesh. Given this potentially important role of social media, we test if our results are different for those who get their news from social media and those who get their news elsewhere.

In addition to allowing people to observe the attitudes and experiences of others passively, smartphones also facilitate communication through calls, messages and social media interactions. They allow individuals to discuss and share their experiences. Mookerjee et al. (2022) argue that the occurrence of domestic violence may be revealed through conversations among neighbours and that such conversations can influence social norms regarding the acceptability of domestic violence. Smartphones may facilitate private conversations among neighbours and people more generally regarding IPV and therefore change attitudes. Smartphones also allow emigrants to communicate with family and friends back home more frequently and at greater length. While abroad, migrants are exposed to new cultures and norms that can be transmitted back to their home country. Transfers of norms from migrants to their home countries have been observed with respect to democratic diffusion (Pérez-Armendáriz & Crow, 2010; Spilimbergo, 2009), fertility choices (Bertoli & Marchetta, 2015) and gender norms (Ge et al., 2011; Samari, 2021; Tuccio & Wahba, 2015; Tuccio & Wahba, 2018). A transfer of norms can occur through communication with migrant friends and relatives who still live abroad (Pérez-Armendáriz & Crow, 2010), and smartphone technology offers the possibility for relatively cheap, high-quality and frequent communication through text, audio and video.

TABLE 1 Intimate partner violence norms.

Respondent thinks it can be justified for man to beat his wife …	Overall %	Men %	Women %
Never	71.59	68.52	74.94
Sometimes	19.57	21.81	17.13
Always	8.84	9.67	7.94
$N =$	30,687	16,008	14,679

Education programs have been seen as a promising tool in the fight against domestic and gender-based violence more generally, and scholars have evaluated such interventions in a variety of contexts (e.g. Abramsky et al., 2014; Corboz et al., 2019; Diop et al., 2004). Smartphones can facilitate education by allowing individuals to access education far beyond the traditional classroom (Buck et al., 2013). Erten and Keskin (2018) find that female empowerment through education reduced the prevalence of physical violence, sexual violence, psychological violence and financial control of women in Turkey. Özer et al. (2023) also find that, in Turkey, an increase in the education of husbands lowers the risk of physical, emotional and economic violence. Smartphones can be used to access educational opportunities via social media and other applications. Edutainment programs can also be accessed through social media and video streaming apps. Such programming can be an effective intervention against gender-based violence (Usdin et al., 2005).

Given these potential mechanisms, we expect that the proliferation of smartphone technology will predict attitudes to domestic violence. Like television, smartphones offer access to information and expose people to the experiences and expectations of others. Moreover, smartphones offer access to social media and educational opportunities and facilitate conversations.

3 | DATA AND METHODOLOGY

To test the hypothesis that smartphone technology can change norms relating to IPV, we employ data from Round 7 of the Afrobarometer. Round 7 of the Afrobarometer was carried out between 2016 and 2018 in 34 African countries.[1] The data are collected from face-to-face surveys of households chosen to deliver a nationally representative sample.

The survey asks respondents to indicate if they think 'it can always be justified', 'sometimes be justified' or 'never be justified' for 'A man to beat his wife?' We use this information as our measure of IPV but we recognise that it only captures one modality of abuse and does not capture attitudes to IPV outside of marriage. It also does not capture attitudes to IPV committed by women against men or IPV committed within the contexts of same-sex partnerships. Nevertheless, the Afrobarometer does afford researchers the opportunity to study attitudes to this particular form of IPV.

Table 1 presents the distribution of these variables overall and for sub-samples of male and female respondents. 71.59% of respondents report that they think it is never justifiable for a man to beat his wife, with 19.57% and 8.84% expressing the view that it is sometimes justifiable and always justifiable, respectively. Men are more tolerant of IPV (directed against women) as a group than women are, but significant shares of women do express the view that this type of domestic violence is sometimes (17.13%) or always (7.94%) justifiable.

Afrobarometer respondents also report whether they personally own a mobile phone/cellphone with access to the internet. Although some definitions of 'smartphone' include camera functionality or the ability to download applications, internet access is generally the primary characteristic. For simplicity, we use the term smartphone, though we acknowledge that the surveys do not probe other dimensions of cellphone technology. We therefore create a variable, *Smartphone*, which takes a value of one if the respondent indicates that they personally own a mobile phone with internet access, and zero otherwise. Table 2 presents summary statistics for our main variables of interest. 39% of respondents report personally owning a smartphone.

[1]Benin, Botswana, Burkina Faso, Cabo Verde, Cameroon, Côte d'Ivoire, Eswatini, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.

TABLE 2 Summary statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
Smartphone	30,687	0.389	0.488	0	1
Smartphone prevalence	30,687	0.365	0.203	0	1
Age	30,687	36.524	14.539	18	106
Poverty index	30,687	5.899	4.531	0	20
Urban	30,687	0.456	0.498	0	1
Female	30,687	0.478	0.5	0	1
Political conservatism	30,687	0.753	0.135	0.21	1
Social conservatism	30,687	0.557	0.102	0.215	0.96
Authoritarian	30,687	0.589	0.091	0.235	1
TV ownership	30,687	0.579	0.494	0	1
TV prevalence	30,687	0.568	0.300	0	1
Radio ownership	30,687	0.779	0.415	0	1
Employed	30,687	0.366	0.482	0	1
No religion	30,687	0.042	0.201	0	1
Christian	30,687	0.546	0.498	0	1
Muslim	30,687	0.336	0.472	0	1
Traditional religion	30,687	0.012	0.109	0	1
Hindu	30,687	0.012	0.11	0	1
Bahai	30,687	0.000	0.008	0	1
Jewish	30,687	0.000	0.011	0	1
Education level	30,687	2.226	1.183	1	5

Sharing mobile phones, both privately and commercially, is common in developing countries (James, 2011). Therefore, widespread ownership of smartphones may allow an individual to access the technology, even if they do not personally own a phone or live with someone who does. In addition, even if I do not own a smartphone, if such technology is changing the attitudes of people around me, there could be a spillover effect on my own behaviours and attitudes. We therefore also include the regional incidence of smartphone ownership. We create this variable by averaging the *Smartphone* variable over the respondent's region (which can be provinces, districts or states depending on the country) as identified in the survey. The variable *Smartphone Prevalence* therefore reflects the rate of smartphone ownership in the respondent's region of residence.

As our outcome of interest is a categorical variable with a natural ordering, we estimate ordered probit models and report the marginal effects for ease of interpretation. Standard errors are clustered at the regional level, and we include country-fixed effects to allow for cross-country heterogeneity in terms of norms, technology and other salient country-level factors that could shape attitudes to domestic violence and smartphone adoption. We also control for individual factors that could shape both demand for a smartphone and attitudes to IPV. Specifically, we control for age, gender, urban or rural status, education, religion, an employed dummy and a lived poverty index that captures how frequently the respondent reports going without enough food, water, medical attention, cooking oil and a cash income. We also control for household ownership of a television or radio as these are also potentially powerful technologies for shaping norms (Adena et al., 2015; Jensen & Oster, 2009). Finally, we control for political and social conservatism and support for authoritarianism. These indices are constructed from several questions in the Afrobarometer that probe political and social positions. All variables are fully defined in Table A1. The summary statistics in Table 2 show that our sample is 48% female, with an average age of 37.5. 45.6% of respondents were urban residents.

4 | RESULTS

Table 3 presents our main results. Individual ownership of a smartphone is not a statistically significant predictor of attitudes to IPV. However, we do find that the effect of smartphone prevalence has a statistically significant and relatively strong effect on attitudes towards IPV. As noted above, sharing of smartphones is common in developing countries (James, 2011) allowing those without ownership to access the technology. In addition, the proliferation of the technology can influence one's own norms via its effects on the norms of others. Holding constant ownership of a television and radio, we estimate that, on average, a one unit change in the average number of smartphones per

TABLE 3 Main results.

	Respondent thinks it can be justified for a man to beat their wife		
	Never	Sometimes	Always
Smartphone	0.0014	−0.0009	−0.0005
	(0.0072)	(0.0048)	(0.0024)
Smartphone prevalence	0.136**	−0.0915**	−0.0448**
	(0.0533)	(0.0356)	(0.0179)
Age	0.0008***	−0.0006***	−0.0003***
	(0.0002)	(0.0002)	(0.0001)
Political conservatism	−0.0618*	0.0415*	0.0203*
	(0.0326)	(0.022)	(0.0107)
Social conservatism	−0.104**	0.0696**	0.0341**
	(0.0434)	(0.029)	(0.0145)
Authoritarianism	0.0491	−0.033	−0.0162
	(0.0428)	(0.0287)	(0.0141)
Poverty index	−0.0027***	0.0018***	0.0009***
	(0.0009)	(0.0007)	(0.0003)
Urban	0.0049	−0.0033	−0.0016
	(0.0078)	(0.0053)	(0.0026)
Female	0.076***	−0.051***	−0.025***
	(0.0059)	(0.0045)	(0.002)
TV ownership	0.0182**	−0.0122**	−0.006**
	(0.0084)	(0.0056)	(0.0028)
Radio ownership	0.0061	−0.0041	−0.002
	(0.0077)	(0.0052)	(0.0026)
Employed	0.0079	−0.0053	−0.0026
	(0.0078)	(0.0053)	(0.0025)
Religion controls	Yes	Yes	Yes
Education level controls	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes
Observations	30,687	30,687	30,687

Note: Ordered Probit marginal effects reported. The corresponding standard errors are clustered at the regional level and reported in parentheses.
*Significance at 10% level.
**Significance at 5% level.
***Significance at 1% level.

person increases the likelihood that respondents report that they view IPV as never acceptable by 13.6%. A similar change is estimated to reduce the likelihood that one will find IPV sometimes acceptable by 9.15% and that it is viewed as always acceptable by 4.48%. This would of course represent an extreme change in the prevalence of smartphones and so is not particularly informative. For a more plausible change, we can consider the effect of a one standard deviation change in the prevalence of smartphones. This change is roughly equivalent to one additional smartphone for every five people (20.3 smartphones per 100 people). It is estimated that such a change increases the likelihood that one will find IPV never acceptable by 2.7%, while decreasing the likelihood that they will find it sometimes acceptable or always acceptable by 1.9% or 0.91% respectively.

In line with Jensen and Oster (2009), we find a significant correlation between ownership of television and attitudes to IPV with those who own a television being 1.8% more likely to express the view that it is never justifiable for a man to beat his wife. This is comparable with the substantive effect of smartphone proliferation outlined above. Radio ownership is not statistically significant, and the estimated marginal effects are only a third of those estimated for television.

In terms of the other control variables, women are less likely to find IPV justifiable as are older people, though the magnitude of this latter association is small. Poverty predicts a lower likelihood of responding that IPV is never justifiable in line with Annan and Brier's (2010) findings that poverty is a factor in shaping IPV. Political conservatism is statistically significant at the 10% level and predicts more acceptance of IPV. Social conservatism similarly predicts more accepting views of IPV and is significant at the 5% level.

Thus, we conclude that, on average, an increase in the prevalence of smartphones is associated with significant and meaningful reductions in the view that IPV is justifiable. Importantly, this result is found controlling for ownership of other mass media technologies and political and social views. We next explore some of the mechanisms that may drive our results and discuss their implications.

As our specific measure of IPV attitudes asks about violence perpetrated by men against women, it is plausible that technology will influence the views of men and women to different extents (Yang et al., 2018). Moreover, the way men and women use the technology could be different (Andone et al., 2016; Park & Lee, 2014). As shown in Table 4, the estimated marginal effects for women and men are very similar. A one standard deviation increase in smartphone prevalence increases the likelihood that a woman will state that they view IPV to be never acceptable by 2.9%. This change in smartphone prevalence is estimated to have an effect of 2.6% for men. We therefore conclude that the proliferation of smartphones is associated with changing attitudes to IPV for both men and women. However, we can see important differences in the estimated marginal effects of other variables in our model. Age, political and social conservatism, poverty and ownership of television are only significant in the male sample. For men, ownership of a television increases the probability of the respondent stating that IPV is never acceptable by 3%, which is comparable with the magnitude of a one standard deviation shock in smartphone prevalence (2.6%). These results reinforce the conclusion that smartphone technology can be a potent force in shaping male attitudes to IPV and suggest that smartphone technology may be a particularly important force in shaping women's attitudes to IPV in Africa.

As noted in Section 2, social media access is an important functionality of smartphone technology. In addition to providing access to news, often targeted at the preferences of the user, social media allows for both passive consumption of the experiences and viewpoints of others, and active communication and discussion. Social media use is therefore a potentially powerful mechanism through which smartphone technology can change attitudes to IPV. However, the proliferation of smartphones also allows for increased access and spread of information and experiences from other sources and types of media, as well as educational and entertainment-based content. Although we cannot fully explore these mechanisms and their relative importance using the Afrobarometer, the survey data do allow us to explore the importance of this mechanism. The survey asks respondents how often they get news from 'social media such as Facebook or Twitter'. We group those who respond that they do so 'every day', 'a few times a week' or 'a few times a month' and compare them with the group who respond either 'less than once a month' or 'never'. Although this is not a direct measure of social media use or how social media is used, it does serve as a proxy for social media use. Table 5 presents the results of this comparison. Less than one third of our sample get news from

TABLE 4 Sample splits by gender.

	Respondent thinks it can be justified for a man to beat his wife …					
	Female			Male		
	Never	Sometimes	Always	Never	Sometimes	Always
Smartphone	0.00275	−0.00191	−0.000839	−0.00142	0.000924	0.000498
	(0.00915)	(0.00637)	(0.00278)	(0.0104)	(0.00677)	(0.00365)
Smartphone prevalence	0.145***	−0.101***	−0.0443**	0.130**	−0.0844**	−0.0455**
	(0.0559)	(0.0388)	(0.0174)	(0.0578)	(0.0374)	(0.0207)
Age	0.000347	−0.000241	−0.000106	0.00101***	−0.000659***	−0.000355***
	(0.000298)	(0.000207)	(0.00009)	(0.000296)	(0.000193)	(0.000106)
Political conservatism	−0.0509	0.0354	0.0155	−0.0723*	0.0470*	0.0253*
	(0.035)	(0.0243)	(0.0107)	(0.039)	(0.0253)	(0.0136)
Social conservatism	−0.0615	0.0427	0.0188	−0.129**	0.0836**	0.0451**
	(0.045)	(0.0312)	(0.0139)	(0.0534)	(0.0341)	(0.019)
Authoritarian	0.0544	−0.0378	−0.0166	0.033	−0.0214	−0.0115
	(0.0484)	(0.0337)	(0.0147)	(0.0529)	(0.0345)	(0.0186)
Poverty index	−0.00177	0.00123	0.000539	−0.00375***	0.00243***	0.00131***
	(0.00115)	(0.000795)	(0.000358)	(0.00119)	(0.00078)	(0.000417)
Urban	0.0172*	−0.0120*	−0.00524*	−0.00666	0.00433	0.00233
	(0.00978)	(0.0068)	(0.003)	(0.00993)	(0.00644)	(0.00349)
TV ownership	0.00712	−0.00495	−0.00218	0.0302***	−0.0195***	−0.0106***
	(0.00976)	(0.00677)	(0.00299)	(0.011)	(0.0071)	(0.00398)
Radio ownership	0.00414	−0.00287	−0.00127	0.00624	−0.00404	−0.0022
	(0.00877)	(0.00608)	(0.00269)	(0.0116)	(0.00752)	(0.00412)
Employed	0.0101	−0.00701	−0.00305	0.00792	−0.00515	−0.00277
	(0.00963)	(0.00674)	(0.0029)	−0.00954	(0.00622)	(0.00333)
Religion controls	Yes	Yes	Yes	Yes	Yes	Yes
Education level controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,679	14,679	14,679	16,008	16,008	16,008

Note: Ordered Probit marginal effects reported. The corresponding standard errors are clustered at the regional level and reported in parentheses.
*Significance at 10% level.
**Significance at 5% level.
***Significance at 1% level.

social media. However, the estimated marginal effects of smartphone prevalence are very similar for the two groups. For both groups, we estimate a marginal effect of 0.138 for the 'never' response to the IPV justification question. The other two marginal effects are somewhat different for each group but are in all cases statistically significant and of comparable magnitude. Social media may be important in terms of changing attitudes of users that are then passed on to non-users, but we conclude that personal social media use is not the sole mechanism driving our results.

Our results in Table 3 indicated that those who hold traditional views on gender roles, religion and people from different backgrounds and sexual orientations are more likely to express that IPV is justifiable. Similar results have

TABLE 5 Sample splits by use of social media as news source.

	Respondent thinks it can be justified for a man to beat their wife					
	News from social media			News from elsewhere		
	Never	Sometimes	Always	Never	Sometimes	Always
Smartphone	0.0112	−0.0084	−0.0028	0.0004	−0.0003	−0.0001
	(0.0148)	(0.0111)	(0.0037)	(0.0091)	(0.0058)	(0.0033)
Smartphone prevalence	0.138***	−0.104***	−0.0336***	0.138**	−0.0878**	−0.0499**
	(0.0462)	(0.0349)	(0.0118)	(0.0648)	(0.0413)	(0.024)
Age	0.0002	−0.0002	−0.0001	0.001***	−0.0006***	−0.0004***
	(0.0004)	(0.0003)	(0.0001)	(0.0003)	(0.0002)	(0.0001)
Political conservatism	0.0176	−0.0133	−0.0043	−0.0963**	0.0614***	0.0349***
	(0.0387)	(0.0294)	(0.0094)	(0.0375)	(0.0236)	(0.0134)
Social conservatism	−0.0880*	0.0666*	0.0214*	−0.117**	0.0743**	0.0423**
	(0.051)	(0.0387)	(0.0125)	(0.0506)	(0.0312)	(0.0186)
Authoritarian	−0.0258	0.0195	0.0063	0.0929*	−0.0592*	−0.0337*
	(0.0657)	(0.0497)	(0.0161)	(0.0511)	(0.033)	(0.0187)
Poverty index	−0.0047***	0.0035***	0.0011***	−0.0019	0.0012*	0.0007
	(0.0012)	(0.0009)	(0.0003)	(0.0012)	(0.0008)	−0.000433
Urban	0.0199*	−0.0150*	−0.0049*	−0.0009	0.0006	0.0003
	(0.011)	(0.0083)	(0.0028)	(0.0091)	(0.0058)	(0.0033)
Female	0.0808***	−0.0614***	−0.0193***	0.0722***	−0.0459***	−0.0263***
	(0.0092)	(0.0075)	(0.0025)	(0.0074)	(0.0051)	(0.0028)
TV ownership	−0.0121	0.0092	0.0029	0.0289***	−0.0185***	−0.0104***
	(0.0142)	(0.0108)	(0.0033)	(0.0087)	(0.0056)	(0.0031)
Radio ownership	0.0109	−0.00823	−0.0027	0.00592	−0.00377	−0.00215
	(0.0137)	(0.0103)	(0.0034)	(0.0084)	(0.0054)	(0.0031)
Employed	0.0044	−0.0033	−0.0011	0.0073	−0.0047	−0.0027
	(0.0088)	(0.0066)	(0.0021)	(0.0112)	(0.0072)	(0.004)
Religion controls	Yes	Yes	Yes	Yes	Yes	Yes
Education level controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9973	9973	9973	20,451	20,451	20,451

Note: Ordered Probit marginal effects reported. The corresponding standard errors are clustered at the regional level and reported in parentheses.
*Significance at 10% level.
**Significance at 5% level.
***Significance at 1% level.

been found in the case of Egypt (Kposowa & Aly Ezzat, 2019). An important question therefore is if social conservatives' views on IPV are changed by the spread of smartphones.[2] Therefore, we split our sample into groups defined by whether they are above or below the mean for our index of social conservatism. Table 6 presents the results. We find that smartphone prevalence is only significant for the socially conservative group. This is also the case for the

[2]We are indebted to an anonymous reviewer for this suggestion.

TABLE 6 Sample splits by social conservatism.

	Respondent thinks it can be justified for a man to beat their wife					
	Socially conservative			Not socially conservative		
	Never	Sometimes	Always	Never	Sometimes	Always
Smartphone	0.0081	−0.0054	−0.0028	−0.0061	0.0042	0.0019
	(0.0095)	(0.0063)	(0.0033)	(0.0096)	(0.0066)	(0.0029)
Smartphone prevalence	0.181***	−0.119***	−0.0621**	0.0843	−0.0584	−0.0258
	(0.0676)	(0.0437)	(0.0242)	(0.0534)	(0.0371)	(0.0164)
Age	0.0007**	−0.0005**	−0.0002**	0.001***	−0.0007***	−0.0003***
	(0.0003)	(0.0002)	(0.0001)	(0.0003)	(0.0002)	(0.0001)
Political conservatism	−0.0029	0.0019	0.001	−0.107***	0.0743***	0.0328***
	(0.0385)	(0.0253)	(0.0132)	(0.0378)	(0.0262)	(0.0118)
Authoritarian	0.0473	−0.0311	−0.0162	0.0166	−0.0115	−0.0051
	(0.047)	(0.0308)	(0.0162)	(0.0551)	(0.0383)	(0.0169)
Poverty index	−0.004***	0.0027***	0.0014***	−0.0021*	0.0015*	0.0006*
	(0.0013)	(0.0008)	(0.0004)	(0.0011)	(0.0008)	(0.0003)
Urban	−0.0103	0.0068	0.0035	0.0123	−0.0085	−0.0038
	(0.0097)	(0.0063)	(0.0034)	(0.0107)	(0.0074)	(0.0033)
Female	0.0795***	−0.0524***	−0.0271***	0.0733***	−0.0507***	−0.0226***
	(0.0081)	(0.0059)	(0.0027)	(0.0075)	(0.0056)	(0.0024)
TV ownership	0.0284***	−0.0186***	−0.0098***	0.0115	−0.0079	−0.0036
	(0.0099)	(0.0066)	(0.0035)	(0.0101)	(0.007)	(0.0031)
Radio ownership	0.0034	−0.0023	−0.0012	0.0095	−0.0066	−0.0029
	(0.0094)	(0.0062)	(0.0032)	(0.0101)	(0.007)	(0.0032)
Employed	0.0092	−0.006	−0.0031	0.0068	−0.0047	−0.0021
	(0.0104)	(0.0069)	(0.0035)	(0.0084)	(0.0058)	(0.0025)
Religion controls	Yes	Yes	Yes	Yes	Yes	Yes
Education level controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,950	14,950	14,950	15,737	15,737	15,737

Note: Ordered Probit marginal effects reported. The corresponding standard errors are clustered at the regional level and reported in parentheses.
*Significance at 10% level.
**Significance at 5% level.
***Significance at 1% level.

television ownership variable. We conclude that, in both cases, the average decline in acceptance of IPV associated with the technology is driven by changing attitudes of social conservatives.

5 | DISCUSSION

We have demonstrated a statistically significant relationship between the spread of smartphone technology and individual attitudes to IPV—a relationship that is evident for both men and women and for the latter group comparable to the estimated effect of owning a television. Given the widespread incidence of IPV around the world and the

immense harm associated with it, understanding the factors that give rise to IPV is an extremely important area of research. We have also shown that although our index of social conservatism predicts the view that IPV is justifiable, our results are driven by smartphone prevalence changing the IPV attitudes of those who are relatively socially conservative.

Although our paper examines attitudes towards domestic violence rather than the incidence of domestic violence, studies such as Cialdini et al. (1990) have shown that social norms have a significant impact on behaviour. The power of norms to influence behaviour has been shown in domains as diverse as alcohol and drug consumption (Donaldson et al., 1994; Granfield, 2005; Haines & Spear, 1996) and electricity usage (Schultz et al., 2007). Additionally, as suggested by Hoffman (1975), norms are often passed from parents to their children. Given this intergenerational perpetuation of norms, it is possible that the causal effect on domestic violence incidence as a result of these changing norms is enduring and exponential. However, it is also worth noting that although norms have been shown to influence behaviour, there are also significant differences between stated preferences and revealed behaviours with respect to issues such as environmentalism, blood donations and vaccinations (Craig et al., 2017; Lambooij et al., 2015; Tarkiainen & Sundqvist, 2009).

There is also an emerging literature that suggests that mobile phones may facilitate sexual violence (Dimond et al., 2011; Henry & Powell, 2018). Additionally, it has been found that young adults are at greater risk of polyvictimisation if they own a smartphone and frequently use mobile apps (Logie et al., 2019). Although new communications technologies may seem to offer a way for victims of domestic abuse to break attempts by perpetrators to control communications, they can be used for cyberstalking and to facilitate coercive control (Douglas et al., 2019; Henry et al., 2020, 2021; Woodlock, 2017). Another strand of the literature, however, has found at least some evidence to support the idea that online tools and smartphones can help those experiencing IPV (Al-Alosi, 2020; El Morr & Layal, 2020; Hegarty et al., 2019; Tarzia et al., 2017).

Thus, although our results point to the potential for smartphone access to change IPV norms, an obvious and important extension to this paper would be to examine if smartphone proliferation also leads to changes in IPV and sexual violence outcomes. Furthermore, although we have attempted to shed light on the mechanisms driving our results using the data available to us, future work would benefit from survey questions designed to probe in more detail how individuals use smartphones. Similarly, well-designed randomised control trials could offer causal evidence on the overall effectiveness of smartphones and on the relative importance of different functionalities of the technology.

Nevertheless, we believe that our results are still of value and should be of interest to those interested in reducing IPV. IPV continues to threaten the lives and well-being of millions of people around the world. Supporting educational programs and edutainment targeted at domestic violence and supporting survivors of domestic violence to share their stories on social media and other outlets may be effective ways to change attitudes to violence. Our results also suggest that content and interventions designed to engage social conservatives may be particularly effective. However, as noted by Jensen and Oster (2009) in the case of cable television in India, the widespread availability of a technology that exposes people to lifestyles and aspirations of those in other countries can be a powerful force in changing norms and behaviours in and of itself without the need for targeted interventions and messaging. Supporting smartphone technology by investing in the infrastructure needed to offer reliable and fast mobile broadband access to as many people as possible and investing in digital literacy programs are promising routes to increase the prevalence of smartphone ownership and thereby change attitudes to IPV.

6 | CONCLUSIONS

Smartphone technology offers access to vast quantities of information, exposure to the experiences and viewpoints of others and the ability to carry out conversations with people who are geographically, culturally and economically distant. Using data from the Afrobarometer surveys of respondents living in 34 African countries, this paper points to a statistically significant and meaningful association between the prevalence of smartphones in a respondent's

region and their attitudes towards IPV. A higher rate of smartphone ownership in a region predicts a lower probability that an individual will express acceptance of IPV. This is true for both men and women. As the estimated marginal effect is very similar for those who get their news from social media and those who get their news elsewhere, we conclude that social media is not the sole mechanism through which this technology can change norms regarding IPV. Finally, we found that an increase in smartphone ownership in a respondent's region predicts less acceptance of IPV only for those who are relatively socially conservative.

Our findings point to a role for smartphone technology in the fight against IPV. Given the prevalence of IPV and the harm entailed, we believe that policymakers and those working to fight IPV will find our results to be of interest, though further work is needed to establish causal evidence and shed more light on the mechanisms through which smartphone technology can change attitudes and behaviours.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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APPENDIX A

TABLE A1 Variable definitions.

Variable	Description	Unit
Smartphone	Whether or not the respondent owns a smartphone	Binary
Age	The age of the respondent	Years
Poverty	Index capturing how often the respondent has gone without food, water, medical treatment, fuel or a cash income. High values reflect greater lived poverty	0–20 scale
Urban	Whether or not the respondent lives in an urban area	Binary
Female	Whether or not the respondent is a female	Binary
Political conservatism	The degree to which the respondent is politically conservative as captured by the average strength of agreement with the following statements (rescaled as appropriate) It is important to obey the government in power, no matter who you voted for. The courts have the right to make decisions that people always have to abide by.	0–1 normalised scale with higher values indicating greater conservatism

(Continues)

TABLE A1 (Continued)

Variable	Description	Unit
	The police always have the right to make people obey the law.	
	The tax authorities always have the right to make people pay taxes.	
	Our country should be governed primarily by religious law	
Social conservatism	The degree to which the respondent is socially conservative as captured by the average strength of agreement with the following statements (rescaled as appropriate)	0–1 normalised scale with higher values indicating greater conservatism
	Men make better political leaders than women and should be elected rather than women.	
	When jobs are scarce, men should have more right to a job than women.	
	Women should have the same rights as men to own and inherit land.	
	In general, it is better for a family if a woman has the main responsibility for taking care of the home and children rather than a man.	
	People should have the right to communicate in private without a government agency reading or listening to what they are saying.	
	Freedom of religion and worship are absolute, meaning that government should never limit what is said in a place of worship.	
	Whether you would like having [people of a different religion] as neighbours, dislike it, or not care.	
	Whether you would like having [people from other ethnic groups] as neighbours, dislike it, or not care.	
	Whether you would like having [homosexuals] as neighbours, dislike it, or not care.	
	Whether you would like having [immigrants or foreign workers] as neighbours, dislike it, or not care.	
Authoritarian	The degree to which the respondent expresses authoritarian views as captured by the average strength of agreement with the following statements (rescaled as appropriate)	0–1 normalised scale with higher values indicating stronger authoritarian views
	Government should be able to ban any organization that goes against its policies.	
	Only one political party is allowed to stand for election and hold office.	
	The army comes in to govern the country	
	Elections and Parliament are abolished so that the president can decide everything	
	It is more important to have a government that can get things done, even if we have no influence over what it does.	

TABLE A1 (Continued)

Variable	Description	Unit
	We should choose our leaders in this country through regular, open and honest elections. Political parties create division and confusion; it is therefore unnecessary to have many political parties in {this country} Parliament should ensure that the President explains to it on a regular basis how his government spends taxpayers' money. Since the President was elected to lead the country, he should not be bound by laws or court decisions that he thinks are wrong. The Constitution should limit the president to serving a maximum of two terms in office.	
TV ownership	Whether or not the respondent owns a television	Binary
Radio ownership	Whether or not the respondent owns a radio	Binary
Employed	Whether or not the respondent has a job that pays a cash income	Binary
Education level	Less than full primary education = 1 (reference level) Primary or some secondary education = 2 Secondary education = 3 Post-secondary qualification or some university education = 4 Completed undergraduate education or postgraduate education = 5	Categorical