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Empowering women facing gender-based violence amid COVID-19 through media campaigns

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COVID-19 heightened women's exposure to gender-based and intimate partner violence, especially in low-income and middle-income countries. We tested whether edutainment interventions shown to successfully combat gender-based and intimate partner violence when delivered in person can be effectively delivered using social (WhatsApp and Facebook) and traditional (TV) media. To do so, we randomized the mode of implementation of an intervention conducted by an Egyptian women's rights organization seeking to support women amid COVID-19 social distancing. We found WhatsApp to be more effective in delivering the intervention than Facebook but no credible evidence of differences across outcomes between social media and TV dissemination. Our findings show little credible evidence that these campaigns affected women's attitudes towards gender or marital equality or on the justifiability of violence. However, the campaign did increase women's knowledge, hypothetical use and reported use of available resources.

The restrictions on movement, social isolation and increased economic stress accompanying the COVID-19 pandemic have increased women's exposure to gender-based violence (GBV) and intimate partner violence (IPV)[1,2], particularly in low-income and middle-income countries[3–5]. Beyond being morally reprehensible, GBV and IPV increase social inequality and undermine economic development[6,7]. The prevalence of GBV and IPV across the globe and their significant economic costs have led to an increase in research on how to curb this violence. As high-profile social movements have led to rapid shifts in the reporting of violence in some contexts[8], systematic reviews have emphasized the need to shift norms that accept violence[6,9], remedy the economic and political marginalization of women[10–12], and consider community-based interventions including public engagement and advocacy[13–15].

COVID-19 has limited organizations' ability to implement traditional in-person, often community-based interventions, spurring the need for alternative ways of disseminating information and providing resources and support to women potentially impacted by violence. Harnessing the increased use of the internet and social media during the pandemic[16], we assess the impact of encouragement to consume a social media and traditional TV campaign aimed at increasing women's rejection of violence, deepening their knowledge of resources and support services available to those impacted by GBV and IPV, and increasing their willingness and frequency of contact with those services.

This study draws on findings that the expansion of entertainment programming along with cable TV has durably shifted gender norms and outcomes across contexts[17,18]. Closely connected experimental research on edutainment posits that shifts in expressed attitudes and behaviours can occur because exposure to role models or dramatized, entertaining content shapes individuals' beliefs about the social desirability of a given behaviour[19–22]. While some studies emphasize the relevance of individual role-modelling within dramatized media[17,18,23], others emphasize the importance of peer effects, whereby communal

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delivery of information shapes individuals' perceptions about the attitudes and behaviours of others around them[22,24,25]. Studies that apply informational or edutainment interventions around GBV and IPV[23,25–27] have produced mixed findings on whether and when these interventions lead to attitudinal or behavioural shifts. Some have found that interventions generated attitudinal shifts such as increased rejection of violence[23,25], especially when delivered via communal channels. Related studies, by contrast, have found that these interventions do not shift attitudes but increase individuals' willingness to report violence[26,27]. However, while scholars have used social media to examine phenomena such as misinformation[28,29] and political accountability[30], there is limited knowledge of whether social media platforms such as Facebook and WhatsApp can be effectively used to deliver edutainment interventions, and of their relative effectiveness vis-à-vis traditional media like television.

Egypt, the context of our intervention, features high levels of gender inequality and GBV, ranking 129th of 153 countries in the World Economic Forum's 2020 Global Gender Gap Index[31]. Although structural factors have been linked to ever-married women's risk of experiencing GBV and IPV[32–34], women across socio-economic backgrounds report high levels of violence[34]. According to the most recent national demographic survey, 36% of ever-married women between the ages of 15 and 49 surveyed report having experienced physical domestic violence[35], while a nationally representative sample showed that Egyptian women's exposure to violence increased with COVID-19 mobility restrictions[36].

Despite this high prevalence of violence, only one third of women surveyed nationally report seeking help to stop violence, and only 18% reported it[35]. Several phenomena explain low levels of help seeking and reporting. More than half of ever-married women surveyed in 2005 express that physical domestic violence was justifiable in some cases[37]. Social norms that blame women who are exposed to IPV, sanction women who report violence to authorities, and stigmatize divorce also present obstacles to women who would seek support[32]. Those who would report violence must further contend with the challenges of navigating the Egyptian legal system amid the absence of some legal protections against IPV[32,33,38].

Advocacy organizations acknowledging the challenges of reporting individually to authorities also support women directly, by providing them with resources, referrals and counselling on ways to safely respond to violence. Amid COVID-19, evidence shows that these organizations are in high demand, as mobility limitations led to increased searches for online resources around domestic violence[2]. Social distancing then presented existing organizations with the broader challenge of reaching isolated audiences, as it rendered women without knowledge of resources and organizations especially vulnerable[5]. Our initial survey of close to 6,000 Egyptian women showed that only 28% exhibited any knowledge of online resources, and 22% knew of any organizations available to support women affected by GBV or IPV.

In this setting, we worked with an established women's rights non-governmental organization (NGO), the Egyptian Center for Women's Rights (ECWR), whose media programmes, hotlines and legal advocacy seek to shift women's rejection of violence, address norms that heighten women's inequality and provide resources to aid women impacted by violence. The organization (and particularly its founder, women's rights lawyer Nehad Aboul Qomsan) views social media and TV as important, underutilized tools for NGOs and public agencies to connect with women subjected to violence and disseminate information about resources available for such women, especially given social distancing restrictions common in the pandemic.

We analysed the effectiveness of encouragement to watch videos aimed at empowering women produced by ECWR and Aboul Qomsan and hosted across two types of media in shifting attitudes, knowledge and responses to violence. The first set of videos was a weekly television show featuring Aboul Qomsan airing on a popular satellite channel, with 25- to 30-minute episodes. For the second set, ECWR and Aboul Qomsan produced 13 videos to be disseminated over social media and hosted online. Unlike a range of edutainment interventions that featured dramatized characters[23–26,26,27], this intervention differs slightly in that Aboul Qomsan directly delivers factual information.

We followed Aboul Qomsan's experience in crafting video messages and content appropriate for the Egyptian context. While naturally different in length and setting, the TV show and the video messages featured similar content (for more details, see Extended Data Tables 1 and 2). Although the video content does not solely focus on IPV and GBV, most of Aboul Qomsan's content centres on discussing social norms that existing research highlights are linked to sustaining violence. In the videos, Aboul Qomsan addresses linkages between patriarchal social norms and exposure to violence; emphasizes that women are not to blame for violence; defines violence beyond just physical force; highlights its prevalence in the family, workplace and public; details Egypt's legal system, identifying areas where it needs reform; discusses different legal options around divorce following GBV or IPV; and instructs friends and families who become aware of violence to support victims.

The videos often emphasize how women can access NGOs (such as through an ECWR-sponsored hotline) that can connect women with support resources, including legal consultations. When discussing high-level violence such as rape, Aboul Qomsan underscores procedures to preserve evidence and immediately notify the police. She formally discusses the hotline at the end of most video messages, while she emphasizes several organizations and intricacies of navigating the Egyptian legal system more diffusely in the TV show. When discussing the complexities of the Egyptian legal system, Aboul Qomsan often emphasizes that respondents should contact ECWR, who can provide legal representation.

Our intervention resembled those fielded in person in contexts as diverse as India[39], Mexico[25] and Uganda[26,27], but it differed in how we recruited participants into the study and especially in how we delivered the content. We identified 5,618 Egyptian women recruited through Facebook advertisements, placed across age brackets in every governorate across Egypt (see the geographic distribution in Extended Data Fig. 1). The advertisements invited Facebook users to share their opinions about women's rights in Egypt and receive a small financial compensation in mobile credit. From there, women who completed a baseline survey and expressed interest in receiving information about women's issues in Egypt were randomly assigned to different treatment arms described below. After delivering the intervention content, we conducted an endline survey to explore how the content shaped their attitudes, knowledge, hypothetical and reported behaviours, and future outlook towards gender equality and empowerment.

This recruitment and treatment dissemination mechanism means that our sample is from the population of female Facebook users in Egypt, rather than the entire female population. Egypt is a site of widespread and fast-growing internet and social media adoption (in 2002, 72% used the internet and 47% used social media[40]), and Facebook and WhatsApp are the two most widely used social platforms[41]. As Fig. 1 shows, the women in our study are demographically representative of female internet users in Egypt.

We decided to include only women in the study for three reasons. First, Aboul Qomsan's content is explicitly designed to speak to women; for instance, she almost always refers to her viewers as female. Second, as discussed above, the COVID-19 pandemic and accompanying social distancing have increased NGOs' and ECWR's insurgency in developing channels to reach women with pertinent information. Finally, we wanted to avoid exposing women to the potential for harassment on social media by including them in mixed-gender groups. Below we discuss the need for future research on how to best facilitate mixed-gender programming in online spaces.

We randomly assigned individuals to receive the content in one of five ways (see Extended Data Table 3 and Supplementary Tables 1–9

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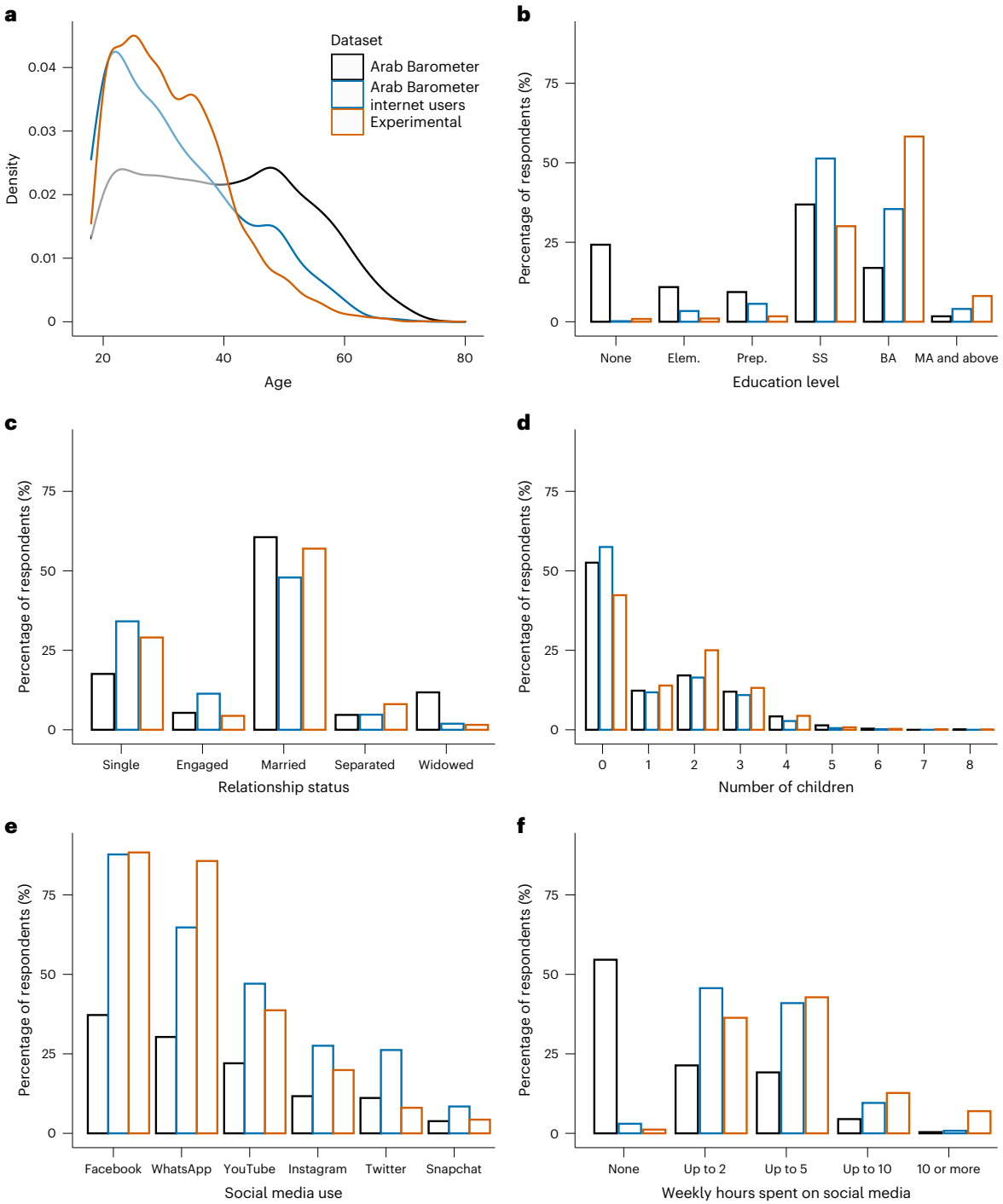

Fig. 1 | Comparison of demographics between Arab Barometer and experimental sample respondents. a–f, The distributions of respondent ages (**a**), education levels (**b**), relationship status (**c**), number of children (**d**), social media platforms used (**e**) and weekly hours spent on social media (**f**) for our experimental sample, the Arab Barometer and the Arab Barometer restricted to internet users. **b**, Education levels reflect completion of No Formal Education (None), Elementary (Elem), Preparatory (Prep), Secondary (SS), Bachelors (BA) or completion of Masters and above (MA and above). The Arab Barometer data belong to the 2016 and 2018 waves. Additional summary statistic comparisons are provided in Supplementary Table 29.

for details on the randomization and balance in demographics and initial attitudes across treatment arms). The first, a control group, received all intervention content upon completion of the endline survey. The second, a treatment group, received WhatsApp messages reminding them about when and where the TV show would air over an eight-week period. In the remaining three treatment arms, we delivered messages about the videos (which were hosted on YouTube) via WhatsApp and Facebook. Participants assigned to these three treatment arms—Facebook, WhatsApp Individual or WhatsApp Group—received 13 links to a website publishing the YouTube videos throughout the same eight-week period. Those in the WhatsApp Individual treatment received individual messages, while those in the WhatsApp Group treatment received messages in groups of 8 to 12 other unknown users. Lastly, those respondents assigned to the Facebook treatment initially received individual messages via Facebook's Custom Messages Channel. However, this treatment arm was transitioned to individual

WhatsApp receipt after the delivery of four videos due to a technical issue with the Facebook account. In the subsequent analysis, we pool individuals who received the messages via WhatsApp and Facebook individually. In all individual and group treatments, moderators answered basic questions about the goals of the research.

We examined whether a mode of reminder was particularly effective in generating treatment consumption and ultimately shifting attitudes, increasing knowledge of information about resources and support, and changing behaviours. In using the Group functionality of WhatsApp, we aimed to measure whether communally transmitted information on social media functions as effectively as content delivered to a group offline, which has been shown to generate discussions conducive to changes in individuals' beliefs about social norms[25,42]. In the discussion below, we note substantive differences between WhatsApp groups and other communally delivered interventions, in particular around moderation[13,15], which might limit the effectiveness of WhatsApp groups when compared with in-person interventions. Moreover, observing conversation in groups before endline, we noted very low levels of aggregate conversation (for more details, see Supplementary Table 10).

Because our study differs in its use of social and traditional media to deliver content, a challenge was whether individuals would consume the content. For those in the social media treatment arms, we measured their aggregate visits to the server hosting the videos and YouTube views. While these data are subject to error around the website's calculation of unique users, Extended Data Fig. 2 and Extended Data Tables 4 and 5 suggest that approximately 45% of those in the social media treatment arms visited the site and that the mean visitor watched between two and three videos.

These server data also allow us to explore the effectiveness of Facebook vis-à-vis WhatsApp in ways that self-reported viewing at endline would not. To do so, we use a difference-in-difference design that compares website views between participants assigned to different treatment arms before and after we transitioned the initial Facebook treatment group to receive videos individually via WhatsApp. The analysis shows that WhatsApp was a more effective method to deliver the intervention content in terms of generating video views, beyond the technical issue necessitating the switch. For more details, see Extended Data Fig. 3 and Supplementary Fig. 1.

After delivering the content over an eight-week period from 18 July through 10 September 2020, we studied the relative effectiveness of the different modes of delivery, which are natural bundles of the mode of reminder (Facebook or WhatsApp) and the mode of dissemination (YouTube or TV), via an online endline survey we fielded from 10 September to 11 October 2020. We first measured the extent to which treated participants internalized the treatment information through indices of directly and indirectly reported consumption of videos and the respondents' factual knowledge about treatment information (Supplementary Tables 11 and 12).

Then, to examine how Aboul Qomsan's discussion and endorsement shift attitudes and behaviours, we focused on the following standardized indices as outcomes: attitudes around violence, gender and marital equality; reported and hypothetical behaviour; and future outlook towards gender and marital equality. Knowledge questions measured the respondents' ability to factually list organizations and online resources available to support women (Supplementary Table 13).

We measured attitudinal outcomes linked to social norms that sustain the overall prevalence of violence in Egypt via two indices centred on content explicitly discussed and endorsed in the videos. The first index of gender and marital equality includes questions about the husband's role in the family, women's place in the workforce, and the justifiability of forms of violence such as yelling and hitting (Supplementary Table 14). The second index revolves around attitudes towards sexual violence, including questions on whether verbal harassment carries legal consequences, on harassment in the street and the workplace, and on whether women's clothing plays any role in exposure to violence (Supplementary Table 15). In line with other studies' use of donations to measure commitment to a cause[43,44], we also measured whether our intervention shifted individuals' willingness to donate some or all of their endline-survey remuneration to a support organization (Supplementary Table 16).

Our main behavioural outcomes centred on hypothetical and recent use of resources in response to domestic or sexual violence (Supplementary Tables 17–19). We preregistered the intervention's focus on accessing support organizations or online resources, which were emphasized in the intervention content. Finally, we measured outcomes related to the respondents' beliefs about whether Egyptian women would achieve gender equality and gender rights in the future (Supplementary Table 20), including the extent to which women would have an equal say in family decisions, as well as more equal legal rights, access to education and economic opportunities.

We also measured reported outcomes that we did not hypothesize our intervention would shift, such as self-reported exposure to violence (Supplementary Tables 21 and 22), hypothetical reporting behaviours to family members or authorities (Supplementary Tables 23 and 24), and reporting behaviours before COVID-19 (Supplementary Table 25), which we used as placebo outcomes to ease concerns about demand effects. Because we sought to avoid risks or sensitivity related to personal disclosure, we avoided asking questions about direct personal experience of violence, opting for more indirect language on whether "you or someone you know" has been exposed to violence. Finally, we included a broad range of covariates representing structural factors that our intervention could not impact but that are linked to IPV and GBV exposure, including age, marital status, cohabitation, age at marriage, education, husbands' education, number of people in the household, income, and income loss due to COVID-19. Supplementary Table 28 displays all of the questions used to generate these endline indices. We preregistered our analysis at https://osf.io/tekyr.

Results

We first show that there was a successful treatment (that is, information delivery), as individuals in the various treatment arms were more likely to report receiving and viewing the intervention content and were able to accurately describe the content of either the videos disseminated over social media or the TV show. The results in Fig. 2 underscore the utility of using both social and traditional media to deliver this type of content (the left panel shows the consumption of the TV show: social media individual (SMI) treatment, 0.148 s.d.; $t_{3947} = 3.974$; $P < 0.001$; 90% confidence interval (CI), (0.075, 0.221); social media group (SMG) treatment, 0.182 s.d.; $t_{3947} = 4.488$; $P < 0.001$; 90% CI, (0.103, 0.262); TV show reminder treatment, 0.862 s.d.; $t_{3947} = 21.268$; $P < 0.001$; 90% CI, (0.782, 0.941); the right panel shows the consumption of videos disseminated on social media: SMI, 1.026 s.d.; $t_{3949} = 27.276$; $P < 0.001$; 90% CI, (0.952, 1.099); SMG, 0.935 s.d.; $t_{3949} = 22.801$; $P < 0.001$; 90% CI, (0.854, 1.015); TV, 0.471 s.d.; $t_{3949} = 11.527$; $P < 0.001$; 90% CI, (0.391, 0.552), all one-sided; see disaggregated results for the individual outcomes aggregated into the index in Supplementary Tables 11 and 12). Relative to the control group, individuals receiving the intervention content via social media were 185–230% more likely to accurately recall the content of a particular video episode, and those who received reminders of the TV show were 63% more likely to accurately recall the content of a particular TV show episode. The successful treatment delivery over social media is particularly noteworthy given the numerous messages that women in Egypt may have received each day, especially during the pandemic[2].

Individuals who received the videos or reminders to watch the TV show reported increased knowledge about resources for women subjected to violence (Fig. 2, right; SMI, 0.225 s.d.; $t_{3945} = 6.134$; $P < 0.001$; 90% CI, (0.153, 0.297); SMG, 0.299 s.d.; $t_{3945} = 7.501$; $P < 0.001$; 90% CI, (0.221, 0.378); TV, 0.122 s.d.; $t_{3945} = 3.073$; $P = 0.002$; 90% CI, (0.044, 0.200);

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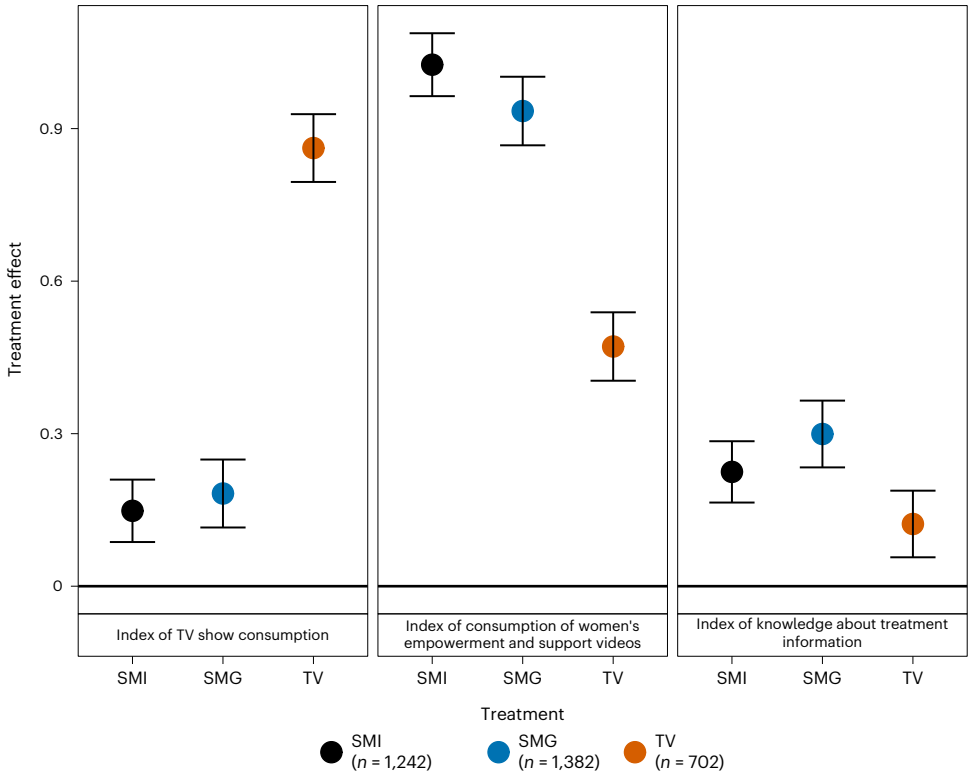

Fig. 2 | Treatment effects on TV show consumption, Facebook and WhatsApp treatment consumption, and knowledge of resources delivered in treatment. The data are presented as treatment effects relative to the control group ±90% CIs (due to positive one-sided *t*-tests). The estimates are from separate weighted generalized least squares (WGLS) regressions where the weights are in the inverse probability of treatment assignment. The labels are the corresponding dependent variables regressed on the treatment indicators (SMI, Facebook or WhatsApp individual message; SMG, WhatsApp group message; TV, TV show reminder), with controls as in panel **a** of the corresponding tables and randomization block fixed effects. The outcomes included in the index of TV show consumption are in Supplementary Table 11. The outcomes included in the index of consumption of women's empowerment and support videos are in Supplementary Table 12. The outcomes included in the index of knowledge about treatment information are in Supplementary Table 13.

one-sided; see disaggregated results for the individual outcomes aggregated into the index in Supplementary Table 13), including knowledge of both ECWR and other organizations providing support to women subjected to violence. These resources were continuously emphasized in the intervention content, and individuals would have been unlikely to learn about them otherwise, underscoring that these responses were driven by content consumption. Treated individuals reported between 131% and 216% greater accurate knowledge of ECWR online resources, and between 12% and 28% greater knowledge of online resources other than ECWR, relative to those in the control group. As in the results that follow, generally, there is no credible evidence of a difference in knowledge acquisition between those receiving the intervention content via social media (individually or in groups) and those receiving it via the TV show, except that there was less knowledge acquisition of organizations other than ECWR among those who received reminders of the TV show (Supplementary Table 13).

Figures 3 through 5 display our results regarding attitudes, resource use and future outlook. The results in Fig. 3 show that there is little credible evidence that the receipt of the videos over social media or reminders to watch the TV show shifted individuals' beliefs towards gender and marital equality, rejection of sexual violence, or willingness to donate to support organizations. Those assigned to receive videos disseminated over social media groups exhibited a marginally significant increase in their index of rejection of support for gender and marital equality (Fig. 3, left; 0.055 s.d.; $t_{3950} = 1.399$; $P = 0.082$; 90% CI, (−0.022, 0.131); one-sided), while those who received reminders of the TV show showed a marginal increase in their index of rejection of sexual violence (Fig. 3, middle; 0.064 s.d.; $t_{3945} = 1.446$; $P = 0.075$; 90% CI, (−0.023, 0.150); one-sided). For the rest of the estimated coefficients, we found that the data supported the null model over the alternative when using Bayes factors (Supplementary Table 26). The minimum detectable effects of our power analysis (Supplementary Table 27, 0.123–0.143) support the proposition that our analysis is sufficiently powered to detect meaningful effects. Supplementary Tables 14–16 show the disaggregated results for each attitudinal outcome separately, and they similarly show overall no credible evidence of an effect on attitudes across all outcomes. Only 3 of 54 coefficients are marginally significant ($P < 0.1$). All other coefficients are generally substantively small and statistically insignificant. We similarly see no credible evidence that 'ceiling effects' among individuals who at baseline hold attitudes rejecting violence or were more in favour of gender and marital equality drive these null results (columns 5–7 in Supplementary Table 32). Instead, these results underscore the stickiness of attitudes towards gender norms, which are reinforced by patriarchal cultural norms, prevailing religious interpretations and economic structures such as labour market barriers[44,45].

In contrast, as we anticipated in the preregistration, the intervention successfully encouraged the treated participants to use the resources for women subjected to violence emphasized in the videos and the TV show. The two central plots in Fig. 4 show that, in hypothetical scenarios of response to domestic and sexual violence, treated participants were more likely to report that they would seek to use online resources or contact a support organization (on domestic violence: SMI, 0.079 s.d.; $t_{3948} = 2.064$; $P = 0.020$; 90% CI = (0.004, 0.154); SMG, 0.100 s.d.; $t_{3948} = 2.397$; $P = 0.009$; 90% CI = (0.018, 0.181); TV, 0.101 s.d.; $t_{3948} = 2.441$; $P = 0.008$; 90% CI = (0.020, 0.183); on sexual violence: SMI, 0.113 s.d.; $t_{3950} = 2.874$; $P = 0.003$; 90% CI = (0.039, 0.206); SMG, 0.123 s.d.;

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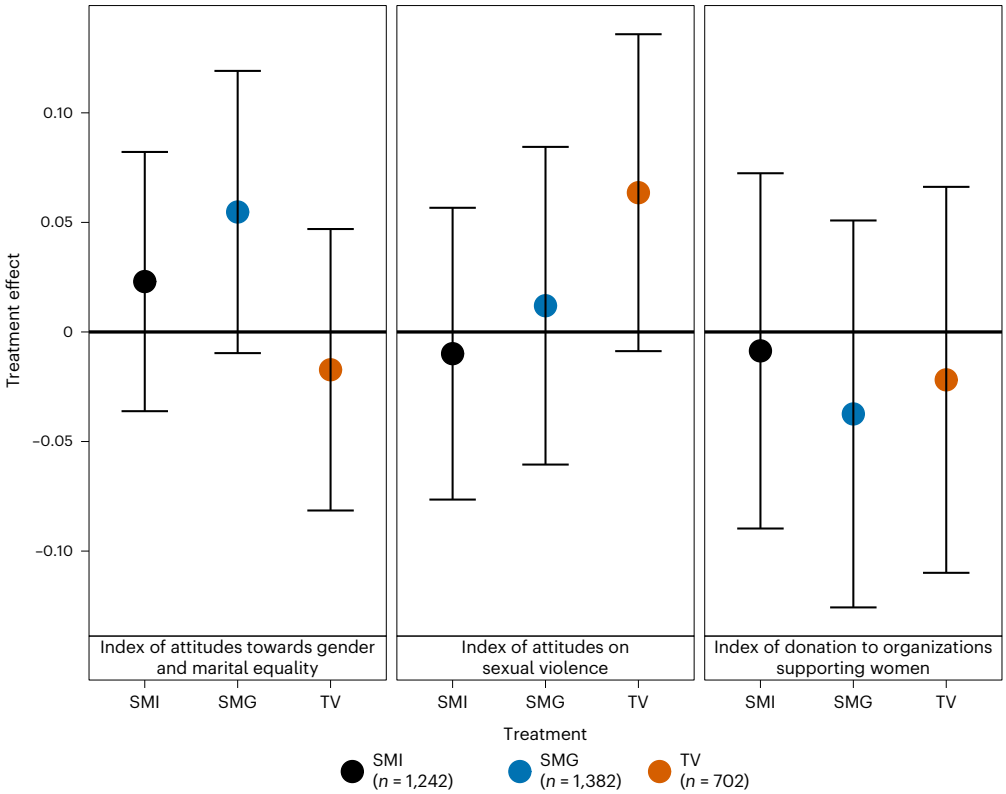

Fig. 3 | Treatment effects on attitudes towards gender and marital equality and towards sexual violence. The data are presented as treatment effects relative to the control group ±90% CIs in the left and centre panels (due to positive one-sided *t*-tests) and ±95% CIs in the right panel (due to two-sided *t*-tests). The estimates are from separate WGLS regressions where the weights are in the inverse probability of treatment assignment. The labels are the corresponding dependent variables regressed on the treatment indicators, with controls as in panel **a** of the corresponding tables and randomization block fixed effects. The outcomes included in the index of attitudes towards gender and marital equality are in Supplementary Table 14. The outcomes included in the index of attitudes on sexual violence are in Supplementary Table 15. The outcomes included in the index of donation to organizations supporting women are in Supplementary Table 16.

$t_{3950} = 2.877$; $P = 0.003$; 90% CI = (0.039, 0.206); all one-sided; see Supplementary Tables 17 and 18 for the disaggregated results).

In turn, there is no credible evidence that the intervention had an impact on individuals' hypothetical responses to violence via talking to family members or contacting the authorities (for more details, see Supplementary Fig. 2 and Supplementary Tables 23 and 24). Bayes factors support the null hypothesis over the alternative for each treatment (Supplementary Table 26). These estimates are substantively small and are sufficiently powered to detect meaningful effects. The preregistration did not hypothesize a shift in these outcomes, as the intervention content did not emphasize or encourage these reporting forms, and it mentioned necessary reforms in the ongoing struggle for women to access justice when subjected to violence.

More importantly, in addition to reporting more willingness to contact a supportive organization or use online resources for women affected by violence, treated women were more likely to report recent contact with a support organization and use of these resources (right plot in Fig. 4; SMI, 0.060 s.d.; $t_{3944} = 1.957$; $P = 0.026$; 90% CI = (−0.0001, 0.120); SMG, 0.100 s.d.; $t_{3944} = 3.010$; $P = 0.002$; 90% CI = (0.035, 0.166); TV, 0.089 s.d.; $t_{3944} = 2.695$; $P = 0.004$; 90% CI = (0.024, 0.155); all one-sided; see Supplementary Table 19 for the disaggregated results). Relative to those in the control group, treated individuals were between 4% and 6% more likely to use online resources and to contact a support organization. These results are unlikely to reflect mechanical responses to treatment activities or demand effects, given the active phrasing of these questions around 'looked for or accessed' and 'contacted', which differs from outcomes related to the consumption of intervention content, and because the questions asked about the use of organizations and online resources generally rather than ECWR specifically. The left panel of Fig. 4 shows that these changes in behaviour are not due to increased exposure to violence; we found no credible evidence of an effect on reported experience of domestic and sexual violence during COVID-19 (see Supplementary Table 26 for Bayes factors supporting these null results and Supplementary Table 21 for the disaggregated results).

Finally, despite a limited impact on women's attitudes towards gender and marital equality and rejection of violence, those who received messages via social media individually or who received reminders about the TV show expressed increased beliefs that women would achieve future greater gender and marital equality (Fig. 5; SMI, 0.135 s.d.; $t_{3944} = 3.636$; $P = 0.0002$; 90% CI = (0.062, 0.207); SMG, 0.041 s.d.; $t_{3944} = 1.025$; $P = 0.153$; 90% CI = (−0.038, 0.120); TV, 0.099 s.d.; $t_{3944} = 2.462$; $P = 0.007$; 90% CI = (0.020, 0.178); all one-sided; see Supplementary Table 20 for the disaggregated results). However, there is no credible evidence that assignment to receive the messages via social media groups affected these expectations (see Supplementary Table 26 for the Bayes factor supporting this null result). This result does not extend to those who received the messages via social media groups, which we discuss in greater detail below.

Comparisons with cross-national surveys and analysis of how the results differed according to key initial attitudinal and demographic variables show that our results probably extend beyond those in our sample to the broader population of female internet users in Egypt. Figure 1 and Supplementary Table 29 show that the women in our

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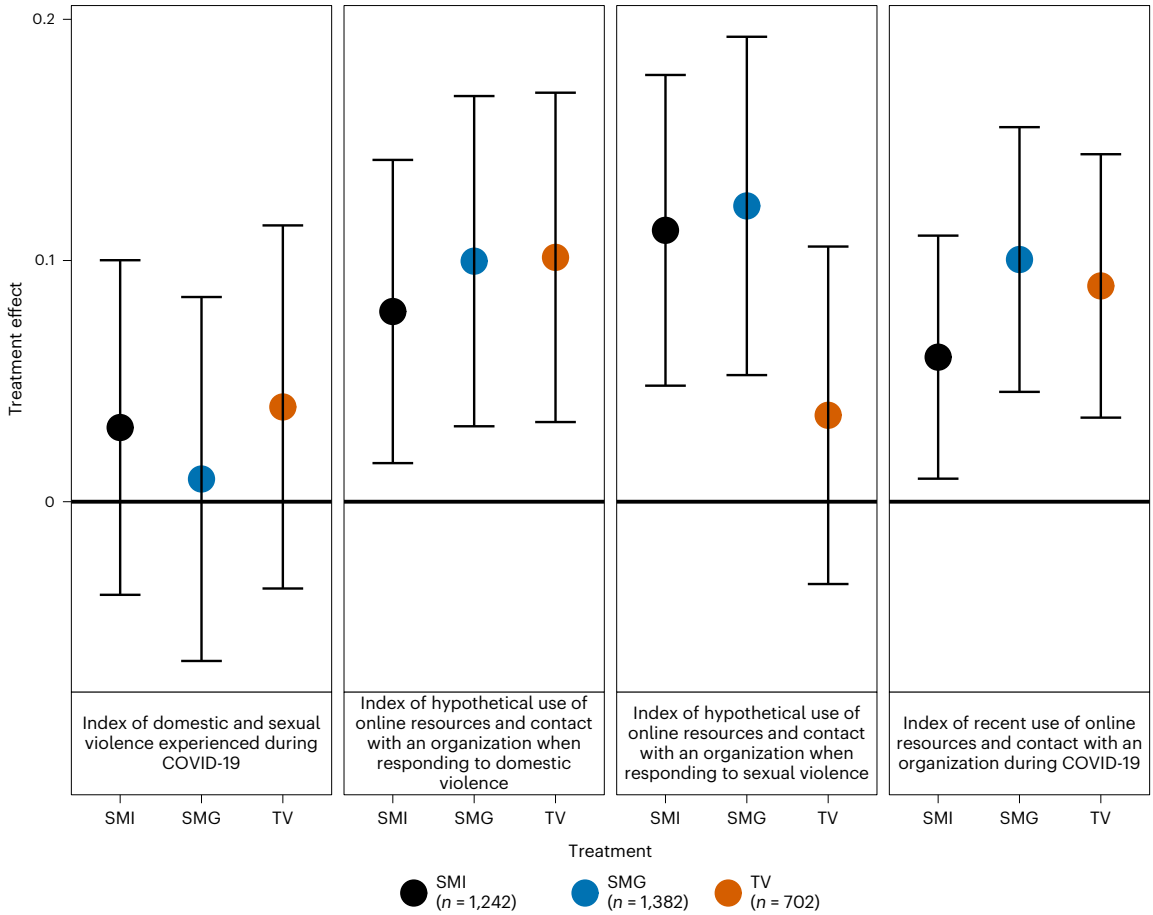

Fig. 4 | Treatment effects on violence experienced during COVID-19 and hypothetical and recent use of online resources or contact with a support organization when responding to domestic or sexual violence. The data are presented as treatment effects relative to the control group ±95% CIs in the left panel (due to two-sided *t*-tests) and ±90% CIs in the other panels (due to positive one-sided *t*-tests). The estimates are from separate WGLS regressions where the weights are in the inverse probability of treatment assignment. The labels are the corresponding dependent variables regressed on the treatment indicators, with controls as in panel **a** of the corresponding tables and randomization block fixed effects. The outcomes included in the index of domestic and sexual violence experienced during COVID-19 are in Supplementary Table 21. The outcomes included in the index of hypothetical use of online resources and contact with a support organization when responding to domestic violence are in Supplementary Table 17. The outcomes included in the index of hypothetical use of online resources and contact with a support organization when responding to sexual violence are in Supplementary Table 18. The outcomes included in the index of recent use of online resources and contact with a support organization during COVID-19 are in Supplementary Table 19.

study are largely demographically representative of female internet users in Egypt, albeit slightly younger, as captured by the two most recent rounds of the nationally representative Arab Barometer survey. Beyond demographic characteristics, Fig. 6 and Supplementary Table 30 display how the attitudes of women in our sample differ from those of surveyed women. The data show that the women in our study expressed attitudes slightly more in favour of gender and marital equality at baseline than the Arab Barometer respondents. Similarly, women in our study are more likely to report at baseline that they would consider contacting a support organization, and they are more likely to report knowing of or experiencing violence; however, these questions are worded differently across the questionnaires.

To ensure the generalizability of our experimental findings to the broader population of Egyptian female internet users and to ensure that slightly more favourable attitudes towards gender or marriage equality at baseline are not producing ceiling effects that drive our null findings, we examined heterogeneous effects according to these and other baseline demographics and attitudes. This analysis found no credible evidence of heterogeneous effects on our findings by these baseline attitudes or demographic variables (Supplementary Tables 31 and 32), or by any of the other key demographic variables we measured, such as education or marital status. The common support and similar distribution of the comparable covariates in Figs. 1 and 2, together with this absence of heterogeneous effects, suggest that any compositional differences in our sample are unlikely to impact the generalizability of interest.

We further assessed generalizability by recomputing our main estimates by weighting the experimental sample to match the governorate–age distribution of Facebook users that saw the recruitment Facebook advertisements. Supplementary Fig. 4b shows that, relative to the Facebook users reached by the Facebook advertisements used to recruit participants, the participants in the experimental sample are younger and are more likely to be drawn from Cairo. The results in Supplementary Table 33 indicate that there is little credible evidence that such sample differences affect the representativeness of our results for the broader population of Egyptian female Facebook users specifically and of Egyptian women on the internet more generally.

One persistent concern for experiments of this nature is the potential for demand effects, or individuals' desire to report attitudinal or behavioural shifts in accordance with their understanding of the study's goals in ways that bias the study's results. In this case, as we measured the consumption of the intervention content before outcomes

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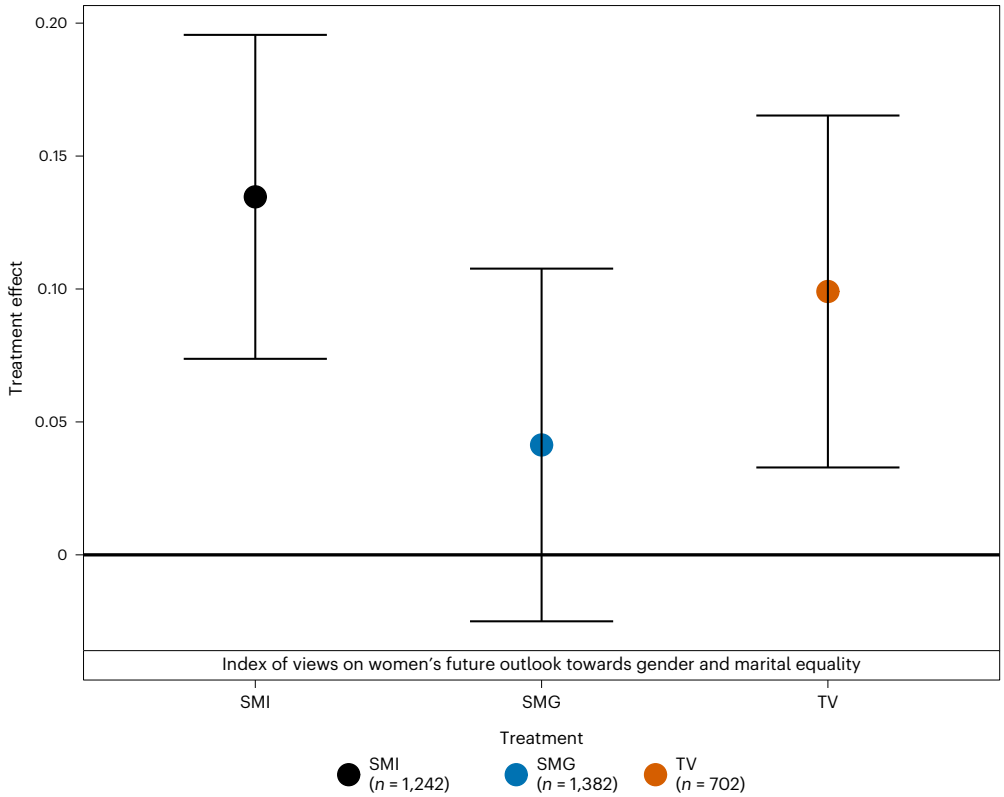

Fig. 5 | Treatment effects on women's future outlook towards gender and marital equality. The data are presented as treatment effects relative to the control group ±90% CIs (due to positive one-sided *t*-tests). The estimates are from separate WGLS regressions where the weights are in the inverse probability of treatment assignment. The labels are the corresponding dependent variables regressed on the treatment indicators, with controls as in panel **a** of the corresponding tables and randomization block fixed effects. The outcomes included in the index of views on women's future outlook towards gender and marital equality are in Supplementary Table 20.

at endline, one concern is that any results reflect the respondents' interaction with the treatment content itself. We point to several reasons why demand effects are unlikely to explain the results we discuss above. First, our survey instrument was carefully designed to test for demand effects as well as social desirability bias, and we found consistent results across direct and indirect (including hypothetical) questions, as well as questions testing accurate recall. That individuals increased their knowledge of ECWR alongside that of other organizations directly featured in the content (Supplementary Table 14) strongly suggests the results are driven via the consumption of the intervention content itself.

Second, individuals' responses to the intervention content amount to selective and nuanced adoption of the content endorsed by Aboul Qomsan. Recruitment content did not differentiate among outcomes, and yet the treated participants expressed an increase in knowledge, no salient shifts in attitudes, and increased hypothetical willingness and reported use of certain forms of engagement and reporting. Aboul Qomsan explicitly endorses measured attitudes. However, that there is no evidence these endorsements shifted respondent attitudes underscores that demand effects are unlikely to drive the broader findings.

Finally, the precise nulls on placebo outcomes that our intervention should have no impact on—the reported experience of violence during COVID-19, recalled experiences of violence before COVID-19 and, in particular, the use of resources before COVID-19 (for more details, see Supplementary Fig. 3 and Supplementary Tables 21, 22 and 25)—emphasize that demand effects and social desirability bias are not driving the shifts we detect in hypothetical or recently reported use of resources.

Discussion

Our findings align first and foremost with those that find that dramatized interventions can generate increased reporting of violence without necessarily impacting underlying attitudes[26,27]. However, our study differs from others in its non-dramatized nature, instead delivering factual content via a high-status figure in a relatable and familiar tone. Furthermore, unlike these other studies, we focused more specifically on the use of online resources and access to support organizations that can provide help, possibly remotely, to women subjected to GBV and IPV in a context of rising levels of such violence.

As it does so, our study builds on findings from edutainment interventions—especially those addressing GBV and IPV—by underscoring that similar content can be cost-effectively disseminated via social media and TV, despite the considerable differences relative to distributing such content via communal film screenings[23,26,27] or via the grouped in-person interventions[13–15] that we discuss below. By using social media both to encourage the consumption of content and to host and deliver some content directly, our study shows that these platforms can be highly impactful where they are increasingly popular, in Egypt[46] and elsewhere, allowing for low-cost (even free) information dissemination. While digital outreach cannot replace in-person programming—especially given the large numbers of women in Egypt who do not have access to the internet—these results show that organizations can usefully encourage the consumption of content disseminated over both social media and TV to generate deeper knowledge and cue greater outreach to support organizations.

We fielded the intervention during a period when national mobility had recovered slightly after the drastic mobility declines from March through May 2020 but remained approximately 20% below mobility

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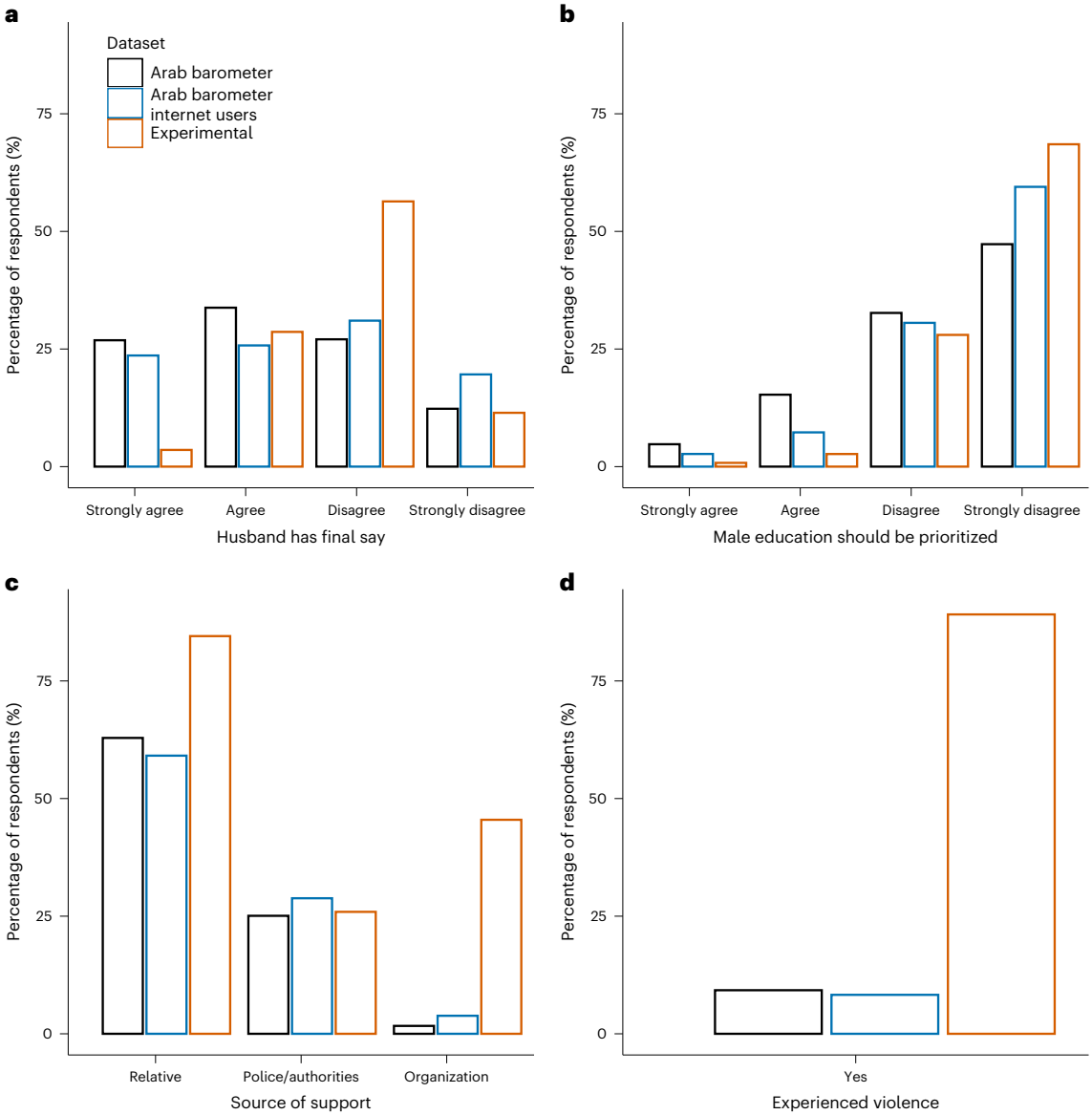

Fig. 6 | Comparison of attitudes and behaviour between Arab Barometer and experimental sample respondents. a, The distribution of the responses to whether the husband has the final say on attitudes towards gender and marital equality. **b**, Responses to whether male education should be prioritized over female education. **c**, Responses regarding sources of support. The variables differ between surveys: the Arab Barometer survey asked whether the respondents thought that a family member who was abused would be able to receive assistance from each of the actors, and our survey asked whether the respondents would recommend a friend or family member who was abused to reach each of the actors. **d**, Responses regarding experience of violence. This variable also differs between surveys. The Arab Barometer survey asked whether in the last 12 months any individual in the household had experienced physical abuse by another member. Our survey asked whether in the month before the COVID-19 pandemic the respondents had heard of someone or had themselves experienced being hit by a man. The Arab Barometer data belong to the 2016 and 2018 waves. Additional summary statistic comparisons are in Supplementary Table 30.

averages during pre-pandemic periods, according to Google's mobility data (Extended Data Fig. 4), while NGOs' in-person programming remained very limited. This recovery in baseline mobility during our period limits our concerns that our results are uniformly attributable to individuals' increased willingness to consume video content during this particular period, so that similar social media interventions could be effective and useful outside of COVID-19 contexts given the relatively low cost of this intervention.

The digitally delivered group-level intervention differs from communal interventions[13–15] or screenings[23–25] where individuals consume content next to those they consider their neighbours and personal contacts in ways that might lead to more rapid changes in beliefs about social norms. This difference might account for the lack of differential effects we find between the individual and group dissemination in the social media treatment arms and is a limitation of the study. The limited conversation in these groups may also underpin the absence of credible evidence that those in the group intervention positively shifted their future outlook towards gender and marital equality. However, it reflects the intervention's focus on the content and the potential for low-cost, scalable modes of delivery, as well as the technical challenges in mimicking or generating groups akin to those who come into contact with one another offline.

We identify at least two additional, more resource-intensive steps that would be needed to more directly mirror these modes of

communal delivery. First, organizations and researchers would need information on community structure to place individuals in groups online that reflect their communities offline, which may be technically difficult to generate via our recruitment mechanism of Facebook advertisements. Second, future programming would need to consider how to create and moderate meaningful, safe and respectful interaction in these online spaces, while inducing common knowledge among participants that they are receiving the same content as their community members.

Finally, while our research provides evidence that these forms of distribution can have normatively positive effects in encouraging outreach to local organizations skilled at navigating the social context and cognizant of the barriers women face when exposed to and reporting violence, these results should not be understood to mean that future interventions should not address men. The absence of men in the intervention constitutes an additional limitation of the study. Beyond improving victims' access to resources, men's attitudes and behaviours are critical to shifting social norms and legal structures and durably reducing violence. Future work should extend our findings by considering how to deliver similar programming to men or mixed-gender groups without heightening the risk of online harassment. Encouragingly, several recent, successful interventions that purposefully include men and male community leaders have shifted women's access to the labour market[47] and exposure to violence[14] or shown that edutainments' impacts can work through shifts in male attitudes[23]. Like these offline interventions, future online interventions must carefully consider how to appropriately include men without cueing fears or heightening the risk of online harassment.

Methods

Ethics

This project received approval from MIT's Committee on the Use of Humans as Experimental Subjects (COUHES) no. 2006000174 and from the American University of Cairo Institutional Review Board no. 2020-2021-003. The participants provided informed consent at the beginning of the study and subsequently manually opted in to receive further videos on "women's empowerment and support" by sending a text to a project WhatsApp account, adding the number to their contacts, and following and sending a message to a project Facebook account. In keeping with Egyptian data protection laws and our COUHES approval, all personally identifiable information was digitally stored using encryption, and all of this information was destroyed upon project completion. After informed consent, once women were sent content, they were also informed that they could unsubscribe or opt out of receiving content at any time and were given instructions for how to do so. Moreover, the participants could block the sender and stop receiving content at any time.

Beyond these considerations, we sought to minimize risks and perceptions of personal disclosure in both the survey instruments and the intervention content, while providing resources to those impacted by GBV and IPV. Drawing on ECWR's experience in the context, we avoided asking sensitive questions that would require respondents to individually identify themselves as having experienced GBV and IPV in favour of questions allowing for the experiences of "you or someone you know". This decision limited comparability relative to nationally representative surveys such as Arab Barometer that asked more direct and personal questions, and it means that our questions do not resemble the GBV or IPV screening tools used in in-patient medical settings[48]. The participants could also skip any questions they felt uncomfortable answering. Furthermore, the content we distributed was directly tailored to the Egyptian context and the decisions women make around responding to violence. While addressing sensitive topics such as violence against women, Aboul Qomsan consistently and conversationally discusses methods for women to safeguard their mental health and discusses the connections between women's health and family health. Finally, all of the videos distributed over social media displayed the short titles of the videos (Extended Data Table 1), and individuals needed to actively click on the links in order to view content, so women in the study could avoid consuming content on any topic.

Most directly, our enumerator team also referred women to support when requested by providing them instructions on how to contact ECWR directly. These requests occurred during data collection, in response to the Facebook advertisement. In total, five women messaged our page or our WhatsApp number directly seeking support. Our enumerators immediately referred these individuals to ECWR for support. In this way, these advertisements facilitated the provision of supportive resources that these women would have otherwise struggled to access, while underlining the need for additional outreach. We received no additional messages requesting support.

Sample recruitment and surveys

We placed 76 Facebook advertisements across combinations of Egyptian governorates and age groups to recruit 9,431 valid responses from a broad sample of Egyptian women to a baseline survey, implemented online via Qualtrics. This excludes precisely duplicated responses, as we feared that those individuals were not genuinely interested, and male respondents whose metadata and response timing indicated they were impersonating women after being informed that only women were eligible to participate. The Facebook page that promoted the recruitment advertisements was titled in Arabic 'Inti mish liwahdik' ('You are not alone') and featured a 40-second video by Aboul Qomsan. In the video, she invited individuals to complete the survey in order to gather information on women's issues in Egypt, especially in light of ECWR's efforts to respond to the burdens confronting women in the COVID-19 outbreak.

In the informed consent of the baseline survey, the respondents were told that the survey was part of an "evaluation in collaboration with the Egyptian Center for Women's Rights", focused "on the views and behaviors of Egyptian women such as yourself". Near completion of the baseline survey, the respondents were invited to text a project WhatsApp account, add the number to their contacts, and follow and send a message to a project Facebook account to "receive short videos with information about women's empowerment and support in Egypt". To incentivize participation, respondents who completed the survey received 25 Egyptian pounds (US$1.20) in mobile phone credit.

We identified 5,618 Egyptian women interested in receiving such information and videos. The enrolment of approximately 60% of the participants in the experiment was in line with our expectations and those of our partner. Supplementary Fig. 5 and Supplementary Table 34 explore how the baseline responses of those who opted in to receive additional information and videos about women's issues in Egypt differ from those who did not. The results indicate that, on average, the women interested in being part of the study were younger, more likely to have experienced GBV and IPV during COVID-19, had more knowledge and recent use of online resources for women and were more likely to contact a support organization. However, there is no credible evidence that there are differences in other covariates, attitudes towards gender and marital equality, and hypothetical use of resources and contact with a support organization. Despite some average differences in baseline characteristics, Supplementary Tables 31 and 32 show no credible evidence that there are heterogeneous effects on our findings from such baseline characteristics, underscoring that any compositional differences in our sample are unlikely to impact the generalizability of our results to the broader population of Egyptian women on the internet.

In collaboration with our partner, the baseline survey outcomes were designed to build on research on the impact of edutainment interventions and community screenings on attitudes towards gender equality, GBV and IPV[23,25–27] and research in public health concentrating on the determinants of violence in Egypt[32,37]. We also added outcomes

from recent modules from the Arab Barometer survey in Egypt and broader research around access to community-level interventions[14,49] and economic empowerment[12]. The outcomes we measured in our study are not meant to accurately measure the overall prevalence of violence in Egypt or among Egyptian female internet users.

The endline survey was also conducted online via Qualtrics between 10 September and 11 October 2020. While endline data collection started five days after the delivery of the final video, to minimize demand effects and social desirability bias, the participants were not informed that they would not receive additional videos, and the TV show remained ongoing. The endline response rates were balanced among treatment conditions at 75%, yielding a final sample of 4,165 participants. Relative to the initial experimental sample, we dropped 210 respondents who responded to the endline more than once, which are balanced across treatment conditions. Supplementary Table 35 shows that our main estimates are robust to the inclusion of these participants.

In addition to repeating the baseline outcomes, the endline survey measured video consumption and recall of the social media videos and TV show content, both directly and indirectly to minimize demand effects. Moreover, it included a series of placebo outcomes to assess the extent of demand effects and social desirability bias. The full questionnaire is available in the Supplementary Information.

Supplementary Fig. 4b shows that, relative to the female Facebook users who initially viewed the advertisements, female Facebook users between the ages of 18 and 34, as well as those in Cairo, were more likely to ultimately enter the experimental sample. Similarly, Extended Data Fig. 1 shows that our final sample of Egyptian women was largely drawn from more densely populated Egyptian governorates, particularly Egypt's most populous city and its capital, Cairo. However, Fig. 1 shows that the respondents were demographically similar in age, education, relationship status, number of children and extent of media usage to Egyptian women who reported having access to the internet—the study's population of interest—in the 2016 and 2018 rounds of the nationally representative Arab Barometer survey.

Treatment assignment, content and distribution

To ensure balance among treatment arms according to baseline demographics and attitudes, we used block randomization to assign baseline respondents who showed interest in receiving information and videos about women's issues in Egypt to one of our five treatment conditions. Extended Data Table 3 displays details on the block randomization procedure, assignment to treatment and endline response rates across treatment arms. Supplementary Tables 1–9 show that our block randomization procedure resulted in covariate balance across experimental conditions.

The treated participants received nudges to consume one of two sets of videos with intervention information. The first set of videos constituted the latest season of a weekly TV show called *Hekayat Nehad* (Nehad's Stories), aired on a popular satellite channel, Al Kahera Wa Al Nas, on Saturday evenings between 27 June 2020 and 5 September 2020. The show's 10 episodes were around 25–30 minutes long and featured Aboul Qomsan sitting in a TV studio and speaking directly to the camera in a conversational tone. The second set was 13 five- to nine-minute videos disseminated over social media, which featured a similar narrative style as the TV show. Extended Data Tables 1 and 2 summarize the content of each TV episode and video disseminated over social media.

The control group received no videos or communication between surveys. The absence of an 'attention control' condition stemmed from practical realities. Because our partner specializes in and is known for content related to women's issues in Egypt, no pre-produced, unrelated content was available, and our partner could not have produced similarly structured content on a different topic on a timeline that would have allowed the intervention to proceed during this period.

Participants in the TV reminder treatment received a WhatsApp message every Saturday informing them about the time and channel of the show *Hekayat Nehad* over an eight-week period from 18 July 2020 through 5 September 2020. Since we received Institutional Review Board approval three weeks after the TV show started, the first of eight messages we delivered also pointed to the location of videos from the first three episodes. This might explain why respondents in the TV condition reported viewing additional content on social media in Fig. 2, to a greater degree than those in the control group.

Participants assigned to the other three treatment arms—Facebook, WhatsApp Individual or WhatsApp Group—received 13 links to a website publishing the videos mentioned earlier during the same period. In the WhatsApp Group treatment, women were invited to join groups of Egyptian women receiving the content and given instructions on how to leave the group if they preferred to receive the information individually. The results indicate a small increase in TV show consumption by these treatment groups, which we attribute to increased interest in Aboul Qomsan's content.

Relative effectiveness of Facebook and WhatsApp

To explore the relative effectiveness of Facebook and WhatsApp in generating consumption of the treatment information, we used server-visit data and conducted a difference-in-differences analysis that exploits the fact that participants assigned to receive videos through Facebook were transitioned to WhatsApp Individual delivery after the delivery of four videos due to a technical issue. Extended Data Fig. 3 displays visits per assigned user across videos, distinguishing Facebook and WhatsApp Individual treatments. Supplementary Fig. 1 reports the corresponding means for the first four weeks and the last eight weeks. The difference in means between those two periods and across Facebook and WhatsApp Individual treatments indicates that the individual dissemination of videos via WhatsApp was much more effective than through Facebook, with 0.126 ($P = 0.022$; 95% CI, (0.025, 0.226); two-sided) more visits per assigned user for WhatsApp Individual than for Facebook. These differences show that, in addition to the technical issue we faced with our Facebook account, WhatsApp was a more effective method to deliver the intervention content in terms of generating video views.

Empirical specification for statistical analysis

Our main results are from the following intent-to-treat specification using WGLS:

$$Y_i = \alpha_0 + \alpha_1 \mathrm{SMI} + \alpha_2 \mathrm{SMG} + \alpha_3 \mathrm{TV} + \Omega X_i + \gamma_b + \varepsilon_i,$$

where Y_i is an outcome of interest of individual i; SMI, SMG and TV are indicators for treatment assignment to social media (Facebook or WhatsApp) individual, social media (WhatsApp) group and TV reminders; Ω reflects the estimate of the baseline-individual controls; X_i are baseline-individual controls from the corresponding family of outcomes; and γ_b are block-randomization fixed effects. The regression weights correspond to the inverse probability of treatment assignment, as detailed in Extended Data Table 3. Our primary estimates (α_{1-3}) recover the treatment effects for the SMI, SMG and TV treatments. Throughout, we performed one-sided tests of statistical significance wherever we hypothesized the direction of a statistically significant effect and two-sided otherwise.

In our main results, our outcomes of interest are z-score indices, whereby we first standardized each variable of the index, then took the average of these standardized variables and finally standardized this average. While rare, we coded missing answers as zero and included controls for such instances, which we interacted with other regressors whenever appropriate. In each table where we report treatment effects, we consider three different versions of X_i. In panel **a**, we control by the lagged dependent variable (if available) and LASSO-selected covariates

from the outcome family. This is our preferred specification, and we use its coefficients in Figs. 2–5. In panel **b**, we control by the lagged dependent variable (if available). In panel **c**, we do not control for any covariates.

Preregistration

This study was preregistered at the Evidence in Governance and Politics repository, https://osf.io/tekyr, on 14 April 2021.

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

All the data used in this research, including de-identified baseline and endline survey data, server data on server visits, YouTube channel views, and supplementary Google Mobility data (https://www.google.com/covid19/mobility/), are available in the Harvard Dataverse repository, https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VFFZRM. These include the de-identified original and derived datasets.

Code availability

All the code developed by the authors using the statistical software R for data construction and analysis (that is, to generate figures, tables and other summary statistics) is available in the Harvard Dataverse repository: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VFFZRM.

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Author contributions

F.C., H.L. and E.P.-M. developed and designed the experiment and oversaw and conducted the data collection. F.C., H.L., E.P.-M. and M.Q. devised the statistical analyses. E.P.-M. and M.Q. wrote the analysis code. M.Q. performed the statistical analyses. All authors wrote the manuscript, provided revisions and finalized the text.

Competing interests

The authors declare no competing interests.

Additional information

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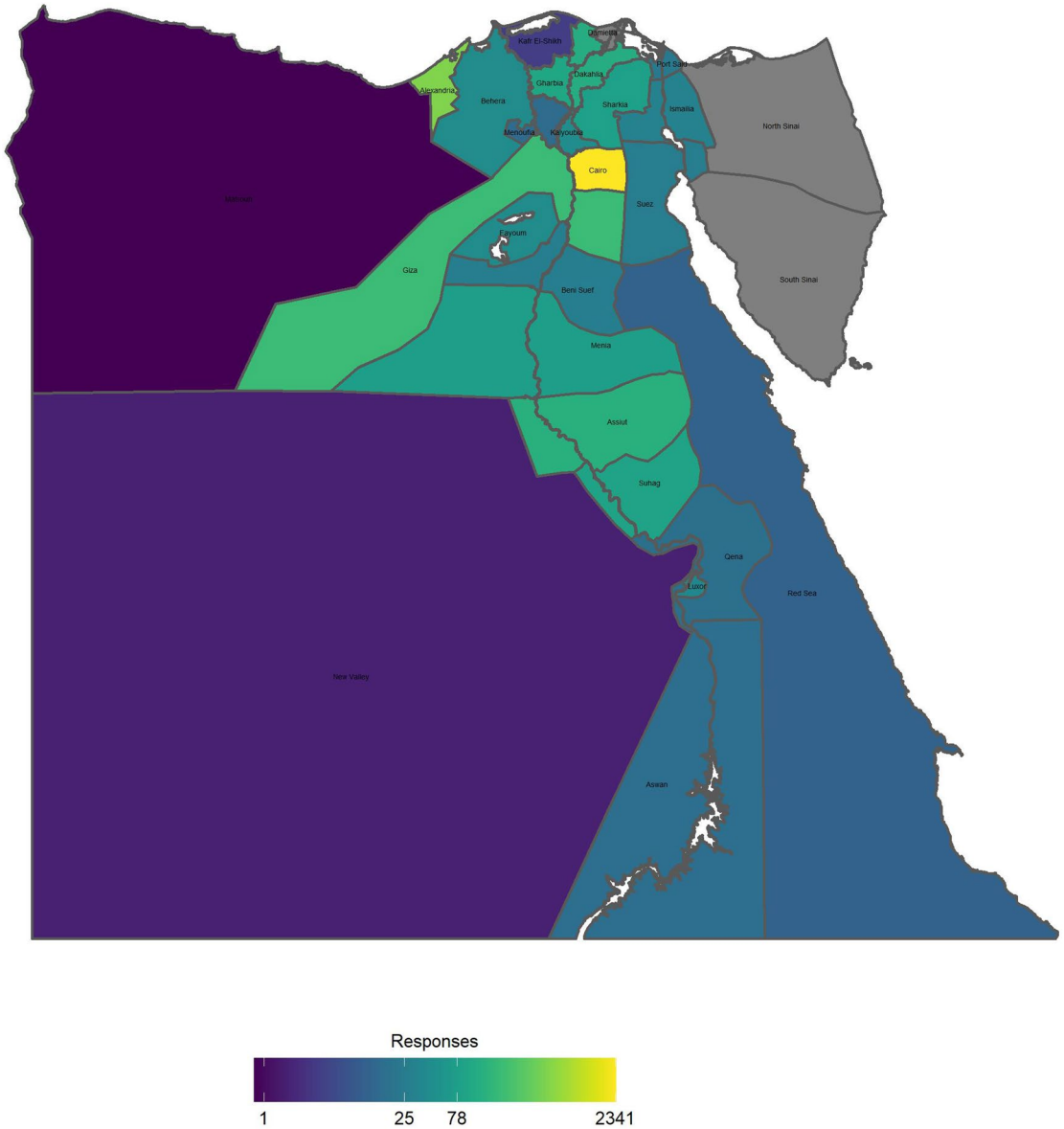

Extended Data Fig. 1 | Survey responses by Egyptian Governorate. The graph shows the distribution of survey responses by governorate, with Cairo having the highest frequency of responses at 2341. The median governorates are Luxor and Bahera, with 37 and 42 responses, respectively. Matrouh had the lowest number of responses, with only one respondent. The survey data was collected and analyzed by our team. Adapted from the Humanitarian Data Exchange under a CC BY 4.0 licence.

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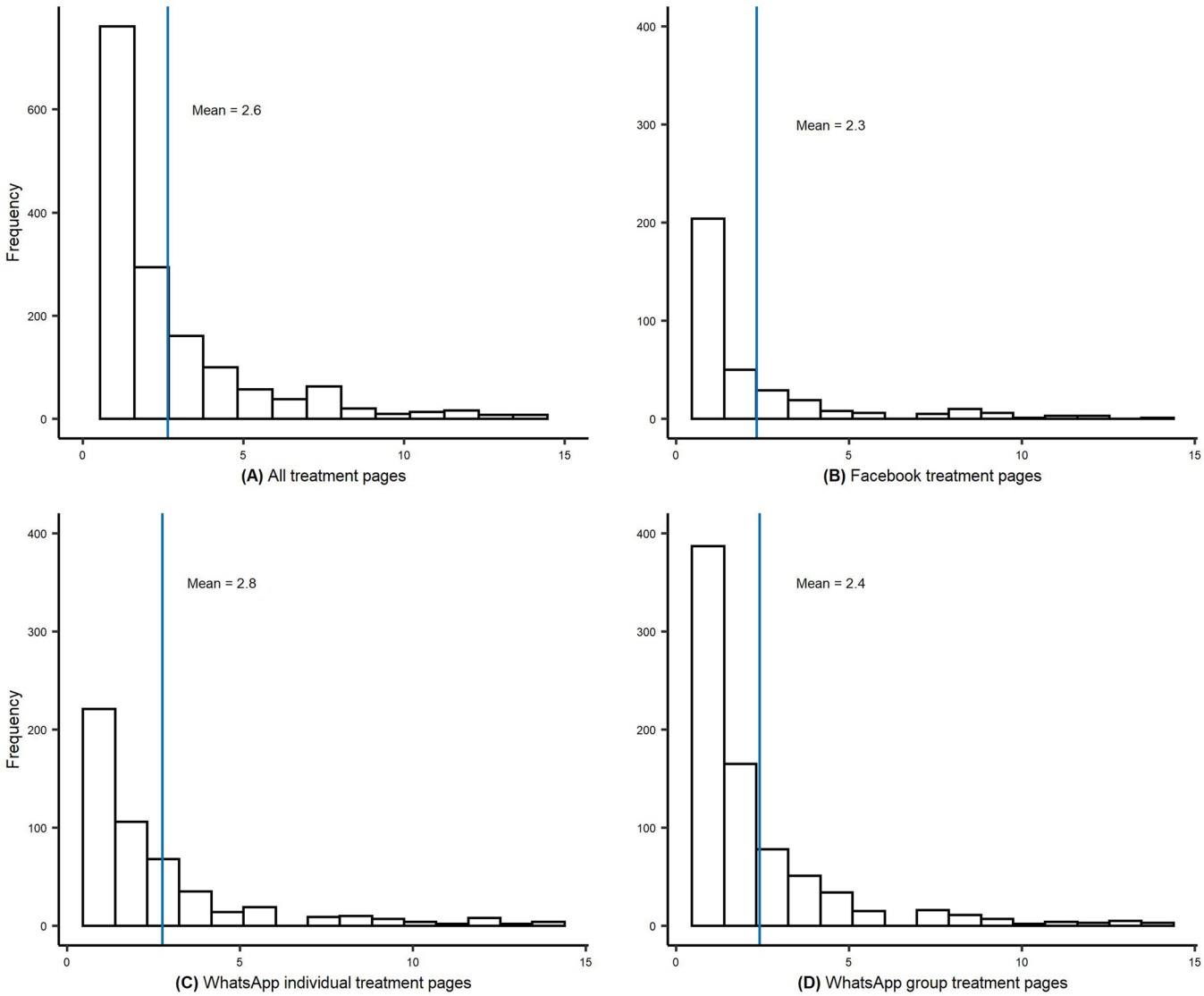

Extended Data Fig. 2 | Number of treatment web pages visited per web page user across treatments. Panel (a) shows the total number of visits to the server hosting videos and YouTube videos for the 14 pages/videos delivered. Panel (b) shows the number of visits for the Facebook treatment group, panel (c) for the WhatsApp individual treatment group, and panel (d) for the WhatsApp group pages. For more detailed results, refer to Extended Data Tables 4 and 5.

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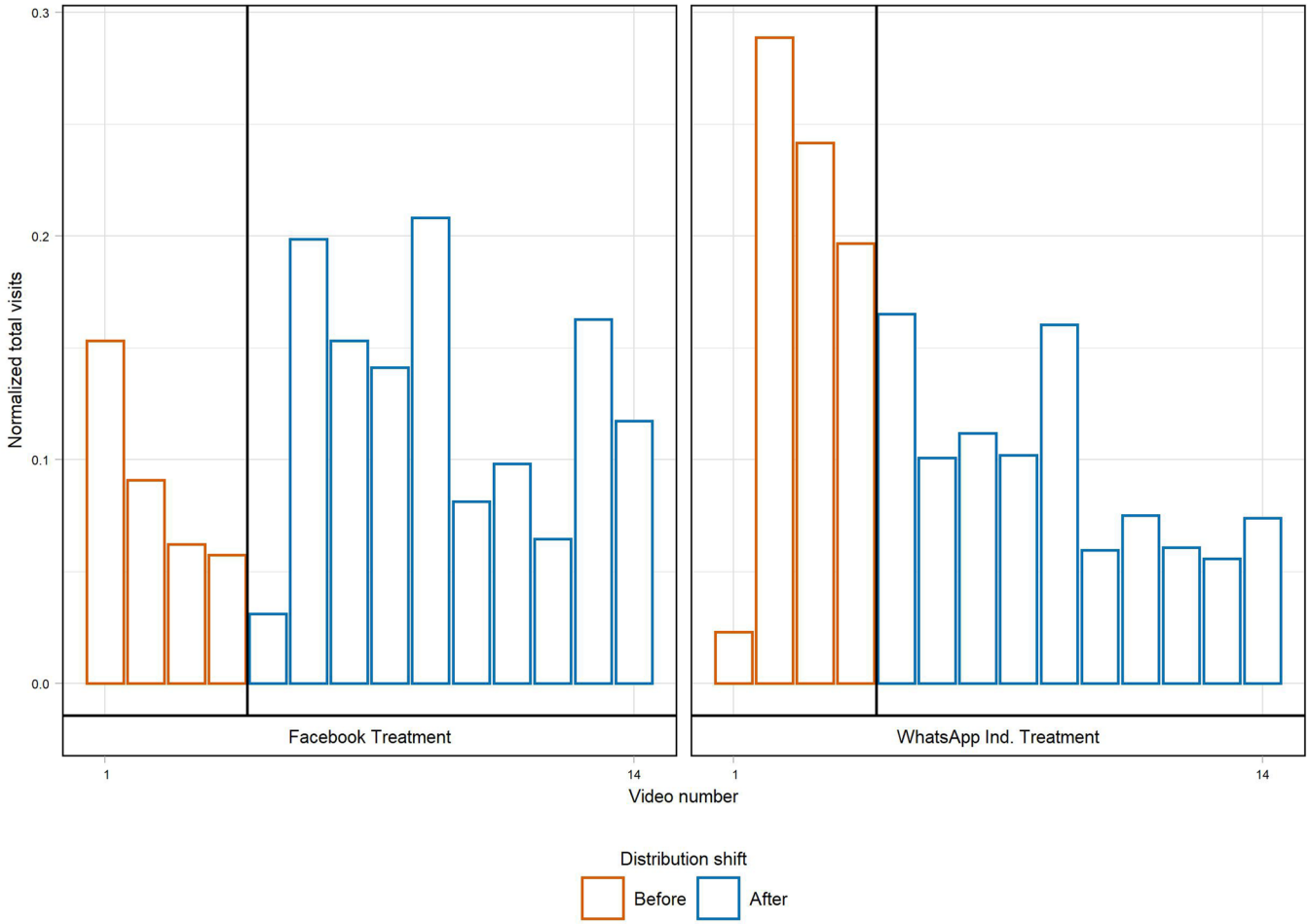

Extended Data Fig. 3 | Video landing web page visits for Facebook and WhatsApp Individual treatment before and after participants assigned to the Facebook treatment were shifted to the WhatsApp Individual treatment. Difference-in-differences analysis of the impact of transitioning the Facebook treatment group from receiving videos on Facebook to receiving videos via WhatsApp. The left panel shows the distribution shift in the total number of video views before and after the transition for the Facebook treatment group. The right panel compares the same distribution shift for the WhatsApp individual treatment group. Analyzing the distribution shift helps us understand the relative effectiveness of Facebook vis-a-vis WhatsApp.

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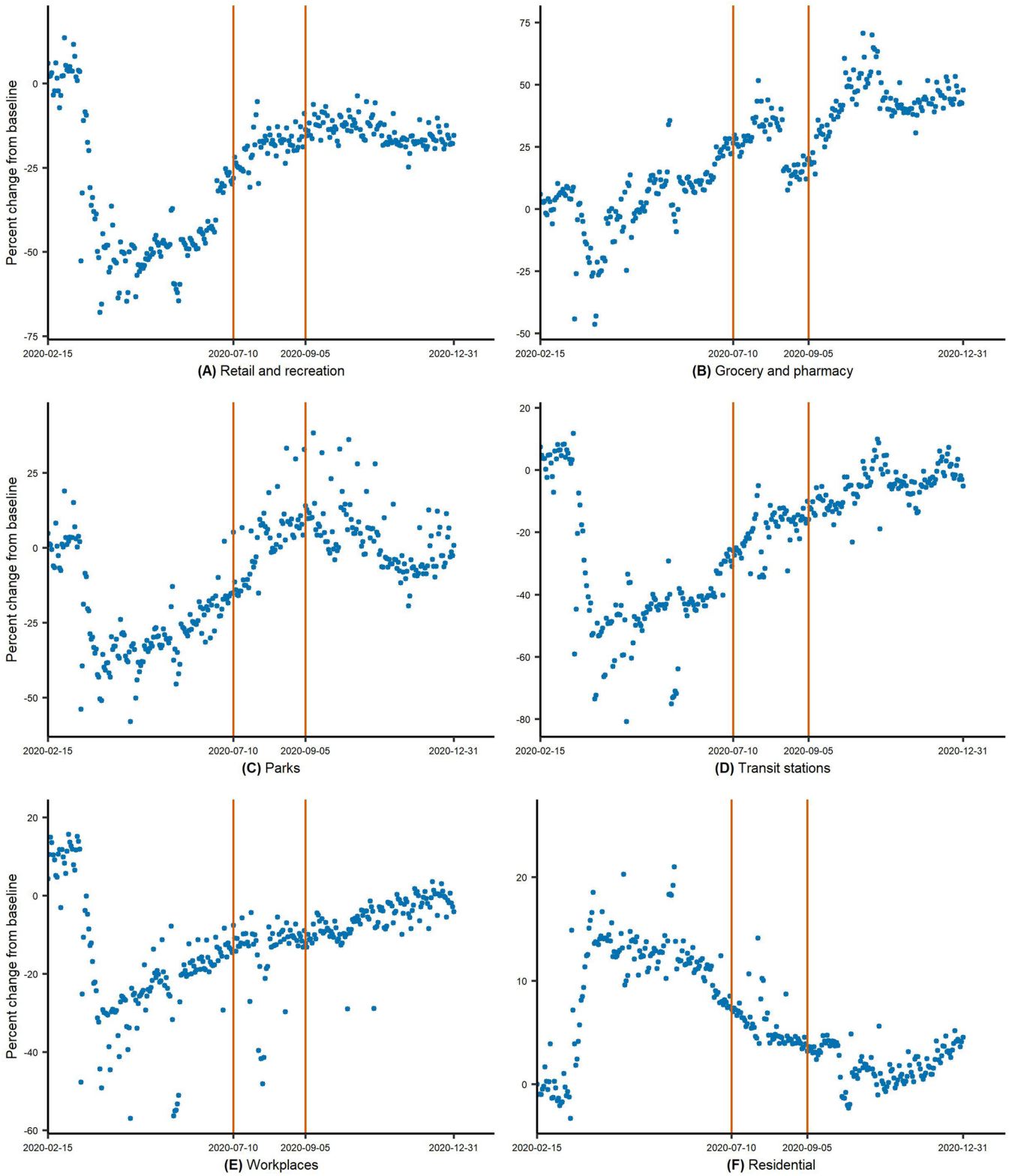

Extended Data Fig. 4 | Mobility in Egypt during the intervention. We plot the daily percent change in mobility relative to the prior to the COVID-19 pandemic across different industries (panel (a) is Retail and recreation, panel (b) grocery and pharmacy, panel (c) parks, panel (d) transit stations, panel (e) workplaces, and panel (f) residential) in Egypt during the first year of the COVID-19 pandemic. Vertical lines demarcate the intervention, which ran from July 10, 2020, to September 05, 2020. All data comes from Google Mobility public data.

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Extended Data Table 1 | Content of videos hosted on the website and delivered via message

Ep.	Title	Content	Reporting
1	What is sexual harassment and what is its penalty?	Pervasiveness of sexual harassment; definition; harassment in public, on streets or in stores; men's role in harassment; legal rights and ramifications of violence; interfering when you witness harassment; contact ECWR where a professional team will help you learn how to deal with these situations.	Organizations
2	Sexual harassment of children and how to protect them?	Sexual harassment of children; protecting, supporting, & believing children; boundaries; contact ECWR.	Organizations
3	Are women's clothes the cause of sexual harassment?	Sexual harassment; justifiability of sexual harassment; research on when it occurs; personal experiences; harassment and veiling, the Niqab; supporting victims & contacting ECWR.	Organizations; ECWR
4	FGC and how to stop it?	FGC; negative health effects; absence of relationship with religion; criminality; doctors' role; contact ECWR.	Organizations; ECWR
5	Impact of COVID-19 on increasing domestic violence	COVID-19 & DV; safety in the home; justifiability of violence; violence's harm to relationships; cycles of violence; supporting victims; contact ECWR.	Organizations; ECWR
6	Rape crimes and how to fight them	COVID-19 & social issues; anxiety; spread of violence & rape in public spaces; female clothing; how to report to the police; gaining justice; family support; psychological effects; contact ECWR.	Organizations; ECWR; police
7	The difference between divorce and Khul' and when to choose either?	COVID-19 rise in DV; rise in questions re: divorce and Khul'; difference between two; legal rights; Egyptian law; contact ECWR.	Organizations; ECWR
8	The importance of work and how to balance between work and home?	Absence of conflict between work and home; safety via financial security; work's benefit to social relations and esteem; work and tensions with a husband or family; work as a safety net; contact ECWR.	Organizations; ECWR
9	The negative effects of Covid-19 on women's work	COVID-19 and labor market; schools; working remotely; combating sexual harassment at the workplace; inappropriate staring; sexual harassment as a crime; contact ECWR.	Organizations; ECWR
10	How to deal with workplace harassment?	Definition; lack of justifiability; online harassment; criminality; intervening in a case of harassment; expressing opinions; creating a safe workplace; contact ECWR.	Organizations; ECWR
11	How to act if you saw someone harassing a colleague at work?	COVID-19 & changes in workplace; work environment; intervening in harassment; helping a colleague; importance of speaking up; assuring privacy; contact ECWR.	Organizations; ECWR
12	Dealing with workplace harassment for new employees	Workplace harassment; seeking training as a new employee; expectations and boundaries; saying no; contact ECWR.	Organizations; ECWR
13	How can men stand against violence against women?	Need for men's support; COVID-19 and rise of ECWR complaints; men's role in intervening; men's role in regulating anger; no justifiability of anger or violence; blame on women; men standing against violence; contact ECWR.	Organizations; ECWR

Videos titles, content descriptions, and teachings on seeking support or reaching out to different organizations for all videos hosted on the website.

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Extended Data Table 2 | Content of TV shows hosted on satellite channel

Ep.	Title	Content	Reporting
1	Statement of the Egyptian Public Prosecutor	Female Genital Cutting (FGC); one family's experience; a family's criminal responsibility.	Reporting FGC to the police
2	Horrible Stories from Medical Clinics	FGC; doctors' role in limiting FGC; FGC's lack of health benefits; Social relationships in COVID-19.	Need for patients & doctors to contact police on FGC
3	Rape and Sexual Harrassment: To Who and Why?	Rape; current events; parental support for daughters who are victims; minimizing victim blaming; reporting; COVID-19.	Procedures for reporting to the police, reforms to limit fears of reporting
4	Underage Marriage	Health implications of underage marriage; laws in Egypt; marriage officials; household life in COVID-19.	Advertising of organization
5	Mary Asaad & Aziza Hussein	A women's initiative to combat FGC; women's activism; family planning; physical & emotional consequences of FGC; religion & FGC.	Advertising of support organization; the need for legal reform.
6	What do men want from women?	Male & female partnership; research on men's perceptions of manhood; FGC; COVID-19 and domestic violence (DV); a UN initiative combatting DV.	NA; Advertising of support organization
7	What should you do if you are in the home & you don't feel safe?	DV against women during COVID-19; reporting DV to then police or doctors; total number of comments, questions, & calls to organizations' pages and hotlines; organizations supporting women facing DV in situations; COVID-19's impacts on women generally; COVID-19 & the economy.	Reporting: Police, institutions, organizations, phone number.
8	FGC & the Internet	FGC; intergenerational relationships; COVID-19 & internet usage.	
9	What's the definition of a man?	A divorce after DV; raising responsible children and men; forgiveness for men & men's expectations; women's views on the justifiability of DV vs. men's.; how to help women facing DV who accept DV; how to respond while violence is occurring & how to flee home if you need to	Seeking support from to organizations; available hotlines; calling the police
10	Do women prefer kind or macho (over-protective) men?	Negative effects of over-protectiveness; anecdote about a marriage; spread of negative information about marriage; shifting gender norms and women's preferences; unjustifiability of any form of DV; role of doctors; reporting DV in cases of extreme violence.	Reporting: Police, institutions, organizations.

Episode titles, content descriptions, and teachings on seeking support or reaching out to different organizations for all 10 episodes of the TV show hosted on a satellite TV channel.

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Extended Data Table 3 | Block sizes, treatment probabilities and responses rates by treatment assignment

Treatment	Baseline	With Facebook account	Only with WhatsApp account	Endline	Response rate
		Treatment probability	Treatment probability		
Control	1104	1/5	1/5	839	0.76
Facebook	565	3/5	0	418	0.74
WhatsApp Individual	1118	1/5	1/5	824	0.737
WhatsApp Group	1879	0	2/5	1382	0.735
TV Show Reminder	952	0	1/5	702	0.737
Total	5618				

We block randomized treatment assignment separately according to whether we could identify the Facebook account of the baseline survey respondent. Blocks are of size 10 when Facebook accounts are available, and of size 50 when only WhatsApp accounts are available.

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Extended Data Table 4 | Unique Ips, users, visits, and average visit time by treatment assignment

Treatment assignment	Assigned	Unique IPs	Unique users	Total visits	Average visit time
Facebook	586	597	345	1347	4:02
WhatsApp Individual	1163	1178	509	2463	4:01
WhatsApp Group	1946	1671	781	3280	3:57
Total	3695	3446	1635	7090	4:01

Website data provides the number of unique IPs, unique users, and total visits by treatment assignment. A Unique User is determined via cookies and thus corresponds to a specific individual in a particular device. Note that this table reports different treatment assignment numbers than Extended Data Table 3 as it includes assignments to individuals who responded twice to the endline survey, and thus were excluded from the study.

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Extended Data Table 5 | Website and YouTube analytics

Video	Website		YouTube	
	Visits	Average visit time	Views	Average viewing time
What is sexual harassment and what is its penalty?	682	0:03:33	535	0:02:33
Sexual harassment of children and how to protect them?	493	0:04:57	391	0:03:44
Are women's clothes the cause of sexual harassment?	372	0:03:29	324	0:02:49
Female genital cutting and how to stop it?	286	0:04:39	268	0:04:04
Impact of COVID-19 on increasing domestic violence	235	0:04:33	212	0:02:47
Rape crimes and how to fight them and COVID-19	226	0:03:11	207	0:02:53
The difference between divorce and Khul and when to choose either?	230	0:04:50	268	0:03:22
The importance of work and how to balance work and family life?	268	0:04:47	281	0:03:51
The negative effects of Covid-19 on women's work	96	0:02:52	107	0:02:55
How to deal with workplace harassment?	143	0:04:33	175	0:03:22
How to act if you saw someone harassing a colleague at work?	110	0:04:17	146	0:02:55
Dealing with workplace harassment for new employees	146	0:04:20	172	0:02:44
How can men stand against violence against women?	184	0:06:51	184	0:02:33
Total	3471	0:04:22	3270	0:02:59

Website and YouTube analytics show that videos received a higher number of website visits and viewing time than YouTube views. The reason is that and the website measures total duration on the site, whereas YouTube measures time spent viewing the content and is much stricter in defining whether a video was viewed.

nature portfolio

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Last updated by author(s): March 30 2023

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For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed	
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☐	☒	A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
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☒	☐	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
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☐	☒	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated

Our web collection on statistics for biologists contains articles on many of the points above.

Software and code

Policy information about availability of computer code

Data collection	Data collection: We collected data via baseline and endline surveys conducted via the Qualtrics Software. Each survey was incentivized with a small mobile phone credit (25 Egyptian Pounds, 1.59 USD). We also collected data on server visits to a website and YouTube channel, and supplemental data using Mobility public data. The de-identified original and derived data sets are available in the Harvard Dataverse repository: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VFFZRM
Data analysis	Data analysis: Data were analyzed using R (version 4.2.1). All the code developed by the authors using the statistical software R for data construction and analysis (i.e., to generate figures, tables, and other summary statistics) are available in the Harvard Dataverse repository: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VFFZRM Data were analyzed using several R packages. Replication file contains all the necessary packages and installs them on a user´s machine. Packages and versions are: xfun = 0.31, knitr = 1.39, rmarkdown = 2.14, stargazer = 5.2.3, xlsx = 0.6.5, plyr = 1.8.7, stringr = 1.4.0, tidyr = 1.2.0, dplyr = 1.0.9, extrafont = 0.18, ggplot2 = 3.3.6, TAM = 4.1.4, expss = 0.11.1, fastDummies = 1.6.3, tidyverse = 1.3.2, xtable = 1.8.4, biostat3 = 0.1.6, lubridate = 1.8.0, janitor = 2.1.0, readxl = 1.4.0, car = 3.1.0, viridis = 0.6.2, mapview = 2.11.0, sf = 1.0.8, ggthemes = 4.2.4, Rfast = 2.0.6, glmnet = 4.1.6, fastDummies = 1.6.3, reshape = 0.8.9, revgeo = 0.15, BayesFactor = 0.9.12.4.4, lsr = 0.5.2, pwr = 1.3.0, gridExtra = 2.3.

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Data

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All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our policy

The data from baseline and endline surveys, server data on website visits, YouTube channel views, and supplemental Google Mobility data (https://www.google.com/covid19/mobility/) are available in the Harvard Dataverse repository: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VFFZRM

Human research participants

Policy information about studies involving human research participants and Sex and Gender in Research.

Reporting on sex and gender	We first refer to our participants first as identifying themselves as female and then use the terms female and women in our study. We determined eligibility for our study through a survey question with a commonly used Arabic word that does not distinguish between sex and gender.
Population characteristics	See above.
Recruitment	As described below, we used a convenience sample recruited via Facebook advertisements that incentivized Egyptian women to join the study using a small mobile phone credit (25 Egyptian Pounds, 1.59 USD). We chose to use Facebook to recruit participants as it is Egypt's most widely used social media platform, and these digital advertisements accommodated social distancing during COVID-19. This recruitment strategy means that our research sample is drawn from Egyptian female Facebook users.
Ethics oversight	This project received approval from MIT's Committee on the Use of Humans as Experimental Subjects (COUHES) #2006000174 and from the American University of Cairo (AUC) Institutional Review Board #2020-2021-003.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

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Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This is a quantitative experimental study. The study examines whether an an online intervention in Egypt shifts womens' attitudes or behaviors around gender and marital equality and violence against women, probing differences according to the mode of implementation. We examined four different treatment arms: individuals receiving links to online content individually via WhatsApp or Facebook, individuals receiving links to online content as part of a WhatsApp Group, individuals receiving reminders and information on an ongoing television show, and a control group that received all content at endline.
Research sample	The research sample is drawn from Egyptian female internet users, recruited via Facebook advertisements placed across age cohorts in Egypt's governorates. Our paper includes a discussion of how the women in our study differ demographically and attitudinally from nationally-representative, face-to-face surveys in Egypt. The sample is not representative of all females in Egypt because it is more urban and slightly younger, but it is likely representative of Egyptian female internet users. 5,618 women were included in the study at baseline and 4,165 completed the endline survey. Of these 4,165 who completed the endline survey, the mean age was 31.55 (SD 9.12), 56% were married (SD .495), and 58% had some university education (SD 0.49).
Sampling strategy	We used a convenience sample recruited via Facebook advertisements that incentivized Egyptian women to join the study using a small mobile phone credit (25 Egyptian Pounds, 1.59 USD). We chose to use Facebook to recruit participants as it is Egypt's most widely used social media platform, and these digital advertisements accommodated social distancing during COVID-19. We performed cursory power calculations to determine the same needed in our five treatment arms to be able to detect 0.2 standardized effects with a 0.8 power.
Data collection	We conducted online surveys via the survey platform Qualtrics. Each survey was incentivized with a small mobile phone credit (25

Data collection	Egyptian Pounds, 1.59 USD). There was no enumerator present during data collection. The research team was not blinded to participants' experimental condition.
Timing	We collected baseline survey responses from June 18, 2020 through July 10, 2020. We distributed messages linking to or informing individuals of content from July 18,0 2020 through September 5, 2020. We collected endline responses from September 10, 2020 through October 11, 2020.
Data exclusions	We excluded from the study individuals who identified as men, and individuals who completed the baseline survey twice, which indicated no genuine interest in the intervention.
Non-participation	Of approximately 9,431 women who completed the initial survey once, 5,828 opted in to receiving the intervention content.
Randomization	Participants were enrolled into experimental groups using block randomization in two batches, according to whether individuals provided links to receive content via a Facebook account in addition to a WhatsApp account. Covariates included in block randomization were age, education, marital status, cohabitation with husband, and a range of attitudinal and behavioral outcomes measured at baseline.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

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☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging