Bettio, Francesca; Tavares, Fernando Flores; Ticci, Elisa

Working Paper

Intimate partner violence during lockdown in Tuscany, Italy: economic shock or confinement-related stressors?

GLO Discussion Paper, No. 1507

Provided in Cooperation with:
Global Labor Organization (GLO)

Suggested Citation: Bettio, Francesca; Tavares, Fernando Flores; Ticci, Elisa (2024) : Intimate partner violence during lockdown in Tuscany, Italy: economic shock or confinement-related stressors?, GLO Discussion Paper, No. 1507, Global Labor Organization (GLO), Essen

This Version is available at:
https://hdl.handle.net/10419/304384

Intimate partner violence during lockdown in Tuscany, Italy: economic shock or confinement-related stressors?

Francesca Bettio[1] Fernando Flores Tavares[2] Elisa Ticci[3]

Abstract[4]

We revisit the issue of Intimate Partner Violence (IPV) during the COVID-19 pandemic asking three questions: whether IPV increased with lockdown, what pandemic-specific 'shocks' or 'stressors' had the greatest impact and how the results change when different measures of IPV are used. Leveraging a large telephone survey conducted in 2021 in the Italian region of Tuscany as part of a mixed-method research project on IPV during the first lockdowns, we show that IPV intensified. As regards pandemic-specific shocks or stressors, we find that parental overburden due to the presence of minors had the largest impact, followed by job loss, whereas confinement to crowded spaces lacking privacy appeared to have a weak effect, if any. Finally, and unsurprisingly, we find that using a fuzzy measure of violence outcomes that accounts for severity as well as prevalence of violence modifies the findings in important respects. In particular, job loss appeared to trigger less severe abuse than parental overburden. Our empirical strategy principally relies on the exogeneity of pandemic-specific shocks to attribute causal interpretation to our estimates. However, our dependent variables (IPV outcomes) are binary or fractional, and endogeneity cannot be ruled out. To address these aspects, we estimate average marginal effects using a two-step Control function (CF) approach combined with a quasi-likelihood method.

Keywords Intimate partner violence · COVID-19 pandemic · Fuzzy set theory · Control-function method · Italy · Gender

JEL Classification C49 · D63 · J16

[1] Global Labor Organization (GLO) and University of Siena, Department of Economics and Statistics, Siena, Italy, email francesca.bettio@unisi.it

[2] University of Siena, Department of Economics and Statistics, Siena, Italy

[3] University of Siena, Department of Political and International Sciences, Siena, Italy.

[4] We acknowledge financial support from Regione Toscana (PANGEA project "PANdemic GEnder violence participatory Assessment: la presa in carico della violenza di genere durante la pandemia secondo le vittime, i testimoni privilegiati e gli operatori sul campo'). We are grateful to Gianni Betti, Anna Coluccia, Federico Crudu, Antonella D'Agostino, Fabio Ferretti, Cinzia Meraviglia, Giuseppina Muratore, Luca Piccoli, Federica Tramontano, and Tiziano Razzolini for their comments and suggestions at different stages of the project.

1. Introduction

Since the COVID-19 pandemic, the literature on violence against women - Intimate Partner Violence (IPV) in particular - has reached massive proportions. Because most contributions are descriptive and based on quickly gathered online data (Béland et al. 2021; Ebert and Steinert 2021; Morgan and Boxall 2020; Peitzmeier et al. 2021) or administrative sources like helpline calls or police records (Hsu and Henke 2021; Leslie and Wilson 2020), they yield a rich and timely but fragmented picture. In this paper, we undertake a causal investigation of pandemic-specific triggers of IPV, leveraging an ad-hoc survey conducted in 2021 in the Italian region of Tuscany as part of a mixed-method research project on IPV (henceforth 'our survey' or 'PANGEA survey'). The survey focuses on the first lockdown in Italy, one of the countries first and worst hit by the pandemic, where strict restriction measures were implemented (Conteduca and Borin 2022). Though local, the survey was large and fully representative of the Tuscan population, which was 3.66 million in December 2021, similar to Croatia and twice the population of Latvia.

We revisit the issue of IPV during the pandemic contributing to the literature along three main lines. First, IPV was expected to increase as in other natural disasters, and our survey confirmed intensification. Second, the unexpected nature, pervasiveness and intensity of the impacts of the COVID-19 pandemic afford fresh opportunities for causal investigation of IPV determinants. Since IPV is a complex multivariable outcome marred by problems of measurement and potential endogeneity, causal investigation is known to be especially problematic. While using the COVID-19 pandemic as a natural experiment validating causal inference is not always considered appropriate (Backer-Hicks and Goodman 2021), the pandemic may safely be exploited to strengthen the assumption of exogeneity for COVID-induced, potential triggers of IPV. Based on our survey, we estimate (and compare) the impact of three such triggers: loss of job due to COVID, parental overburden due to the presence of minors during lockdowns, and being confined to crowded living space with no privacy during lockdowns. Focusing on pandemic-specific triggers also helps discern groups of women that IPV policies should especially target under pandemic-type conditions.

These three potential factors have been investigated across disciplines under different theoretical approaches and disciplinary jargons. Economists consider 'shocks' events like loss of job and income due to an unanticipated occurrence, and we argue that even normal life events like living with children or in crowded spaces can be treated as shocks when unanticipated events affect their outcomes. Factors contributing to IPV are often viewed as 'stressors' by psychologists, especially in the context of natural disasters, and variants of Hill's family stress theory (Hill 1949) have also become popular among sociologists (Farrington 1986): Wu and Xu (2020), for example, recently proposed using this theory as a unifying framework to study domestic violence during the pandemic. In what follows, we therefore refer to our COVID-induced, potential IPV triggers as 'shocks', 'stressors' or COVID-specific stress factors in order to emphasize that they qualify as exogenous shocks and sources of stress. Loss of job due to COVID can be treated as an exogenous economic

shock, if only because its sectoral distribution followed pandemic-specific regulations.[5] The presence of children has long been considered a correlate of IPV, albeit with mixed findings, but the parental overburden caused by home schooling and the amount of time children spent at home during confinement were a novelty brought by COVID,[6] which deserves specific investigation as a potential source of conflict and aggression. Finally, confinement meant living in crowded spaces in certain households, with no privacy; crowding could increase family tensions, conflict and aggression, while lack of privacy hindered the capacity of victims to organize support.

Our third contribution is measurement of outcomes. Any attempt to identify causal links between IPV and potential triggers hinges on accurate measurement of IPV outcomes. We consider two different measures. The first is prevalence, namely the percentage of women in the population who have experienced at least one episode of abuse in a given period. Prevalence is traditionally computed for different types of violence (psychological, physical or sexual), and by virtue of its conceptual and computational simplicity, it has become standard in the literature. Because this measure ignores the frequency and severity of violence, the need for a comprehensive measure is often voiced, including by international organizations (Eurostat 2021; UN 2007 and 2014). Bettio et al. (2020) developed a fuzzy IPV index that can account for frequency and severity, and we use this index as our second IPV measure. We show that the results and policy implications of the two measures differ in non-trivial ways.

We address three specific questions. The first is whether IPV intensified during lockdowns. The objective here is to confirm evidence from the literature that the pandemic intensified IPV by increasing its frequency. We do so using descriptive statistics to measure subjective perceptions of frequency among women interviewed in the PANGEA survey.

The second question concerns the effect of the three COVID-induced stressors we identified on IPV during lockdowns. The stressors are job loss for at least one partner, parental overburden due to living with under-tens during lockdowns, and living in crowded spaces with no privacy during lockdowns. Since our dependent variables (IPV outcomes) are binary or fractional dependent variables and endogeneity issues cannot be ruled out, we estimate average marginal effects using a two-step control function (CF) approach combined with a quasi-likelihood method.

The third question is how IPV outcomes change if a comprehensive measure of violence against women is used instead of simple prevalence. While the general purpose in this case is to gain awareness of potentially partial or distortive indications yielded by incomplete measurement, a specific purpose is to discern what matters for 'lighter' as opposed to more 'serious' IPV abuses.

The paper is structured as follows: the next section selectively reviews the vast extant literature, followed by a detailed description of the data source and an overview of IPV incidence and the victim's profile

[5] For an in-depth analysis of the effects of the pandemic on Italian workers, refer to Barbieri et al. (2022) and Nappo et al. (2023).
[6] See also Huebener et al. (2021) on school closures as a "disruptive exogenous shock" to family life.

(Section 3). The empirical strategy is illustrated at length in Section 4 and the findings are discussed in Section 5. A concluding summary wraps up the paper in Section 6.

2. Literature review

Expectations of an adverse impact of the pandemic on IPV follow from the historical experience of other natural disasters (Brabete et al. 2021; Campbell 2020; Kofman and Garfin 2020; Mavisakalyan et al. 2024; Peterman et al. 2020). Limiting the list of citations to a few surveys and meta-studies, Brink et al. (2021), Bhuptani et al. (2022), Kourti et al. (2021) and Zamba et al. (2022) all concur that, on the whole, IPV and domestic violence increased during the pandemic.

In general, heightened risk of violence is associated with the stress factors that accompany disastrous events (Anastario et al. 2009[7]; First et al. 2017; Harville et al. 2011; Schumacher et al. 2010; Parkinson, 2019). What economists call economic shocks (brought on by the pandemic) and others refer to as economic stressors have received perhaps the most attention across disciplines. However, with some exceptions that we now highlight, most existing studies on economic shocks exploited selected administrative data sources, not necessarily representative online surveys conducted during the pandemic, and they report association rather than causal effects. Limiting attention to advanced countries, the internet-based survey conducted by Davis et al. (2021) noted that physical IPV perpetration and victimization were more common among those who lost their job. The online survey of Peitzmeier et al. (2021) found that financial difficulties since the beginning of the COVID-19 pandemic were correlated with increasing first-time incidents of IPV or increased severity of IPV for those with prior experience of abuse. The large online survey of Australian women by Morgan and Boxall (2020) indicated that the likelihood of experiencing physical and sexual abuse was higher for women with no prior experience of violence who reported increased financial stress. Béland et al. (2021) surveyed Canadian women online and showed that worries about the impact of COVID-19 on ability to meet financial obligations and essential needs were associated with greater concern about the impact of COVID-19 on family stress and domestic violence. Based on an online survey conducted in the US in the early months of COVID-19, Drotning et al. (2022) found that loss of household income during the pandemic was associated with near doubling of the frequency of family violence, mainly verbal abuse. Back in Europe, Ebert and Steinert's (2021) online survey of 3818 partnered women in Germany found a higher likelihood of physical IPV and exposure to threats for women with financial concerns attributed to the pandemic.

Only a few studies are based on representative surveys and/or exploit the exogeneity of COVID-related economic shocks to assign causal validity to the effects on IPV/domestic violence, but their findings are not entirely consistent. According to Arenas-Arroyo et al. (2021), in Spain not only job loss but also concerns about losing work or being on temporary layoff since the pandemic contributed to the surge in IPV. The authors found that IPV rose for all types of violence (physical, sexual, and psychological) and the impact was

[7] As noted by Sety and Breckenridge (2014), however, earlier empirical evidence on whether stress from disasters actually causes IPV was not conclusive, though disasters have traditionally been associated with an escalation in the severity of violence and violent attitudes.

significant when both members of the couple were economically affected or, in line with the male backlash hypothesis, when the male but not the female partner was affected. Aguero et al. (2023) focused on job loss, and although their study concerns Peru, not a high-income country, it is worth mentioning here because the findings strongly sustain the importance of actual economic distress caused by job loss and dispute the role of mere economic anxiety brought on by the pandemic. However, according to Henke and Hsu (2022), a different picture emerges from labour market, crime and mobile device tracking data at city level in the United States, where they found that local unemployment reduced domestic violence between January 2019 and November 2020.

Turning now to studies investigating family stressors, psychologists, sociologists and criminologists have long investigated family stressors in connection with domestic violence, building on Hill's seminal contribution to family stress theory as well as on popular conceptualizations of parenting/parental stress (Abidin 1992; Crnic and Greenberg 1990). Although pre-pandemic literature has investigated parental stress primarily in connection with violence against children, IPV too has been found to correlate positively with the presence of children (e.g. because women with children find it more difficult to quit a violent relationship; Bettio and Ticci 2017; Saunders 2022; Stahly 2000; Strube and Barbour 1984). With onset of the pandemic, evidence that partners confined at home with children were at increasing risk of parenting stress or mental health deterioration revived interest in child maltreatment (Geprags et al. 2023; Peterman et al. 2020) rather than IPV. Studies considering IPV viewed the presence of children as an exacerbator of economic factors (Arenas-Arroyo et al. 2021; Peitzmeier et al. 2021; Ebert and Steinert 2021) or showed an inconsistent association with IPV (McNeil et al. 2022). In partial disagreement, we view the presence of minors during confinement as a potentially important pandemic-specific trigger of IPV on its own. Parents faced a phenomenal increase in childcare and workload, especially when home-schooling replaced formal schooling. In their revisitation of family stress theory to interpret COVID-specific aspects of domestic violence, Wu and Xu (2020) note that parents are likely to have experienced unprecedented daily stress associated with the challenges of home-schooling, as also noted by Scheiderer et al. (2017) for the Great Recession. Difficulties in balancing work and family or less satisfaction with family life have in fact been documented for several countries, especially among working women with young children (Del Boca et al. 2020 for Italy; Huebener et al. 2021 for Germany). Finally, qualitative evidence from in-depth interviews conducted to complement the PANGEA survey[8] (Tramontano et al. 2024) suggests that female partners' requests to redefine the traditional division of care workload during confinement sometimes turned bargaining into conflict that led to violent reactions when the male partner held sufficiently strong gender views. More generally, the pandemic offered new opportunities for threats and forms of control involving children: for example, fear that children could spread the virus was exploited to prevent mothers from taking them out (Ibidem).

The onset of psychological stress and aggressive behaviour in response to crowding and the absence of privacy is a topos in psychology and health-related disciplines, for example in relation to the conditions

[8] See Section 3.

facing astronauts, jail inmates and certain patients on mandatory confinement in narrowly spaced wards.[9] Unsurprisingly, therefore, several contributions on domestic violence during the pandemic mention overcrowding and lack of privacy during confinement as a potential trigger or an aggravating factor. However, we only found a few studies focusing specifically on space- and privacy-related issues in relation to aggressive behaviour during COVID, and fewer still focusing on IPV. The study by Weber et al. (2024) is worth mentioning as a partial exception because it specifically investigates the relationship between aggression on the one hand, and residential density, subjective crowding and perceived lack of privacy during national lockdowns in the UK on the other. The authors found a stronger association with aggression for subjective crowding than for residential density, as well as a statistically significant association between aggression and perceived lack of privacy. Also, Kondo et. al. (2022) focused on a low-income, high-violence neighbourhood in the US (New Orleans) and found that areas with parks were associated with reduced distress related to the pandemic, whereas areas with a high density of alcohol outlets and crowded streets were associated with greater distress. All this suggests that certain characteristics of the living space in which partners and their families were confined may have played an independent role in the surge of IPV. Overall, however, this is a poorly investigated issue.[10]

Differential IPV outcomes depending on personal and social characteristics are a common theme across all strands of the literature. The US literature in particular documents the significance of belonging to marginalized, immigrant communities in the case of women (Williams et al. 2021; Sabri et al.2020; Peitzmeier et al. 2021). This also emerges from the profile of abused women in our survey (Section 4).

3. The Data

3.1. Data collection and sample

As noted, the PANGEA data was gathered for inter-disciplinary, mixed-method research. Quantitative data was gathered through a large, representative, cross-sectional survey with retrospective questions targeting the female adult population domiciled in the region of Tuscany and living with their partners during the first lockdown episode[11]. Qualitative data was collected by re-interviewing (willing) self-reported victims of intimate partner violence during lockdowns as well as by extending the survey to abused women who had sought shelter in anti-violence centres in Tuscany. Qualitative data was meant to complement and enrich the

[9] See, for example, Raybeck (1991) and McMinn et al. (2000).

[10] Other sources of COVID-specific stress factors frequently found in the literature include social isolation and the virus itself. According to Davis et al. (2021), for example, being tested and testing positive to COVID-19 was correlated with higher risk of experiencing IPV, especially psychological violence. However, since practically the entire population under confinement was exposed to these risks at least once, and since differential exposure is hard to measure retrospectively, it would have been especially problematic to isolate the impact of these factors with the kind of survey we conducted. We can only assume that social isolation and fear of testing positive were largely common to the women in our sample and their partners.

[11] A complete lockdown was imposed in the whole of Italy between 9 March and 3 May 2020. People could only leave the house for essential food and medical services, or if they were "key workers." The restrictions were gradually eased in May and selectively reinstated in November.

interpretation of quantitative findings. The findings from qualitative analysis are discussed at length elsewhere (Tramontano et al. 2024) but are selectively recalled here where relevant.

The quantitative survey contacted 35,709 women, 3778 of whom agreed to be interviewed. Sampling was stratified by province, and implicitly by size of municipality. The data collection took place in three rounds: in August-September 2021 (3000 interviews), November-December 2021 (743 interviews) and May-July 2023 (35 interviews in anti-violence centres). In the first round, the interviewers administered the questionnaire by Computer-Assisted Telephone Interview (CATI). In the second round, a combination of CATI and Computer-Assisted Mobile Interview (CAMI) was used to reduce the bias of under-representation in the sample of those not appearing in telephone directories and those who do not have landline phones (typically young women). The third round oversampled actual victims by interviewing 35 women who had suffered from intimate partner violence during lockdowns and had sought shelter in anti-violence centres in Tuscany. These interviews were based on a semi-structured questionnaire that added open-ended questions to the closed questions of the CATI questionnaire. The oversampling technique is recommended when the group of interest tends to elude standard sample surveys on the general population (Verma 2008).

The sample from the first two rounds of 2021 (3743 observations) underwent filtering and qualitative analysis of the interviews which led to the validation of 3599 observations. After adding the 35 observations from the CAVs, the final available sample comprised 3634 women between 18 and 75 years of age. For the purposes of this paper, we restricted the sample to working-age women (18-64) who are not pensioners. The working sample thus comprised 2061 observations. To ensure sample balance, we weighted all 3599 observations from the first two rounds based on the distribution of women in Tuscany across five age groups (18-34, 35-44, 45-54, 55-64, 65-75) and the total female population from the ten Tuscan provinces. Finally, since the additional observations in the third round have an equal probability of experiencing of some acts of violence, as in the prior rounds, we redistributed the weights of those who faced violence proportionally, to ensure that the relationship between violence and non-violence remained unchanged.

3.2. Measurement and overview

The PANGEA survey questionnaire included 45 closed-ended questions[12] that were developed using the classification and language of the National Statistical Institute 'Women's Safety Survey' (ISTAT 2008, 2015), the European Fundamental Rights Agency Survey on women's well-being and safety (FRA 2012), and the EU survey on gender-based violence against women and other forms of inter-personal violence (EU-GBV by Eurostat 2021). Accordingly, violence against women is classified into three types – psychological, physical, and sexual – with an added subdivision between COVID-related psychological violence and general

[12] The survey was administered by the survey agency *Winpool* based in Verona, which also selected and trained interviewers. The questionnaire was approved by the ethics commission of the University of Siena. Before starting each interview, respondents were informed that their data was strictly confidential and that privacy and anonymity were guaranteed. All interviews were conducted in Italian, and only began after obtaining informed consent.

psychological violence. Table A1 in Appendix I lists the individual acts of violence in each type. To address the missing data from variables with no response, we used stochastic imputation methods.[13]

IPV measures and findings. As anticipated, a new feature of this study is the way IPV outcomes are measured. We used two measures, the conventional prevalence of violence whereby women are considered abused if they suffered a single act of violence, irrespective of intensity and severity, and a fuzzy index which also accounts for severity and intensity. This index was derived by Bettio et al. (2020) and exploits fuzzy logic under the following premises. First, intensity is gauged by the frequency with which individual acts of violence occur in the relevant interval. Second, severity is understood as socially perceived severity and is proxied by the inverse probability of occurrence of a certain abusive act, based on the assumption that the effort societies put into fighting adverse outcomes is broadly commensurate with the perceived severity of these outcomes. Third, acts of violence are only ranked by severity if they pertain to the same type of violence (e.g. psychological, physical or sexual), since ranking across types is problematic. Fourth, since certain acts of violence tend to occur together, the severity scale based on inverse prevalence is corrected for correlation between acts of violence in order to counter problems of measurement and avoid redundancy. Under these premises, fuzzy logic can be used to combine intensity and severity into type-specific indexes that are computed for each individual and can be aggregated across individuals. Further aggregation of each type-specific index into an overall index can be controversial because of the difficulty of comparing severity across violence types. The most transparent option, and the one we adopt in this paper, is to take a simple average, which is equivalent to abstaining from ranking violence types in terms of severity, i.e. physical violence is not viewed as more severe, per se, than other types since it all depends on the specific abuse that is committed.

Bettio et al. (2020) formalized the construction of the index, applied the index to the first Europe-wide survey of violence against women carried out by the Fundamental Rights Agency (FRA, 2014), and validated the resulting severity scale by comparing it with existing scales, which are usually much more costly to compute and less fine grained. A Stata code to actually implement the index is available from GitHub (Tavares et al. 2024).

The fuzzy index we present here uses the severity scale obtained by Bettio et al. (2020). Given sufficient cultural homogeneity between the population of Tuscany and that of the European Union as a whole, using a scale based on a very large sample has clear advantages. However, since differences between the FRA questionnaire and our own required some amendments, we report the revised scale in Appendix I.[14]

Table 1 summarizes the evidence from our sample on the distribution of IPV by types in terms of prevalence and fuzzy index values. Average prevalence refers to the whole population while average fuzzy

[13] Details about the imputation methods are available from the authors on request.

[14] The fuzzy index we use here accounts for prevalence and severity, not for intensity. This is because intensity was investigated ordinally rather than cardinally ('more than before', 'like before', 'less than before'), and only for non-COVID-specific abuses (see Section 5). We adapted the method of Bettio et al. (2020), using the average number of distinct violent acts experienced by each woman rather than the frequency of individual acts.

index values only refer to the (type-specific) group of victims.[15] Of the 2061 women in our working sample, approximately 150 experienced abuse at least once from their partner during lockdown. After applying sampling weights to correct for oversampling, however, their number reduced to approximately 118 (ignoring decimals due to weighting). The corresponding prevalence was 5.7%. Psychological violence was the most widespread as it affected nearly all self-reported victims (112 women corresponding to 5.5% prevalence). Physical violence affected less than half the victims (44 women or 2.2% prevalence) while sexual violence was reported by 27 (1.3% prevalence). Lockdown conditions made it easier for the partner to exercise old and new forms of control, like preventing the woman from working, contacting friends and family and even contacting doctors, clinics and hospitals, and more generally from leaving home (as far as allowed by confinement measures). Nearly 40% of the victims reported suffering at least one such form of control.

The ranking among IPV types reverses when fuzzy indexes gauge outcomes: the sexual violence index reaches 0.47 (out of 1) followed by physical (0.36) and psychological violence (0.26). The overall fuzzy index value (0.18) is lower than any type-specific value since not all victims suffered from all types of violence. This overall value was in fact obtained by first averaging the type-specific index for each victim and then averaging out the 118 individual values.

Table 1 - Prevalence and Fuzzy index of IPV during lockdown, by type

	Panel A: Victims, prevalence, and mean number of violent acts			Panel B: Fuzzy Index of Violence
	Victims (N)	Prevalence (%)	Distinct violent acts experienced by victims (Mean)	Fuzzy Index: Mean value for victims of specific type
Overall	118.06	5.73	5.45	0.1817
		[0.51]	[0.48]	[0.182]
Psychological	111.94	5.43	3.90	0.2553
Total		[0.45]	[0.29]	[0.224]
Physical	44.22	2.14	3.50	0.3600
		[0.32]	[0.32]	[0.364]
Sexual	27.11	1.32	1.91	0.4701
		[0.25]	[0.14]	[0.370]

Notes: Standard errors in parenthesis. Outcomes with sampling weights and imputed values.

How do the above figures compare with those from other studies on IPV during lockdown? Concerning prevalence, there is unfortunately no exhaustive answer. According to pre-pandemic survey estimates from the National Statistical Institute (ISTAT 2015), 12 months prevalence was lower in 2014 in Tuscany for sexual and physical violence (0.9% and 0.2%, respectively), and higher for psychological violence (ranging from 4.5% for economic violence to 11.3% for belittling and verbal abuse). However, numerous differences between our questionnaire and that used by ISTAT (e.g. age groups or inclusion of non-partners among potential

[15] This is because the severity that the index captures would be diluted and distorted by an overwhelming share of zero values if the calculations referred to the whole population, with the added disadvantage that this share tends to differ considerably among types of violence.

perpetrators) cast doubt on the comparison, except perhaps for the indication that physical and sexual violence may have intensified with COVID.

As concerns international comparisons, only a minority of studies based on telephone surveys can be taken as reference, especially those for European countries. Teixeira et al. (2022) conducted a telephone survey in January 2021 on a representative sample of 1541 Portuguese women to investigate episodes of violence since March 2020 and found that 4.9 % of respondents experienced violence for the first time in that period. This is a lower figure than ours, and may be explained by the much shorter questionnaire and exclusion of women with a previous history of violence. A higher figure (9.4%) is reported by Kliem et al. (2021) based on a large, nationally representative telephone survey carried out in Germany between February and March 2021 that asked women about their experience in the previous 12 months. Overall, however, the above differences are still small with respect to those obtained with online surveys. For example, an online survey for Portugal (Gama et al. 2021) found a 13.7% prevalence of domestic violence, mostly psychological, between April and October 2020. One factor that may have amplified differences between online and telephone surveys is that recent experiences of violence tend to be associated with a higher reporting rate (Pachana 2011) and online surveys were often conducted during or soon after the worst lockdowns.

On balance, we cannot rule out underestimation of psychological violence by our survey. The qualitative investigation we conducted by re-interviewing women with experience of abuse during the lockdown revealed a tendency for some of them to minimize and even disavow 'lighter' forms of abuse that they had previously acknowledged (Tramontano et al. 2024). This suggests that recollection of psychological abuse months after it occurred may be less accurate than that of physical or sexual abuse.

Victim's profile. The main demographic and socioeconomic characteristics of the women in our sample are set out in detail in Appendix I (Table A2) distinguishing between those who experienced at least one instance of abuse (V) and those who did not (NV). The former were, on average, younger (45.5 years against 48.2 for non-abused women), disproportionately of foreign nationality (18.3% against 4.4%), almost equally educated (i.e. the share with higher education is practically the same for the two groups), significantly less likely to be married (67.0% against 87.7%) though more likely to be divorced or to have no child living in the household (48.9% against 58.2%), significantly less likely to be unemployed or not working (39% against 23.1%) but more likely to have lost their job during the lockdown (28.26% against 21.67%). On average, the partners of abused women were also slightly less educated, more likely to be unemployed or non-active and to have lost their jobs during the lockdown.

Typical household characteristics also differed between the two groups of women. Abused women more often reported that it was somewhat difficult or very difficult for the household to make ends meet from one pay check to another (48.9% against 25.5% for non-abused women). Furthermore, where they lived was more crowded and less likely to have outdoor spaces. The indicator we constructed to capture crowded living space and lack of privacy, takes value 1 if the household (i) has no outdoor space and (ii) accommodates more

than one person per room (excluding bathroom and storage rooms and counting children as half persons). The crowding indicator takes value 0.17 for women who have been abused and 0.12 otherwise.

On the whole, this victim profile is familiar in the literature, and we used this evidence to define and select the variables for our estimation.

4. Empirical strategy

Summarising so far, our dependent variables are prevalence and fuzzy IPV outcomes, further distinguished by types of violence. The explanatory variables of interest are our three stressors: job loss following lockdown for at least one partner, partners living with children under age 10 during lockdowns, partners living in crowded spaces with no privacy during lockdown. The list of controls reflects the victim's profile and includes her age, civil status, nationality, his and her educational level and working status, the household's economic condition, and her knowledge of local centres supporting victims of violence or the national helpline number, all measured at or around the time of the interview. We also added two control variables obtained from administrative data: high-risk alcohol consumption in the health district serving the household and the size of the municipality of residence. The former serves as proxy for a variable on alcohol abuse by the partner that the PANGEA questionnaire did not collect due to the optimal duration limit imposed on CATI interviews; the latter proxies differences in institutional context that may influence the availability of organized support despite the pandemic, e.g. online support from help centres or through pharmacies, hospitals, neighbourhood police etc.

We now illustrate our strategy to address econometric issues arising from our measurement(s) of IPV outcomes, as well as endogeneity. Let us consider a general model for woman i:

$$G(\boldsymbol{s_i}, \boldsymbol{x_i}, \boldsymbol{\beta}, \boldsymbol{\gamma}) = \Phi(\boldsymbol{s_i}\boldsymbol{\beta}; \boldsymbol{x_i}\boldsymbol{\gamma}) \quad (1)$$

where $G(.)$ is a function such that $0 \leq G(.) \leq 1$. The vector $\boldsymbol{s_i}$ includes pandemic-specific potential triggers, our three independent variables of interest, while $\boldsymbol{x_i}$ comprises control variables. $\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$ are the respective coefficient vectors and Φ(.) is the standard normal cumulative distribution function.

The first IPV outcome (y_i: prevalence) is estimated by a probit model where $\Phi(\boldsymbol{s_i}\boldsymbol{\beta}, \boldsymbol{x_i}\boldsymbol{\gamma})$ represents the probability of experiencing at least one act of violence.

$$P(y_i = 1 \,|\boldsymbol{s_i}, \boldsymbol{x_i}) = G(\boldsymbol{s_i}, \boldsymbol{x_i}, \boldsymbol{\beta}, \boldsymbol{\gamma}) = \Phi(\boldsymbol{s_i}\boldsymbol{\beta}, \boldsymbol{x_i}\boldsymbol{\gamma}) \quad (2)$$

The second IPV outcome (y_i^*) is a fuzzy IPV index which measures the experience of violence along a continuum. However, the index is bounded between 0 and 1 whereby neither $\boldsymbol{\beta}$ nor $\boldsymbol{\gamma}$ can be consistently estimated by a linear model. We therefore adopted the Papke and Wooldridge (1996) solution of a quasi-maximum likelihood (QML) estimation for a functional form, ensuring that estimates of $E(y_i^* | \boldsymbol{s_i}, \boldsymbol{x_i})$ are bounded (between 0 and 1) without an *ad hoc* transformation of boundary values. Papke and Wooldridge first proposed a logistic function but used a probit function in a later study due to its advantages in handling

endogenous explanatory variables (Papke and Wooldridge 2008), and we adopted this latter solution for our IPV fuzzy index estimation:

$$E(y_i^*|\boldsymbol{s_i}, \boldsymbol{x_i}) = G(\boldsymbol{s_i}, \boldsymbol{x_i}, \boldsymbol{\beta}^*\boldsymbol{\gamma}^*) = \Phi(\boldsymbol{s_i}\boldsymbol{\beta}^*; \boldsymbol{x_i}\boldsymbol{\gamma}^*) \quad (3)$$

We estimated three specifications (for total IPV, psychological IPV, and physical and/or sexual IPV) for equations 2 and 3.

Tackling endogeneity of control variables. Equations 2 and 3 correctly identify the causal effect of the **s** shock-stressors provided all right-hand side variables are exogenous with respect to the outcome variable. However, the literature indicates that an important control variable, the woman's employment status, may suffer from endogeneity (Greulich and Dasré 2022; Lenze and Klasen 2017). To address this potential issue, we instrumented women's employment status with a combination of two instruments. The first is the female employment rate at municipal level before the pandemic (2019); the second is the variation (difference) in that rate since 2011. The validity and strength of these instruments are discussed in Subsection 4.1.

Because the endogenous explanatory variable (EEV) is discrete and the dependent variables are either binary (IPV prevalence) or fractional (IPV index), we resorted to the two-step control function (CF) approach combined with a quasi-likelihood method (Lin and Wooldridge 2017).

In the prevalence and fuzzy IPV specifications, the CF first stage involves modelling the binary EEV ($Employment_{i2}$) as follows:

$$Employment_{i2} = 1[\boldsymbol{z_i}\boldsymbol{\delta_2} + \boldsymbol{s_i}\boldsymbol{\beta_2} + \boldsymbol{x_i}\boldsymbol{\gamma_2} + v_{i2} \geq 0) \quad (4)$$

where v_{i2} is the error term such that $v_{i2}/|\mathbf{z} \sim$ Normal (0,1), and **z** is a vector of instruments assumed to be independent of **v**.

The CF second stage for IPV prevalence is a probit model that includes the generalized residual $\hat{r}_i$ obtained from the first stage:

$$P(y_{i1} = 1 \mid \boldsymbol{s_i}, \boldsymbol{x_i}, Employment_i, r_i) = \Phi(Employment_{i2}\tau_1 + \boldsymbol{s_i}\boldsymbol{\beta_1} + \boldsymbol{x_i}\boldsymbol{\gamma_1} + \hat{r}_i\,\theta_1) \quad (5)$$

where H_0: $\theta_1 = 0$ tests the null hypothesis that $Employment_{i2}$ has actually been made exogenous.

In the fuzzy IPV estimation, the second stage is a fractional probit model that includes the generalized residual $\hat{r}_i$ obtained from the first stage:

$$E(y_{i1}^* \mid \boldsymbol{s_i}, \boldsymbol{x_i}, Employment_i, r_i) = \Phi(Employment_{i2}\tau_1^* + \boldsymbol{s_i}\boldsymbol{\beta_1^*} + \boldsymbol{x_i}\boldsymbol{\gamma_1^*} + \hat{r}_i\,\theta_1^*) \quad (6)$$

where the (non) significance of θ_1^* also indicates that $Employment_i$ is actually exogenous. For discrete EEV, $\hat{r}_i$ can correct for endogeneity, particularly when the extent of endogeneity, as measured by θ is "small" (Wooldrige 2015: 442). Following Wooldridge (2014, 2015), we bootstrapped both stages to obtain valid standard errors for CF estimators. Note finally that the assumption that $\hat{r}_i$ in both (5) and (6) is a sufficient

correction is supported by the finding that θ is not statistically different from zero in either equation (see Section 5).

4.1. Instrument validity and strength

Taken together, the two instruments we chose reflect actual local employment opportunities for women in the long and medium run and are therefore an important factor in their choice to work. Earlier empirical literature has used proxies of area-specific employment opportunities as instruments for women's labour market outcomes (Biswas and Thampi 2022; Dildar 2021; Greulich and Dasré 2022; Lenze and Klasen 2017). In principle, local-level indicators like the average employment rate in a given area may be affected by the kind of gender norms that also influence violence in the area. This may seem to contradict the exclusion restriction assumption that a valid instrument requires. However, we are comparing average employment rates within a geographically small and relatively culturally homogeneous area – Tuscany – whereby the extent to which women work in, say, municipality A compared to municipality B is unlikely to reflect significant differences in gender norms between these municipalities.

The results of first stage estimation (Equation 4) are reported in Table A3 of Appendix II and provide evidence of the relevance and strength of our combination of instruments. The female employment rate has a negative and significant association with non-employed women, and a negative and non-significant relation with the difference in female employment rates. Thus, both instrumental variables have the expected signs, though only the first shows strong predictive power. Regarding the exclusion restrictions, neither instrument is significantly correlated with our dependent variables (see Table A4 in Appendix II). In the same Appendix we further document the strength of our joint instrument set (Table A5).

5. Results

Regarding our first research question, we found that violence intensified under confinement for all IPV types. In our questionnaire, psychological violence included abuses like forbidding the woman to go to the doctor or hospital, which we termed COVID-specific and listed separately (see Table A1). For each non-COVID-specific abuse, a woman was asked whether the intensity was higher, the same, or lower than before the pandemic. Only a small minority of abused women answered 'less than before', the percentage ranging from a tiny 3.1% for sexual abuse to 7.3% for psychological abuse. Depending on the type of violence, slightly more or slightly less than half the abused women indicated no change in intensity (Table 2). Hence, nearly half the women reporting sexual abuse and 37-38% of those reporting psychological or physical violence answered 'more than before'. This is strong evidence of a significant increase in violence.

Table 2 – Percentage distribution of perceived change in IPV intensity by violence type

	Psychological violence	Physical violence	Sexual violence
More than before	37.66	37.05	48.55
Like before	55.05	56.13	48.33
Less than before	7.29	6.81	3.12
All	100.0	100.0	100.0

The evidence in Table 3 answers our second and third research questions. The table sets out the estimated marginal effects[16] of the COVID stressors as well as the instrumented control variable (women's working status). It also gives estimates of the coefficient of generalized residuals in the CF model. From a methodological perspective, the salient finding is that the coefficients of generalized residuals lack significance, which indicates that endogeneity has been controlled for. An additional indication in the same direction is that the CF estimates for the strongest COVID stressors (presence of children and job loss) are also close to those from probit/fractional regressions (across IPV measures and types). In fact, instrumentation affects the results mainly by reducing the statistical significance of the third COVID stressor (crowded spaces) as well as of the instrumented variable. This last finding is not new in the literature (Alonso-Borrego and Carrasco 2017; Dildar 2021; Lenze and Klasen 2017 among others). Since our interest in the actual role of women's employment is primarily instrumental, we refer readers to the vast literature on the topic.

From a substantive perspective, the findings reveal a hierarchy of the COVID-specific effects. The presence of small children yields the most consistent and often the largest effects across different measures and types of IPV. Focusing on the CF model, the increase in prevalence amounts to 2.5 pp. for all types of abuse, i.e. a 44% rise with respect to the average predicted value. Psychological violence is the strongest driver in this case (2.7 pp.) though the difference with respect to sexual/and or physical violence is small. The results for the fuzzy measure of violence tell a similar story: the estimated increase in the IPV index for all types of violence amounts to 0.014 index points in the CF model, corresponding to a 127% rise with respect to the average predicted value. In this case too, the increase is primarily driven by psychological violence.

The results are mixed in the case of job loss, and they vary with IPV measurement. The estimated effect is almost as strong as that of presence of children when IPV is measured by prevalence: 2.2 pp. for violence of all types corresponding to a 39% rise. In this case too, the aggregate result is driven by psychological IPV (1.9 pp.) while the effect for physical/sexual IPV is lower and lacks significance (0.8 pp). When IPV is measured by the fuzzy index, however, significance drops below conventional levels across models and violence types. Crowding apparently had the weakest effect, if any at all: the estimated effect of this stress factor is comparatively small and reaches significance only for fractional IPV estimates, driven by physical/sexual IPV.

[16] Stata's average marginal effects.

Table 3 - Main estimates

A. Dependent variable: 1 if victims of IPV

	Any type of IPV		Psychological IPV		Sexual and/or physical IPV	
Model	**(1a) Probit**	**(2a) CF**	**(1b) Probit**	**(2b) CF**	**(1c) Probit**	**(2c) CF**
Average predicted value of dependent variable	0.057	0.057	0.054	0.054	0.025	0.025
	(0.004)	(0.005)	(0.004)	(0.005)	(0.003)	(0.003)
Average Marginal effect						
At least one partner lost job (= 1)	**0.022****	**0.022****	**0.019***	**0.019***	0.007	0.008
	(0.010)	(0.010)	(0.010)	(0.010)	(0.007)	(0.007)
Children (<18 years) in household (= 1)	**0.024****	**0.025****	**0.025*****	**0.027*****	**0.021*****	**0.023*****
	(0.010)	(0.011)	(0.010)	(0.010)	(0.007)	(0.007)
House with no outside space and non-privacy index >= 1 (= 1)	0.013	0.012	0.008	0.006	0.004	0.002
	(0.015)	(0.016)	(0.014)	(0.015)	(0.008)	(0.010)
Woman not working (= 1)	**0.037*****	0.148	**0.039*****	0.161	**0.021*****	0.301
	(0.012)	(0.190)	(0.012)	(0.199)	(0.008)	(0.322)
Generalized residuals		-0.039		-0.041		-0.048
		(0.052)		(0.051)		(0.033)
Number of observations	2061	2061	2061	2061	2061	2061

B. Dependent variable: fuzzy indicators of IPV

	Any type of IPV		Psychological IPV		Sexual and/or physical IPV	
Model	**(1a) Frac.**	**(2a) CF**	**(1b) Frac.**	**(2b) CF**	**(1c) Frac.**	**(2c) CF**
Average predicted value of dependent variable	0.011	0.011	0.014	0.014	0.007	0.007
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Average marginal effect						
At least one partner lost job (= 1)	0.001	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Children (<18 years) in household (= 1)	**0.013*****	**0.014*****	**0.017*****	**0.018*****	**0.009*****	**0.010*****
	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.003)
House with no outside space and non-privacy index >= 1 (= 1)	**0.006***	0.005	0.008	0.006	**0.005***	0.004
	(0.004)	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)
Woman not working (= 1)	**0.008*****	0.108	**0.012*****	0.141	**0.005****	0.074
	(0.003)	(0.141)	(0.004)	(0.174)	(0.002)	(0.122)
Generalized residuals		-0.017		-0.023		-0.011
		(0.012)		(0.016)		(0.009)
Number of observations	2061	2061	2061	2061	2061	2061

Notes: *** p<0.01, ** p<0.05, * p<0.1. Outcomes are average marginal effects. Standard errors in brackets. In columns (2a), (2b) and (2c) the instruments are female employment rate at municipal level and its variation with respect to 2011. The bootstrapped standard errors were obtained through 500 replicated weights. Frac = fractional. CF = Control-function method. Control variables included but not shown in the table are her age, civil status, nationality, his and her educational levels and working status, economic condition of household, the size of municipality of residence, high-risk alcohol consumption in health district serving the household, and her knowledge of local centres supporting victims of violence or the national helpline number.

Evidence from the qualitative in-depth interviews of the PANGEA project (Tramontano et al. 2024) may throw light on the above results. Some of the victims taking part in qualitative interviews linked their

experience of violence during lockdowns with the conflict arising from the need to constantly renegotiate a childcare workload that had become more onerous and complex during confinement. An additional source of conflict they highlighted was the fact that children were perceived by some partners as vehicles of contagion (Tramontano et al. 2024, passim).

In contrast, most victims viewed confinement in spaces lacking privacy not so much as a trigger of violence, but as an impediment to organizing support from outside. Controlling behaviour was widespread during confinement and these women felt that partners could check on them everywhere, even in the bathroom, no matter how large living spaces might be.

All this may offer some explanation of why living parental overburden and confinement in crowded spaces lacking privacy had the strongest and the weakest impacts, respectively. In the middle were job loss for either partner which may be viewed as epitomizing COVID-specific economic shocks. An important nuance that our estimates reveal is that job loss mainly affected 'lighter' forms of abuse (recall the loss of significance for fuzzy IPV), and it is worth noting that this information would have been lost had we only used prevalence to measure IPV.

Concerning controls (other than her working status), the vast majority of the variables included to account for heterogeneous effects turned out to significantly differentiate IPV outcomes across types and measurements of violence. Focusing again on the CF estimates, the making-ends-meet variable, non-marriage status, foreign nationality and her and his low education stand out for their significance. The findings are mixed for other controls like young age, partner working status and size of municipality, while alcohol consumption in the health district of residence and distance from anti-violence shelters/support centres never achieved significance. In the case of alcohol consumption, our results seem surprising, given clear indications to the contrary in the literature, but we cannot rule out that the proxy we used for individual alcohol abuse was poor. For some male partners, obtaining alcohol or drinking at licensed suppliers (bars, wineries etc.) may have been hindered by confinement, as some of the women participating in the qualitative survey pointed out (Tramontano et al. 2024, passim).

5.1. Sensitivity and robustness

We did two sensitivity tests and removed a potentially problematic control variable to check the robustness of the marginal effects of interest. Both sensitivity tests concerned assumptions about errors in the CF model.

For our first sensitivity test, we followed Wooldridge (2014) who emphasized the importance of comparing CF average partial effects with those derived from joint quasi-maximum likelihood estimation (QMLE: Wooldridge 2014). In order to illustrate this test, we need to briefly discuss the difference between CF and JMLE estimations. The JMLE model we estimated was implemented by the Stata user command *cmp* (Roodman, 2011). The endogenous variable was instrumented as in Equation 4. Indeed, CF and JMLE both use the same reduced form but different assumptions on the conditional distribution of errors (see Wooldridge

2015). For prevalence IPV, the second stage estimates a bivariate probit corresponding to Equation 2. For fuzzy IPV, the second stage estimates the fractional probit regression corresponding to Equation 3. Each pair of equations is estimated simultaneously by a maximum likelihood Seemingly Unrelated Regression (SUR) method for multi-equation models. The latter produces limited-information maximum likelihood estimations which are consistent for recursive systems in which the endogenous variable, as in our case, is on the right-hand side (Roodman 2011). Here too, valid standard errors for JMLE estimators were obtained by bootstrapping.

The results are reported in Appendix III and are reassuring in two important respects. For our covariates of interest (the three shock-stressors), the sign and significance of the JMLE estimates are practically the same as for CF. Moreover, the *athanrho* statistics, namely the inverse hyperbolic tangent of the correlation coefficient between the error terms of the two equations in the JMLE model, is not significant across IPV specifications. This indicates that not much is lost if the two equations are estimated separately as in the CF model. However, JMLE point estimates turned out to be less precise than CF estimates. Take for example the case of IPV prevalence of any act of violence. The JMLE average marginal effect of economic shocks is 2.7 pp., i.e. within the 2.2 pp. confidence interval of the CF estimate. In percentage terms, however, the JMLE estimate is lower (23% compared to 39%), since the average estimated prevalence in the population is significantly higher for this model (11.8 pp). More generally, because JMLE estimates show higher standard errors than the corresponding CF estimates, we exercise prudence and deduce that comparison of the two sets of estimates supports the CF results but is not conclusive.

The second test is much more conclusive. Following Terza et al. (2008), which Wooldridge himself mentions as an alternative to the CF model with generalized residuals, we obtained CF estimates using standard residuals from the first stage regression rather than generalized residuals. The results thus obtained are also shown in Table A6-A8, and reveal a near overlap with those of the CF model in Table 3.

Finally, we checked the robustness of the coefficients of interest by removing the make-ends-meet variable (Table A8, Appendix III**)**. Note that this variable captures the prevalent condition of the household in late 2021, when the economy (GDP) had almost recovered to pre-pandemic levels; as such, it need not have been influenced by job loss during the first lockdown. However, it probably captured 'usual' economic conditions for that household, since poverty tends to persist in time. Removing it thus serves the purpose of verifying that our third COVID-specific stressor, crowding and lack of privacy, does not act as a proxy for poor economic conditions. The results are reassuring since the coefficients of our variables of interest maintain the same level of statistical significance and very similar values.

6. Conclusions

While the dust is settling after the upheaval of the COVID-19 pandemic, we revisited the implications for IPV, an issue that received enormous attention when the pandemic was still raging but may still be worth analysing. We were in fact able to leverage the information collected for a mixed-method research project

begun more than a year after the pandemic started. In this article, we exploited the project's quantitative survey while also leveraging evidence from the qualitative interviews to interpret the findings. We addressed three questions on the specific impact of the pandemic: whether IPV intensified, what pandemic-specific shocks had the strongest impact, and how this impact changes if IPV outcomes are measured partially (by prevalence) or wholly (prevalence, intensity, and severity). Our key findings are as follows:

- IPV intensified overall, stability being reported in most cases but a perceived increase in abuse was reported by a large minority of the abused women, ranging from 37% for physical abuse to 48.5% for sexual IPV.
- Of the three specific shocks investigated (job loss following lockdown for one or both partners, presence of minors during lockdown and confinement in crowded spaces lacking privacy during lockdown), the second had the greatest impact across estimation models and IPV outcome measurements, followed by job loss. Confinement in crowded spaces with no privacy appears to have played a weak role, if any.
- Changing IPV outcome measurement mainly affected the role of job loss, which loses significance when the outcome is measured by fuzzy indexes, i.e. when severity is considered.

Since our empirical strategy accounted for the possibility of endogeneity as well as non-linearity of the dependent variables, and the post-estimation tests we conducted broadly confirmed our strategy, the above results appear to be fairly robust and to have non-trivial policy implications. For one, IPV did intensify non-negligibly as documented by other studies, but the intensification was apparently greater for sexual violence, unlike what some of these studies reported (Section 2). This not only calls for the design of preventative measures, but also for targeting them to the women most at risk of sexual abuse in pandemic-like situations. For another, both the literature and policy action de facto prioritized economic shocks over other shocks, those concerning parenting in particular. Only a few countries made an effort to keep schools open while measures to counter economic distress were put in place. School closure may have been justified by the risk of contagion, but knowledge that this measure not only hinders learning but also significantly raises the risk of violence among couples with minors warrants some reconsideration of priorities and group targeting in pandemic times. All the more so since different types of shocks appear to have impacted IPV types in differentiated manners. By using a comprehensive measure of IPV outcomes, we specifically found that economic shocks are more consequential for less serious types of abuse. While more evidence on differential impact by abuse type is needed to exclude that our finding reflects specific local conditions, or to conclude that it can be generalized to non-pandemic times, the more general lesson we feel entitled to draw is that measuring violence comprehensively rather than partially is essential to gain robust evidence for policy indications.

References

Abidin, R. R (1992). Presidential address: The determinants of parenting behavior. *Journal of Clinical Child Psychology* 21:407–412,

Agüero, J., Field, E., Hurtado, I.R. & Romero, J. (2023). COVID-19, Job Loss, and Intimate Partner Violence in Peru. Available at SSRN: https://ssrn.com/abstract=3998964

Alonso-Borrego, C., & Carrasco, R. (2017). Employment and the risk of domestic violence: does the breadwinner's gender matter? *Applied Economics*, 49(50), 5074-5091.

Anastario, M., Shehab, N., & Lawry, L. (2009). Increased gender-based violence among women internally displaced in Mississippi 2 years post–Hurricane Katrina. *Disaster medicine and public health preparedness*, *3*(1), 18-26.

Arenas-Arroyo, E., Fernandez-Kranz, D., & Nollenberger, N. (2021). Intimate Partner Violence under Forced Cohabitation and Economic Stress: Evidence from the COVID-19 Pandemic. *Journal of Public Economics, 194*, 104350.

Bacher-Hicks, A. and Goodman, J. (2021). The COVID-19 Pandemic Is a Lousy Natural Experiment for Studying the Effects of Online Learning: Focus, instead, on measuring the overall effects of the pandemic itself. *Education Next*, 21(4), 38-42.

Barbieri, T., Basso, G., & Scicchitano, S. (2022). Italian workers at risk during the Covid-19 epidemic. *Italian Economic Journal*, 8(1), 175-195.

Béland, L.-P., Brodeur, A., Haddad, J., & Mikola, D. (2021). Determinants of Family Stress and Domestic Violence: Lessons from the COVID-19 Outbreak. *Canadian Public Policy, 47*(3), 439–459.

Bettio, F. & Ticci, E. (2017). Violence against women and economic independence European Commission, Directorate-General for Justice and Consumers, Publications Office, 2017, https://data.europa.eu/doi/10.2838/394400

Bettio, F., Ticci, E., & Betti, G. (2020). A fuzzy index and severity scale to measure violence against women. *Social Indicators Research*, *148*, 225-249.

Bhuptani, P. H., Hunter, J., Goodwin, C., Millman, C., & Orchowski, L. M. (2023). Characterizing intimate partner violence in the United States during the COVID-19 pandemic: a systematic review. *Trauma, Violence, & Abuse*, *24*(5), 3220-3235.

Biswas, A., & Thampi, A. (2022). Women's workforce participation and spousal violence: Insights from India. In *Indian Economy and Neoliberal Globalization* (pp. 346-372). Routledge India.

Brabete, A. C., Wolfson, L., Stinson, J., Poole, N., Allen, S., & Greaves, L. (2021). Exploring the linkages between substance use, natural disasters, pandemics, and intimate partner violence against women: a rapid review in the context of COVID-19. *Sexes*, 2(4), 509-522.

Brink, J., Cullen, P., Beek, K., & Peters, S. A. E. (2021). Intimate partner violence during the COVID-19 pandemic in Western and Southern European countries. *European journal of public health*, 31(5), 1058–1063.

Campbell, A. M. (2020). An increasing risk of family violence during the COVID-19 pandemic: Strengthening community collaborations to save lives. *Forensic science international: reports*, 2, 100089.

Conteduca, F. P., & Borin, A. (2022). A new dataset for local and national COVID-19-related restrictions in Italy. *Italian Economic Journal*, 8(2), 435-470.

Crnic, K., and M. Greenberg (1990). Minor parenting stresses with young children. *Child Development* 61.5: 1628–1637.

Davis, M., Gilbar, O., & Padilla-Medina, D. M. (2021). Intimate Partner Violence Victimization and Perpetration among U.S. Adults during the Earliest Stage of the COVID-19 Pandemic. *Violence and Victims,* 36(5), 583–603.

Del Boca, D., Oggero, N., Profeta, P. et al. (2020). Women's and men's work, housework and childcare, before and during COVID-19. *Review of Economics of the Household*, 18, 1001–1017.

Dildar, Y. (2021). Is economic empowerment a protective factor against intimate partner violence? Evidence from Turkey. *The European Journal of Development Research*, 33(6), 1695-1728.

Drotning, K. J., Doan, L., Sayer, L. C., Fish, J. N., & Rinderknecht, R. G. (2022). Not All Homes Are Safe: Family Violence Following the Onset of the COVID-19 Pandemic. *Journal of Family Violence*.

Ebert, C., & Steinert, J. I. (2021). Prevalence and Risk Factors of Violence against Women and Children during COVID-19, Germany. *Bulletin of the World Health Organization, 99*(6), 429–438.

Eurostat. (2021). *Methodological Manual for the EU Survey on Gender-based Violence against Women and Other Forms of Inter-personal Violence (EU-GBV)*. Luxembourg: Publications Office of the European Union.

Farrington, K. (1986). The Application of Stress Theory to the Study of Family Violence: Principles, Problems, and Prospects. *Journal of Family Violence, 1*(2), 131–147.

First, J. M., First, N.L. & Houston, J.B. (2017). Intimate Partner Violence and Disasters. *Affilia,* 32(3), 390–403.

FRA – European Union Agency for Fundamental Rights (2014). *Violence Against Women: An EU-wide Survey. Main Results.* Vienna.

Gama, A., Pedro, A. R., De Carvalho, M. J. L., Guerreiro, A. E., Duarte, V., Quintas, J., ... & Dias, S. (2021). Domestic violence during the COVID-19 pandemic in Portugal. *Portuguese Journal of Public Health*, *38*(Suppl. 1), 32-40.

Geprägs, A., Bürgin, D., Fegert, J.M. *et al.* (2023). Parental stress and physical violence against children during the second year of the COVID-19 pandemic: results of a population-based survey in Germany. *Child and Adolescent Psychiatry and Mental Health,* 17**(**25).

Greulich, A., & Dasré, A. (2022). The association between women's economic participation and physical and/or sexual domestic violence against women: A case study for Turkey. *PLoS one*, *17*(11), e0273440.

Harville, E. W., Taylor, C. A., Tesfai, H., Xiong, X., & Buekens, P. (2011). Experience of Hurricane Katrina and reported intimate partner violence. *Journal of Interpersonal Violence*, *26*(4), 833-845.

Henke, A., & Hsu, L. (2022). COVID-19 and Domestic Violence: Economics or Isolation? *Journal of Family and Economic Issues, 43*(2), 296–309.

Hill, R. (1949). *Families under Stress*. Westport, CT: Greenwood Press.

Huebener, M., Waights, S., Spiess, C. K., Siegel, N. A., & Wagner, G. G. (2021). Parental well-being in times of COVID-19 in Germany. *Review of Economics of the Household*, 19(1), 91–122.

Istat. (2015). *Nota Metodologica. La Violenza Contro le Donne Dentro e Fuori la Famiglia*.

Istat. (2008). *La Violenza Contro le Donne. Indagine Multiscopo sulle Famiglie. "Sicurezza delle Donne" Anno 2006, Informazioni n. 7 – 2008*.

Kliem, S., von Thadden, A., Lohmann, A., Kröger, C., & Baier, D. (2023). The effect of the COVID-19 pandemic on domestic violence in germany: a comparison of three representative population surveys. *Journal of interpersonal violence*, *38*(11-12), 7296-7314.

Kofman, Y. B., & Garfin, D. R. (2020). Home is not always a haven: The domestic violence crisis amid the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S199.

Kondo, M. C., Felker-Kantor, E., Wu, K., Gustat, J., Morrison, C. N., Richardson, L., ... & Theall, K. P. (2022). Stress and distress during the COVID-19 pandemic: the role of neighborhood context. *International Journal of Environmental Research and Public Health*, *19*(5), 2779.

Kourti, A., Stavridou, A., Panagouli, E., Psaltopoulou, T., Spiliopoulou, C., Tsolia, M., Sergentanis, T. N., & Tsitsika, A. (2023). Domestic Violence During the COVID-19 Pandemic: A Systematic Review. *Trauma, violence & abuse*, 24(2), 719–745.

Lenze, J., & Klasen, S. (2017). Does women's labor force participation reduce domestic violence? Evidence from Jordan. *Feminist Economics*, *23*(1), 1-29.

Leslie, E., & Wilson, R. (2020). Sheltering in place and domestic violence: Evidence from calls for service during COVID-19. *Journal of Public Economics*, 189, 104241.

Mavisakalyan, A., Otrachshenko, V., & Popova, O. (2024). *Natural disasters and acceptance of intimate partner violence: The global evidence*. GLO Discussion Paper Series No. 1465. Global Labor Organization (GLO).

McMinn BG, Hinton L. (2000). Confined to barracks: The effects of indoor confinement on aggressive behavior among inpatients of an acute psychogeriatric unit. *American Journal of Alzheimer's Disease*. 15(1):36-41.

McNeil, A., Hicks, L., Yalcinoz-Ucan, B., & Browne, D. T. (2023). Prevalence & correlates of intimate partner violence during COVID-19: A rapid review. *Journal of Family Violence*, *38*(2), 241-261.

Morgan, A., & Boxall, H. (2020). Social Isolation, Time Spent at Home, Financial Stress, and Domestic Violence during the COVID-19 Pandemic. *Trends and Issues in Crime and Criminal Justice, No. 609*, 1–18.

Nappo, N., Fiorillo, D., & Lubrano Lavadera, G. (2023). Subjective job insecurity during the COVID-19 pandemic in Italy. *Italian Economic Journal*, 9(3), 1153-1179.

Olea, J. L. M., & Pflueger, C. (2013). A robust test for weak instruments. *Journal of Business & Economic Statistics*, *31*(3), 358-369.

Pachana, N. A., Brilleman, S. L., & Dobson, A. J. (2011). Reporting of life events over time: methodological issues in a longitudinal sample of women. *Psychological assessment*, *23*(1), 277–281.

Papke, L. E., & Wooldridge, J. M. (1996). Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates. *Journal of Applied Econometrics, 11*, 619–632.

Papke, L. E., & Wooldridge, J. M. (2008). Panel Data Methods for Fractional Response Variables with an Application to Test Pass Rates. *Journal of Econometrics, 145*, 121–133.

Parkinson D. (2019). Investigating the Increase in Domestic Violence Post Disaster: An Australian Case Study. *Journal of interpersonal violence*, *34*(11), 2333–2362.

Peterman, A., Potts, A., O'Donnell, M., Thompson, K., Shah, N., Oertelt-Prigione, S., & Van Gelder, N. (2020). *Pandemics and violence against women and children* (Vol. 528, pp. 1-45). Washington, DC: Center for Global Development.

Peitzmeier, S. M., Fedina, L., Ashwell, L., Herrenkohl, T. I., & Tolman, R. (2021). Increases in Intimate Partner Violence during COVID-19: Prevalence and Correlates. *Journal of Interpersonal Violence, 37*(21-22), 20482–20512.

Peterman, A., Potts, A., O'Donnell, M., Thompson, K., Shah, N., Oertelt-Prigione, S., & Van Gelder, N. (2020). *Pandemics and violence against women and children* (Vol. 528, pp. 1-45). Washington, DC: Center for Global Development.

Raybeck, D. (1991). Proxemics and Privacy: Managing the Problems of Life in Confined Environments. In: Harrison, A.A., Clearwater, Y.A., McKay, C.P. (eds) *From Antarctica to Outer Space*. Springer, New York, NY.

Roodman, D. (2011). Fitting Fully Observed Recursive Mixed-process Models with CMP. *The Stata Journal, 11*, 159–206.

Sabri, B., Hartley, M., Saha, J., Murray, S., Glass, N., & Campbell, J. C. (2020). Effect of COVID-19 Pandemic on Women's Health and Safety: A Study of Immigrant Survivors of Intimate Partner Violence. *Health Care for Women International, 41*(11-12), 1294–1312.

Saunders, D.G. (2022). Barriers to Leaving an Abusive Relationship. In: Geffner, R., White, J.W., Hamberger, L.K., Rosenbaum, A., Vaughan-Eden, V., Vieth, V.I. (eds) *Handbook of Interpersonal Violence and Abuse Across the Lifespan*. Springer, Cham.

Schneider, W., Waldfogel, J., & Brooks-Gunn, J. (2017). The Great Recession and risk for child abuse and neglect, *Children and Youth Services Review*, 72, 71–81.

Schumacher, J. A., Coffey, S. F., Norris, F. H., Tracy, M., Clements, K., & Galea, S. (2010). Intimate partner violence and Hurricane Katrina: predictors and associated mental health outcomes. *Violence and victims,* 25(5), 588–603.

Sety M, James K, & Breckenridge J (2014). Understanding the risk of domestic violence during and post natural disasters: Literature review In *Issues of gender and sexual orientation in humanitarian emergencies* (99–111): Springer.

Stahly, G. B. (2000). Women with Children in Violent Relationships: The Choice of Leaving May Bring the Consequence of Custodial Challenge. *Journal of Aggression, Maltreatment & Trauma*, *2*(2), 239–251.

Strube, M. J., & Barbour, L. S. (1984). Factors Related to the Decision to Leave an Abusive Relationship. *Journal of Marriage and Family*, *46*(4), 837–844.

Tavares, F. F., Betti, G., Bettio, F., & Ticci, E. (2024). *Stata do-file to compute the fuzzy multidimension index of violence against women proposed by Bettio, Ticci, and Betti (2020)*. GitHub. https://github.com/fernandoflt/vawfuzzyindex

Teixeira, A. L., Cerejo, D., Rosa, M. D. R., & Lisboa, M. (2022). Effects of the COVID-19 pandemic on the lives of women with different socioeconomic backgrounds and victimization experiences in Portugal. Social Sciences, 11(6), 258.

Terza, J. V., Basu, A., & Rathouz, P. J. (2008). Two-stage residual inclusion estimation: addressing endogeneity in health econometric modeling. *Journal of health economics*, 27(3), 531-543.

Tramontano, F., Ticci, E. & Bettio, F. (2024) Tra emergenza e normalità. Un'analisi mixed method della violenza da partner in Toscana durante la pandemia di COVID 19. *Sociologia e Ricerca Sociale*.

UN (2007), *Indicators to measure violence against women*, Geneva, Switzerland,

UN (2014). *Guidelines for producing statistics on violence against women—Statistical surveys*. New York: United Nations.

Verma. (2008). *Sampling for Household-based Surveys of Child Labor*. Geneva: ILO, IPEC.

Weber, C., Gatersleben, B., Jagannath, S., Füchslin, B., & Delabrida, Z. N. C. (2024). Crowding and aggression during the COVID-19 lockdown in the United Kingdom: The relationship between residential density, subjective crowding, privacy, and aggression. *Journal of Environmental Psychology*, *96*, 102335.

Williams, E. E., Arant, K. R., Leifer, V. P., Balcom, M. C., Levy-Carrick, N. C., Lewis-O'Connor, A., & Katz, J. N. (2021). Provider Perspectives on the Provision of Safe, Equitable, Trauma-Informed Care for Intimate Partner Violence Survivors during the COVID-19 Pandemic: A Qualitative Study. *BMC Women's Health, 21*(1).

Wooldridge, J. M. (2014). Quasi-maximum Likelihood Estimation and Testing for Nonlinear Models with Endogenous Explanatory Variables. *Journal of Econometrics, 182*(1), 226–234.

Wooldridge, J. M. (2015). Control Function Methods in Applied Econometrics. *Journal of Human Resources, 50*(2), 420–445.

Wu, Q., & Xu, Y. (2020). Parenting stress and risk of child maltreatment during the COVID-19 pandemic: A family stress theory-informed perspective. *Developmental Child Welfare*, *2*(3), 180-196.

Zamba C, Mousoulidou M, Christodoulou A. (2022). Domestic Violence against Women and COVID-19. *Encyclopedia*. 2(1):441-456.

Appendices

Appendix I - Violence types and acts, severity weights, and descriptive statistics

Table A1 - Violence types and acts, and severity weights

Violence Types and Acts	Severity weights (type specific)
Psychological violence (COVID and non-COVID specific)	
During the lockdown periods starting in March 2020, did your partner…	
Forbid or try to prevent you to go to the doctor, to the hospital, or other health care places?[1]	1.253
Restrict or try to restrict your contact with family of origin, relatives, or friends?[2]	0.827
Forbid or try to prevent you to work outside the home?	1.117
Forbid or try to prevent you to leave the house?[1]	1.253
Question your fidelity?	0.732
Belittle or humiliated you in private?	0.603
Belittled or humiliated you in public?	0.724
Prevent you from making your own decisions about family finances and purchases?	0.836
Do anything to intentionally frighten or intimidate you, such as yelling and destroying objects?	0.738
Threat to take the children away from you?	1.183
Hurt or threat to harm your children?[3]	1.345
Hurt or threat to hurt a person close to you?	1.327
Threat to hurt you?	1.062
Physical violence	
During the lockdown periods starting in March 2020, did it happen that your partner …	
Slap you?	0.832
Hit you with a fist or a contusive object, or bite or kick you?	0.985
Throw anything at you or an object that hurt you or otherwise could have hurt you?	0.951
Grab you, turn your arm or pulled your hair, hurting or frightening you?	0.919
Push or pull you, hurting or frightening you?	0.748
Intentionally try to strangle or choke you?	1.146
Intentionally try to burn you?	1.161
Use a gun, knife, other weapon, or other dangerous substances against you?	1.161
Beat your head against something?	1.097
Sexual violence	
During the lockdown periods starting in March 2020, did it happen that your partner …	
Force you into sexual intercourse by threatening, holding you down or hurting you in some way?	1.054
Attempt to force you into sexual intercourse by threatening you, holding you down, or doing hurting you any other way?	1.029
Make you take part in sexual activities against your will or in a situation in which you were unable to refuse?	0.981
Did you happen to consent to sexual activity, even though you didn't feel like it, because you were afraid of what your partner would do if you refused?	0.936

Notes: Severity weights extracted and adapted from Bettio et al. (2020). The weights are normalized such that their mean within each violence type is equal to one. 1. Weights considered to be equivalent to the item "Forbidden you to leave the house, taken away your car keys or locked you up?"; 2. Weight considered to be equivalent to the average between the weight of the items "Tried to keep you from seeing your friends?" and "Tried to restrict your contact with your family of birth or relatives?"; 3. Weight considered to be equivalent to the average between the weight of the items "Hurt your children?" and "Threatened to hurt your children?".

Table A2 – Sample demographic and socioeconomic characteristics

Variable	Category	NV		V	
		N	%	N	%
Age group (years)	18-34	308.10	15.86	24.69	20.91
	35-44	423.97	21.82	34.86	29.53
	45-54	698.15	35.93	36.56	30.97
	55-64	512.72	26.39	21.94	18.59
Nationality group	Italian	1857.58	95.61	96.50	81.74
	Foreigner	85.36	4.39	21.56	18.26
Education background	Lower secondary education or less	354.57	18.25	25.86	21.90
	Upper secondary education	909.40	46.81	52.16	44.18
	Higher education or more	678.98	34.95	40.04	33.91
Education background of partner	Lower secondary education or less	503.29	25.9	43.90	26.55
	Upper secondary education	909.95	46.8	51.39	46.64
	Higher education or more	529.70	27.3	22.78	26.81
Civil status	Married	1703.71	87.69	79.11	67.01
	Not Married	219.26	11.28	30.95	26.21
	Legally divorced	19.975	1.03	8.00	6.78
Occupation status	Employed	1492.63	76.82	71.20	60.31
	Unemployed	105.65	5.44	21.38	18.11
	Outside labour force	344.66	17.74	25.48	21.58
Occupation status of partner	Employed	1672.54	86.1	96.41	81.7
	Unemployed	28.0328	1.44	10.99	9.31
	Outside labour force	242.37	12.47	10.66	9.03
Lost her job during the lockdown	No	1521.99	78.33	84.35	71.45
	Yes, temporarily	364.48	18.76	26.00	22.03
	Yes, permanently	56.47	2.91	7.71	6.53
Partner lost his job during the lockdown	No	1568.43	80.7	82.46	69.84
	Yes, temporarily	342.20	17.6	31.70	26.85
	Yes, permanently	32.30	1.66	3.90	3.30
Make ends meet at the end of the month	Easy enough to very easy	1448.29	74.54	60.34	51.11
	Some difficulty to very difficult	494.65	25.46	57.72	48.89
Number of children in the household	0	1130.85	58.20	57.72	48.89
	1	449.75	23.2	33.42	28.30
	≥ 2	362.34	18.65	26.92	22.81
Household members (n)	2	527.88	27.2	28.68	24.29
	≥ 3	1415.06	72.79	89.38	75.71
Rooms (n)	≤ 2	78.78	4.05	9.30	7.87
	≥ 3	1864.16	95.95	108.77	92.13
House with and without outside space	With outside space	745.39	38.36	31.31	26.52
	No outside space	1197.55	61.64	86.75	73.48
Municipality population	0-49,999	941.56	48.46	67.27	56.98
	50,000-99,000	587.76	30.25	28.60	24.22
	100,000 or more	413.62	21.29	22.20	18.80

Note: Outcomes with sampling weights and imputed values. NV refers to women that did not experience IPV; V refers to women that experienced IPV.

Appendix II - Instrument diagnostics

Table A3 - First stage estimates

Average Marginal effect	**Probit First stage**
Children (<18 years old) in the household = 1	-0.023
	(0.020)
If the house has no outside space and non-privacy index >= 1	0.033
	(0.029)
Female employment rate by municipality	-0.926***
	(0.252)
2019-2011 difference in female employment rate by municipality	-0.002
	(0.006)
Observations	2,061

Notes: *** p<0.01, ** p<0.05, * p<0.1. Outcomes are average marginal effects. Bootstrapped Standard errors are within brackets, obtained through 500 replicated weights.

Table A4 – Correlation between dependent variables and instruments

Correlation	**IPV Fuzzy index**	**IPV Prevalence**	**Instrument 1**	**Instrument 2**
IPV Fuzzy index	1.0000			
IPV Prevalence	0.680*	1.0000		
Instrument 1	-0.0096	0.0105	1.0000	
Instrument 2	-0.0075	-0.0890	0.0860*	1.0000

Notes: * p<0.1. Pairwise correlation type depends on the type of the variables: polychoric (ordinal), tetrachoric (ordinal with two categories), polyserial (continuous and ordinal), biserial (continuous and ordinal with two categories), and Pearson (both with over 10 categories). Instrument 1 refers to Female employment rate by municipality and Instrument 2 to 2019-2011 difference in female employment rate by municipality.

Instruments' strength. To the best of our knowledge, there is no specific test for instrument strength in nonlinear models. Therefore, we employed 2SLS models and report the first-stage F-statistics as per Olea and Pflueger (2013). In this approach, we treat Equations 4 and 5 as linear probability models and consider Equation 6 as an unbounded continuous variable. Table A5 presents the Effective F-statistics for the first stage. The F-statistic indicates a critical value at $\tau = 5\%$, which confirms the sufficient joint strength of our instruments.

Table A5 - Montiel-Pflueger robust weak instrument test

Effective F statistic: 8.616	
Critical Values	2SLS
τ = 5%	8.515
τ = 10%	6.112
τ = 20%	4.722
τ = 30%	4.2

Appendix III - Sensitivity tests

Table A6 - Estimates comparison with Terza, Basu, and Rathouz CF's approach and a joint quasi-maximum likelihood estimation

A. Dependent variable: 1 if victims of IPV

	Any type of IPV		
	(1a)	**(2a)**	**(3a)**
Model	***CF1***	***CF2***	***JM***
Average predicted value of dependent	0.057	0.057	0.118
	(0.005)	(0.005)	(0.053)
Average Marginal effect			
At least one lost job (= 1)	**0.022****	**0.022****	**0.027****
	(0.010)	(0.010)	(0.012)
Children (<18 years old) in the household (= 1)	**0.025****	**0.024****	**0.031****
	(0.011)	(0.011)	(0.013)
If the house has no outside space and non-privacy index >= 1 (= 1)	0.012	0.013	0.012
	(0.016)	(0.016)	(0.019)
Not working women before the pandemic (= 1)	0.148	0.060	0.372
	(0.190)	(0.163)	(0.310)
First stage generalised residuals	-0.039		
	(0.052)		
First stage residuals		-0.017	
		(0.113)	
atanrho			-0.924
			(1.262)

B. Dependent variable: fuzzy indicators of IPV

	Any type of IPV		
	(1a)	**(2a)**	**(3a)**
Model	***CF1***	***CF2***	***JM***
Average predicted value of dependent	0.011	0.011	0.019
	(0.001)	(0.001)	(0.009)
Average Marginal effect			
At least one lost job (= 1)	0.001	0.001	0.002
	(0.002)	(0.002)	(0.003)
Children (<18 years old) in the household (= 1)	**0.014*****	**0.014*****	**0.020****
	(0.003)	(0.003)	(0.008)
If the house has no outside space and non-privacy index >= 1 (= 1)	0.005	0.005	0.009
	(0.004)	(0.004)	(0.006)
Not working women before the pandemic (= 1)	0.108	0.131	0.053
	(0.141)	(0.194)	(0.049)
First stage generalized residuals	-0.017		
	(0.012)		
First stage residuals		-0.032	
		(0.025)	
atanrho[1]			-0.482
			(0.355)
Number of observations	2061	2061	2061

Notes: See notes to Table 3. CF1 stands for Control Function as proposed by Wooldridge (2015), CF2 for Control Function as proposed by Terza, Basu, and Rathouz (2008), and JM to joint models (joint QMLE). 1. The variable atanhrho refers to arc-hyperbolic tangents of the ρ (see Roodman, 2011).

Table A7 - Estimates comparison with a joint quasi-maximum likelihood estimation, by type of violence and indicator of violence.

Dependent variable:	**1 if victims of IPV**			**Fuzzy indicators of IPV**		
	Any type of IPV	**Psychological IPV**	**Sexual and/or physical IPV**	**Any type of IPV**	**Psychological IPV**	**Sexual and/or physical IPV**
Model	***JM***	***JM***	***JM***	***JM***	***JM***	***JM***
Average Marginal effect						
At least one lost job (= 1)	**0.027****	**0.024****	0.014	0.002	0.002	0.002
	(0.012)	(0.012)	(0.012)	(0.003)	(0.005)	(0.003)
Children in the household (=1)	**0.031****	**0.033*****	**0.034*****	**0.020****	**0.026*****	**0.014****
	(0.013)	(0.013)	(0.013)	(0.008)	(0.010)	(0.006)
If the house has no outside space and non-privacy index >= 1 (= 1)	0.012	0.007	0.003	0.009	0.010	0.007
	(0.019)	(0.018)	(0.016)	(0.006)	(0.007)	(0.004)
Not working women before the pandemic (= 1)	0.372	0.322	0.234	0.053	0.081	0.025
	(0.310)	(0.266)	(0.209)	(0.049)	(0.072)	(0.033)
Atanhrho	-0.924	-0.806	-0.897	-0.482	-0.536	-0.424
	(1.262)	-1.093	(1.371)	(0.355)	(0.355)	(0.603)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,061	2,061	2,061	2,061	2,061	2,061

Notes: See notes to Table A7.

Table A8 – Estimates without make-ends meet variable

A. Dependent variable: 1 if victims of IPV

	Any type of IPV		**Any type of IPV**	
	(1a)	**(2a)**	**(1b)**	**(2b)**
Model	***Probit***	***CF***	***Probit***	***CF***
	All variables		**Without make-ends meet variable**	
Average Marginal effect				
At least one partner lost job (= 1)	**0.022****	**0.022****	**0.028*****	**0.028*****
	(0.010)	(0.010)	(0.010)	(0.010)
Children (<18 years old) in the household (= 1)	**0.024****	**0.025****	**0.026****	**0.028*****
	(0.010)	(0.011)	(0.010)	(0.011)
If the house has no outside space and non-privacy index >= 1 (= 1)	0.013	0.012	0.015	0.012
	(0.015)	(0.016)	(0.015)	(0.016)
Woman not working (= 1)	**0.037*****	0.148	**0.044*****	0.210
	(0.012)	(0.190)	(0.013)	(0.240)
Generalized residuals		-0.039		-0.052
		(0.052)		(0.058)
Number of observations	2061	2061	2061	2061

Estimates without make-ends meet variable (cont.)

B. Dependent variable: fuzzy indicators of IPV

	Any type of IPV		Any type of IPV	
	(1a)	(2a)	(1b)	(2b)
Model	***Fractional***	***CF***	***Fractional***	***CF***
	All variables		Without make-ends meet variable	
Average Marginal effect				
At least one partner lost job (= 1)	0.001	0.001	0.002	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Children (<18 years old) in the household (= 1)	0.013***	0.014***	0.014***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)
If the house has no outside space and non-privacy index >= 1 (= 1)	0.006*	0.005	0.007*	0.005
	(0.004)	(0.004)	(0.004)	(0.004)
Woman not working (= 1)	0.008***	0.108	0.011***	0.135
	(0.003)	(0.141)	(0.003)	(0.180)
Generalized residuals		-0.017		-0.018
		(0.012)		(0.013)
Number of observations	2061	2061	2061	2061

Notes: See notes to Table 3. In columns (2a) and (2b) the instruments are the female employment rate at the municipal level and its variation with respect to 2011.