

# Chapter 3

## Consequences of the Lockdown: Domestic Violence During the COVID-19 Pandemic



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### Abstract

#### Background

The global pandemic of the coronavirus disease **2019** (COVID-19) has presented many unique challenges to health systems. The hidden impact of COVID-19 and its associated lockdown have been an increased prevalence of domestic **violence**.

#### Objective

To increase our understanding of the connection between COVID-19 containment measures, domestic violence, and mental health in Germany, we conducted an online self-assessment survey of 98 domestic violence victims and 276 controls. All participants answered questions concerning domestic violence, emotional regula-

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tion skills, limitations due to and acceptance of containment measures, and quality of their contact experiences. Results

There was no significant effect of “gender” x “domestic violence.” Among victims of domestic violence, the number of women was considerably higher than the number of men. In addition, the factors “negative contact quality,” “emotional regulation,” and “resilience” differed significantly between the victims of domestic violence and the control group. Conclusions

The COVID-19 outbreak and associated containment and quarantine measures resulted in a “hidden pandemic” of domestic violence for which prevention programs and early victim assistance through the expansion of digital technologies are urgently needed. Prospective studies should expand empirical data to focus on the long-term psychological effects of domestic violence and biomarkers that can serve as warning signs of stress-related disorders.

**Keywords** COVID-19 · SARS-CoV-2 · Domestic violence · Mental health · Containment measures

## 1 Introduction

Coronavirus disease 2019 (COVID-19) is caused by acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. This infectious disease, which primarily affects the respiratory tract and broke out in Wuhan (Hubei Province, China) in 2019, spreads rapidly to various countries worldwide [2, 3]. On March 11, 2020, it was declared as a global pandemic [4]. To contain the spread of COVID-19, prevent increased morbidity, and avoid overburdening health systems, social containment measures were implemented [5–7]. These measures have included selective quarantines, stay-at-home orders, travel restrictions, and the closure of kindergartens, schools, and all nonessential services and businesses [6, 8]. Although these measures can be effective in containing the spread of disease, they also can lead to unintended, negative consequences [9]. Several new stressors, including physical and mental health risks as well as social and economic impacts, could result [1, 9]. There is evidence that quarantine, in particular, can lead to negative psychological outcomes such as posttraumatic stress symptoms, confusion, and anger [10].

Previous natural disasters and health crises have been associated with an increase in violence both inside and outside the home [11]. Similar to social isolation during previous epidemics and pandemics, the psychological effects of social isolation during the COVID-19 pandemic in particular may increase the risk and severity of domestic violence [9, 12–16]. Increases in domestic violence have been reported in the context of natural disasters, such as after the 2004 Indian Ocean earthquake and tsunami [17], Hurricane Katrina in the United States in 2005 [18], and the 2009 “Black Saturday” bushfires in Australia [13]. Following the 2004 tsunami in North Sumatra and the 2011 earthquake in Tōhoku, Japan, increased rates of violence

within couples persisted even a decade after these disasters [19, 20]. Women and girls also experienced more sexual violence, coercion, and exploitation during past epidemics such as those caused by the Ebola and Zika virus outbreaks [21, 22].

Domestic violence is a broad term that describes assault or abuse committed within a domestic setting by one person against another who are either in a current or former intimate relationship, cohabitation, or familial association [9, 23]. It is a global health problem that can lead to psychological trauma and accompanying mental, physical, and sexual health consequences for the victim and the entire family [24, 25]. In addition, domestic violence is a notable cause of mortality and morbidity among women [26]. The term domestic violence is interchangeably used with intimate partner violence or gender-based violence and also comprises elder abuse as well as child abuse [1, 27, 28]. A variety of behaviors fall within the scope of domestic violence [25]. These include physical (e.g., hitting, slapping), sexual (e.g., assault, rape), psychological (e.g., insult, manipulation), economic (e.g., prohibition from working, coercive control of finances), as well as social (e.g., social isolation, coercive control of messages) violence [29, 30].

Domestic violence can affect all types of age groups, ethnicities, relationship statuses, as well as socioeconomic levels [31]. It is typically experienced by women of all ages, and children and their mothers are particularly at risk of becoming victims of violence [9, 32]. In addition, domestic violence is the leading cause of homicide among women [32]. Despite this disproportionate distribution, men can also experience this type of violence. According to the Centers of Disease Control, one in four women and one in ten men report being victims of some form of intimate partner violence each year [33]. Prior to the COVID-19 pandemic, 35% of women worldwide were described as experiencing physical and/or sexual violence by an intimate partner during their lifetime [34]. In general, physical forms of violence are more severe against women than against men [35]. Individuals who have been a victim of intimate partner violence are at increased risk for various psychological (e.g., mood disorder, posttraumatic symptom disorder, substance abuse, suicidal behavior) and physical (e.g., cardiovascular disease, chronic pain, sleep disorders) health conditions [36]. This type of violence is a chronic and often persistent stressor, and some studies have even demonstrated the presence of hypothalamic-pituitary-adrenal (HPA) axis dysregulation involved in the stress response in victims of intimate partner violence [37–39].

Prolonged proximity to others, including family members or intimate partners, and external stressors can lead to an increased tension, feelings of isolation, loneliness, and worsening of existing mental health status [40]. In addition, individuals living in quarantine are described as more likely to experience anger and posttraumatic stress symptoms and have increased substance use, which may increase the risk for violent behavior, particularly in the home [41]. Furthermore, the risk of re-abuse is known to increase when a person is unable to escape the abuser due to social isolation measures [24]. Therefore, the situation created by COVID-19, including the containment efforts, presents unique problems, particularly with regard to domestic violence. Social containment strategies have profound

implications for families experiencing domestic violence [42]. For children and adults living in these situations, the home is often where violence and abuse in various forms occurs [9, 32]. Contact with the abuser is a key factor in experiencing domestic violence [43]. It also increases the risk of health problems associated with domestic violence, such as chronic illness, gynecological morbidity, trauma-related injuries, and stress-related symptoms [44, 45]. Due to movement restrictions and the reduction of social contacts, the possibilities of benefiting from social and protective networks or escaping the violent situation are severely limited [43, 46]. In addition, access to public services and institutions that provide social support is disrupted [43, 47]. Moreover, in the exceptional circumstances of the COVID-19 pandemic, exposure to heightened external stressors may increase the risk for domestic violence [48]. These include situations such as unemployment and financial insecurity [14, 48, 49], fear for health [10, 50], and altered parenting responsibilities [48].

In the context of the current COVID-19 pandemic and associated lockdown, an increase in reports of domestic violence has been described worldwide [1, 9, 50–53]. Initial leads came from a police station in Jianli (Hubei Province, China) near the epicenter of the COVID-19 outbreak, where reports of domestic violence from February 2019 and February 2020 were compared. This revealed a tripling of domestic violence cases and estimated that 90% of these cases were related to COVID-19 [54–56]. In France, a 30% increase has been documented since the March 17, 2020 lockdown. Percentages are comparable for Argentina (25%), Cyprus (30%), and Singapore (33%) as evidenced by domestic violence counseling services [57]. In the United Kingdom, the number of deaths caused by domestic violence was found to have doubled between March 23 and April 21, 2020 ( $n = 16$  deaths) compared with the average rate over the past 10 years [58]. In a study of maxillofacial surgery in the United Kingdom, Blackhall and colleagues reported cases of severe facial trauma ( $n = 19$  cases) associated with domestic violence or self-harm [59].

Our aim was to examine the relationship between COVID-19, its associated containment measures, domestic violence, and mental health through an online survey. The specific objectives of this study were to determine (1) whether there are gender differences in domestic violence and (2) how victims of domestic violence differ from control individuals who did not experience domestic violence. Our study hypotheses are as follows:

- 1a) Women are more likely to be victims of domestic violence than men.
- 1b) Female victims report an increased frequency of domestic violence than male victims.
- 2a) Victims of domestic violence have more children attending kindergarten and school than the control group.
- 2b) Victims of domestic violence have more negative contact experiences compared to controls.
- 2c) Victims of domestic violence have lower emotional regulation skills compared to controls.

- 2d) Victims of domestic violence have more problems to endure and tolerate their feelings compared to controls (resilience).
- 2e) Victims of domestic violence report more restraints due to containment measures compared to controls.
- 2f) Victims of domestic violence show a lower willingness to implement containment measures (commitment) compared to controls.

Moreover, we conducted mediation analyses to see which factors can influence the above points on domestic violence.

## 2 Methods

### 2.1 Participants

The participants were recruited via local newspaper advertisements, social media, e-mail distribution lists for students and employees, newsletter for employees of Magdeburg University Hospital, information on the website of Otto-von-Guericke University Magdeburg, and distribution of flyers (including within the emergency department of Magdeburg University Hospital). All subjects gave written informed consent before enrollment in the study according to procedures approved by the institutional review board of the Medical Faculty (Otto-von-Guericke University Magdeburg) prior to study inclusion. Subjects received no financial compensation for their participation in the study. The study was conducted in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki).

In total, 660 participants ( $n_{\text{female}} = 451$ ,  $n_{\text{male}} = 172$ ,  $n_{\text{diverse}} = 5$ ) aged  $31.75 \pm 12.26$  years participated in the online survey study. Inclusion criteria were age of at least 18 years and participation between April 27, 2020, and June 8, 2020. One participant was excluded due to not giving sensible answers. Two participants were excluded because they indicated an age less than 18 years and a further 33 participants dropped out before the age question. Four were excluded because they indicated that they had not provided reliable responses. Furthermore, one participant was excluded because the DEG\_TIME was  $>100$  (negative points for extremely fast completion; the value is normalized so that values of more than 100 points indicate poor quality of the data) [60] and dwell time on 15 of 31 pages of the online survey fell below one-third of the mean time.

This resulted in a final sample of 619 participants. Within this sample, 98 reported at least one instance of domestic violence, while 276 reported not having been a victim of domestic violence. There was a high proportion of missing information ( $n = 245$ ), because 140 participants dropped out of the survey before the domestic violence questions, 104 lived alone, and one did not answer all domestic violence questions.

## **2.2 Procedure**

We conducted an anonymous online survey of mental health and well-being during the COVID-19 pandemic. The questionnaire was created using SoSci Survey [61]. The survey was compatible with desktop or laptop computers, tablets, and smartphones but was only available in German. The first page of the questionnaire contained information about the study, data protection, and points of contact in case of crisis. Before starting the survey, participants had to give their informed consent. The entire survey consisted of a variety of questions and psychological scales. At the end of the survey, participants were asked if they had provided sensible and reliable responses. The average time for survey completion was approximately 20 min. Only a subset of questions was selected to focus the statistical analyses, and these are explained in more detail in the following sections.

### **2.2.1 Demographic Information**

Multiple-choice and open-ended questions were used to record gender (female/male/diverse), age in years, place of residence (country, state), education (level of education, professional qualification), profession, marital status, parenthood, and characteristics of the current household.

### **2.2.2 Domestic Violence**

To assess the presence of domestic violence, participants were asked to indicate how often a person living in their household had perpetrated various types of violence against them in the past two weeks. Fifteen items required responses on a five-point Likert scale (1 = “never,” 2 = “1 to 2 times,” 3 = “3 to 5 times,” 4 = “6 to 10 times,” 5 = “more than 10 times”). These items included physical violence (e.g., “slapped you”), sexual violence (e.g., “had sexual intercourse with you by force”), psychological violence (e.g., “humiliated you”), economical violence (e.g., “forbade you to handle money”) as well as social violence (e.g., “forbade you to have contact with your family”). A person was defined as a victim of domestic violence if at least one item had a value greater than 1. For further statistical analyses the variable “sum of domestic violence” was formed. This was the sum of all 15 items, reflecting the overall frequency/intensity of domestic violence.

### **2.2.3 Self-Report Measure for the Assessment of Emotion Regulation Skills**

The ability of successful emotion regulation was assessed with the Self-Report Measure for the Assessment of Emotion Regulation Skills (SEK-27) [62]. This questionnaire consists of 27 items representing 9 different competencies in

dealing with problematic emotions during the past 14 days. Each item has to be answered on a five-point Likert scale (0 = “not at all,” 1 = “infrequent,” 2 = “sometimes,” 3 = “frequent,” 4 = “(almost) always”). For the present study, only six items from the “resilience” and “regulation” subscales were used for further statistical analyses.

#### **2.2.4 Commitment Score**

The following eight items were used to assess commitment to COVID-19 containment measures for the past 14 days: (1) “I comply to the measures”; (2) “I believe the measures are useful”; (3) “I believe the measures will be successful”; (4) “Complying with the measures is a challenge for me”; (5) “I believe the measures will have bad consequences for me”; (6) “I believe the measures will have bad consequences for my friends and/or relatives”; (7) “I believe the measures will have bad consequences for many people”; and (8) “I believe the measures can also be an opportunity for the future.” Each item had to be scored on a five-point Likert scale from 0 = “not at all” to 4 = “very strong.” To calculate the total score for all items (commitment score), ratings for items 4 to 7 were inverted.

#### **2.2.5 Restrictions Due to Containment Measures**

To assess the extent to which participants were personally affected by the COVID-19 mitigation measures, they were asked: “In terms of the past 14 days, what constraints and additional stresses are you experiencing as a result of the current situation?” Participants were instructed to select all that applied from a list of predefined constraints: “loss of earnings”; “child care”; “closing their own business/company”; “more work”; “home office”; “less work”; and “strenuous/stressful work.” In addition, there was a blank space in which additional constraints could be entered. The score was calculated by counting the selected answers.

#### **2.2.6 Contact Quality**

To assess how participants described the quality of most of their face-to-face contacts, they were asked: “With regard to the past 14 days, how would you describe the quality of your current contacts?” Participants were instructed to rate the following seven items: “supportive,” “friendly,” “disruptive,” “calming,” “frightening,” “stressful,” and “upsetting.” Each item had to be rated on a five-point Likert scale from 0 = “not at all” to 4 = “very strong.” The score for “negative contact quality” was formed by taking the average of the inverted scores for the items “disruptive,” “frightening,” “stressful,” and “upsetting.”

## 2.3 Statistical Analyses

IBM SPSS Statistics Version 26 (Armonk, New York, United States) was used for descriptive inferential data analysis and hypothesis testing, and the PROCESS Version 3.5 [63] macro for SPSS was applied for mediation analyses. First, we tested for normal distribution ( $p > 0.05$ ) using the Shapiro-Wilk test. To test for group differences, we performed parametric two-sample t-tests for normally distributed variables. Otherwise, nonparametric Mann-Whitney U tests were calculated. Chi-square tests were performed to test statistical independence. A  $p$ -value of less than 0.050 was considered statistically significant.

Mediation analyses were conducted using the PROCESS v3.5 macro for SPSS [63] which uses ordinary least squares regression, yielding unstandardized path coefficients for total, direct, and indirect effects. Bootstrapping with 5000 samples with heteroscedasticity-consistent inference (HC3) [64] was used to calculate confidence intervals and inferential statistics.

## 3 Results

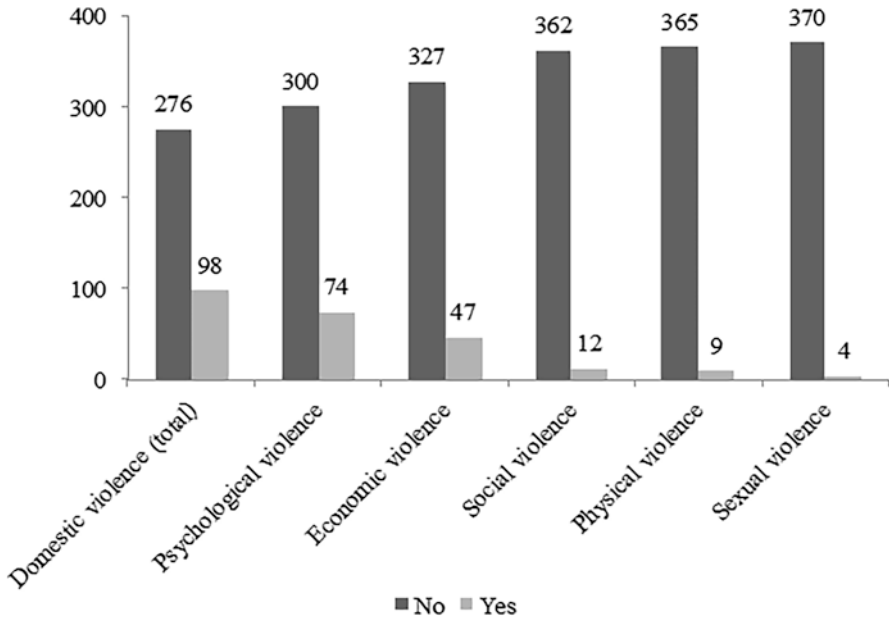
### 3.1 Sociodemographic Data

The present sample includes 98 individuals who were victims of domestic violence as well as 276 controls who were not domestic violence victims during the first lockdown in Germany. Figure 3.1 gives an overview of the frequency of the different types of domestic violence. Psychological and economic violence were the most common forms in this present sample. Victims of domestic violence (median [Mdn] = 28.00,  $Q1 = 22.00$ ,  $Q3 = 37.00$ ) and controls (Mdn = 28.50,  $Q1 = 24.00$ ,  $Q3 = 39.00$ ) did not differ with respect to age ( $U = 12,370.00$ ,  $Z = -1.26$ ,  $p = 0.209$ ). Furthermore, the two groups did not differ with respect to education, marital status, household structure, or lifestyle. Table 3.1 shows the detailed sample characteristics of domestic violence victims compared to control subjects.

### 3.2 Gender Differences Regarding Domestic Violence

A chi-square test was applied to examine 1a) the distribution of “gender” and “presence of domestic violence.” Since the sample of diverse individuals was small ( $n = 2$ ), we decided to exclude these two persons for the analyses of gender differences. The results showed no statistically significant association between gender and the presence of domestic violence ( $\chi^2(2) = 0.39$ ,  $p = 0.535$ ). Descriptively, 25.0% of the female and 28.3% of the male study participants reported being victims of domestic violence. Among victims of domestic violence, the proportion of





**Fig. 3.1** Graphic representation of the frequency of different types of domestic violence (number of cases)

females ( $n = 70, 72.9\%$ ) was considerable higher than that of males ( $n = 26, 27.1\%$ ). Figure 3.2 provides an overview of the gender distribution in both groups.

To test whether 1b) female victims experienced domestic violence more frequently than male victims, a Mann-Whitney U test was calculated with the dependent variable “sum of domestic violence.” Female (Mdn = 16.00,  $Q1 = 16.00$ ,  $Q3 = 17.00$ ) compared to male (Mdn = 17.00,  $Q1 = 16.00$ ,  $Q3 = 17.00$ ) victims did not differ significantly in terms of frequency ( $U = 817.50, Z = -0.31, p = 0.757$ ).

### 3.3 Comparison of Domestic Violence Victims and Controls

To test whether 2a) victims of domestic violence had more kindergarten- or school-age children compared with controls, Mann-Whitney U tests were conducted with dependent variables “number of children in kindergarten” and “number of children in school.” Victims of domestic violence (Mdn = 1.00,  $Q1 = 0.00$ ,  $Q3 = 1.00$ ) had more kindergarten-age children than controls (Mdn = 0.00,  $Q1 = 0.00$ ,  $Q3 = 1.00$ ;  $U = 1380.00, Z = -2.04, p = 0.041$ ). Victims of domestic violence (Mdn = 0.00,  $Q1 = 0.00$ ,  $Q3 = 1.00$ ) did not differ from controls (Mdn = 0.00,  $Q1 = 0.00$ ,  $Q3 = 1.00$ ) in terms of school-age children ( $U = 1552.50, Z = -1.03, p = 0.302$ ).

To test whether 2b) victims of domestic violence reported more negative contact experiences compared to controls, a Mann-Whitney U test was calculated with the

**Table 3.1** Sample characteristics of domestic violence (DV) victims compared to controls

	Victims of DV ( <i>n</i> = 98)	Controls ( <i>n</i> = 276)	Statistics
Age [mean years]	Mdn = 28.00 ( <i>Q</i> 1 = 22.00, <i>Q</i> 3 = 37.00)	Mdn = 28.50 ( <i>Q</i> 1 = 24.00, <i>Q</i> 3 = 39.00)	<i>U</i> = 12,370.00, <i>Z</i> = -1.26, <i>p</i> = 0.209
Years of education [number]	<i>n</i> = 1 <i>n</i> = 113 <i>n</i> = 162	<i>n</i> = 1 <i>n</i> = 44 <i>n</i> = 53	<i>U</i> = 12,865.00, <i>Z</i> = -0.84, <i>p</i> = 0.404
Marital status [number]	<i>n</i> = 30 <i>n</i> = 39 <i>n</i> = 29	<i>n</i> = 82 <i>n</i> = 106 <i>n</i> = 81 <i>n</i> = 7	<i>U</i> = 13,121.00, <i>Z</i> = -0.46, <i>p</i> = 0.642
Household members [number]	Mdn = 2.00 ( <i>Q</i> 1 = 1.00, <i>Q</i> 3 = 3.00)	Mdn = 2.00 ( <i>Q</i> 1 = 1.00, <i>Q</i> 3 = 3.00)	<i>U</i> = 12,105.50, <i>Z</i> = -1.64, <i>p</i> = 0.102
Lifestyle [number]	<i>n</i> = 16 <i>n</i> = 10 <i>n</i> = 14 <i>n</i> = 58	<i>n</i> = 36 <i>n</i> = 23 <i>n</i> = 22 <i>n</i> = 195	<i>U</i> = 12,096.00, <i>Z</i> = -1.88, <i>p</i> = 0.061

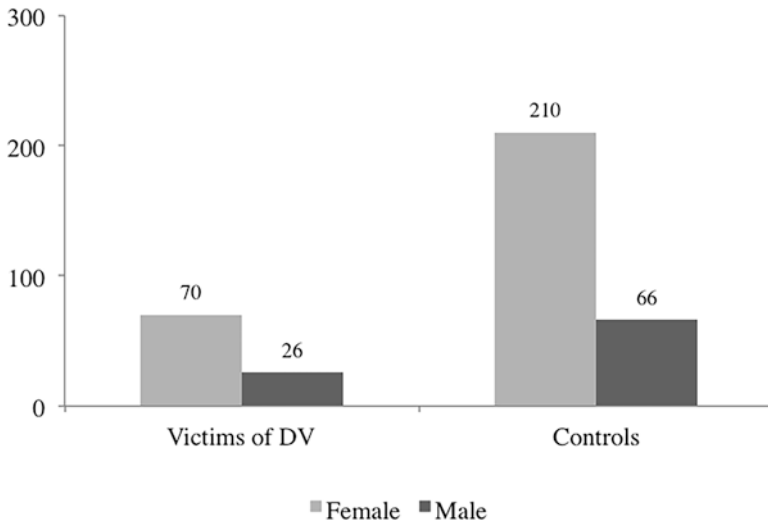
Abbreviations: *DV* domestic violence, *Mdn* median, *n* number, *Q*1 first quartile; *Q*3 third quartile

dependent variable “negative contact quality.” Contact quality was more negative for victims of domestic violence (*Mdn* = -2.00, *Q*1 = -2.50, *Q*3 = -1.50) than for controls (*Mdn* = -1.75, *Q*1 = -2.25, *Q*3 = -1.25; *U* = 9895.00, *Z* = -3.98, *p* < 0.001).

To test whether 2c) victims of domestic violence had lower emotional regulation competence, a Mann-Whitney *U* test was conducted with the dependent variable “SEK-27 subscale regulation.” Emotional regulation competence was lower in victims of domestic violence (*Mdn* = 10.00, *Q*1 = 8.00, *Q*3 = 12.00) than in controls (*Mdn* = 11.00, *Q*1 = 9.00, *Q*3 = 12.00; *U* = 10,834.00, *Z* = -2.64, *p* = 0.008).

To test whether 2d) victims of domestic violence reported more difficulty coping with and tolerating their feelings than control subjects, a Mann-Whitney *U* test was calculated with the dependent variable “SEK-27 subscale resilience.” Victims of domestic violence reported lower resilience scores (*Mdn* = 11.00, *Q*1 = 8.00, *Q*3 = 12.00) than control subjects (*Mdn* = 11.00, *Q*1 = 9.00, *Q*3 = 12.00; *U* = 11,397.50, *Z* = -2.01, *p* = 0.044).

To test whether 2e) victims of domestic violence reported more restraints due to containment measures compared to controls, a Mann-Whitney *U* test was conducted



**Fig. 3.2** Graphic representation of gender distribution among victims of domestic violence (DV) compared to controls (number of cases)

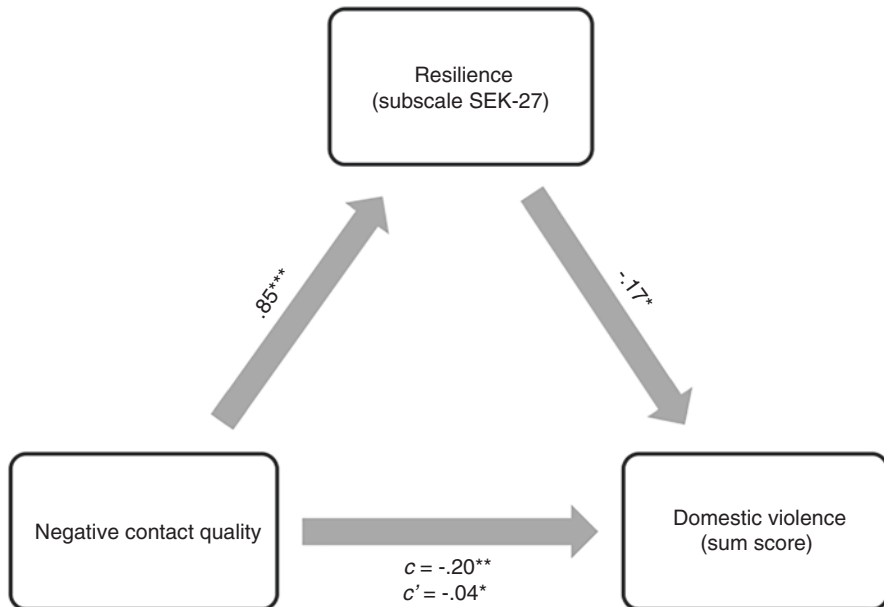
with dependent variable “number of restrictions.” Victims of domestic violence (Mdn = 1.00,  $Q1 = 1.00$ ,  $Q3 = 2.00$ ) did not report significant more restraints than controls (Mdn = 1.00,  $Q1 = 1.00$ ,  $Q3 = 2.00$ ;  $U = 12,496.50$ ,  $Z = -1.21$ ,  $p = 0.227$ ).

To test whether 2f) victims of domestic violence showed lower commitment for the containment measures compared to controls, a Mann-Whitney U test was calculated with dependent variable “commitment score.” Victims of domestic violence (Mdn = 29.00,  $Q1 = 26.00$ ,  $Q3 = 32.00$ ) and controls (Mdn = 30.00,  $Q1 = 27.00$ ,  $Q3 = 33.00$ ) did not differ significantly in commitment ( $U = 11,982.00$ ,  $Z = -1.68$ ,  $p = 0.093$ ).

### 3.4 Mediator Analyses

A simple mediation was performed to analyze whether negative contact quality predicted the presence of domestic violence and whether the direct path was mediated by the resilience score. An effect of negative contact quality on domestic violence was observed ( $B = -0.20$ ,  $p = 0.003$ ). After including the mediator into the model, negative contact quality significantly predicted the mediator ( $B = 0.85$ ,  $p < 0.001$ ), which in turn predicted the presence of domestic violence ( $B = -0.04$ ,  $p = 0.024$ ) (Fig. 3.3). We found that the association between negative contact quality and the presence of domestic violence was partially mediated by the resilience score.

Mediation was also performed to analyze whether negative contact quality predicted the presence of domestic violence and whether the direct path was mediated by emotional regulation competence. An effect of negative contact quality on



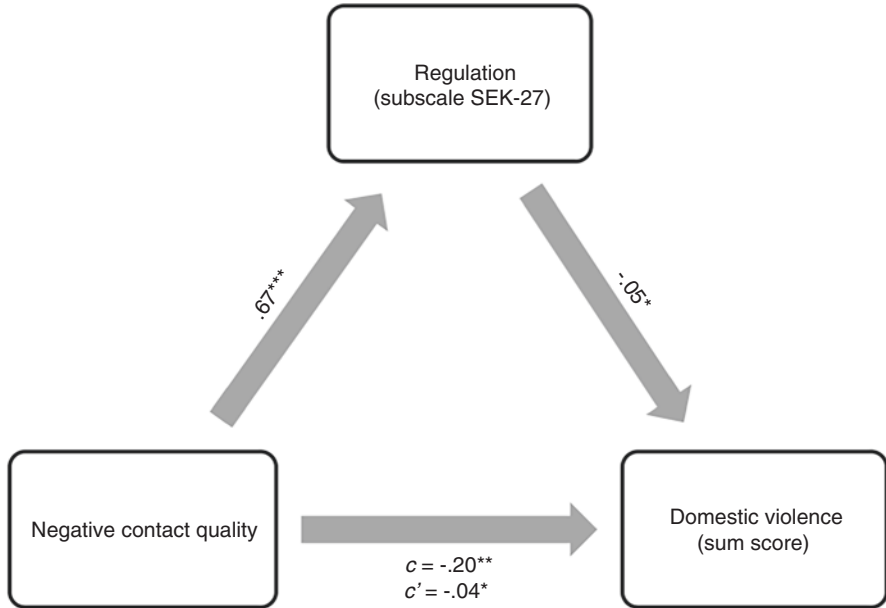
**Fig. 3.3** Relationship between negative contact experiences and incidence of domestic violence, mediated in part by resilience score. \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$

domestic violence was observed ( $B = -0.20$ ,  $p = 0.003$ ). After entering the mediator into the model, negative contact quality significantly predicted the mediator ( $B = 0.67$ ,  $p < 0.001$ ), which in turn predicted the presence of domestic violence ( $B = -0.05$ ,  $p = 0.026$ ; Fig. 3.4). We found that the relationship between negative contact quality and the presence of domestic violence was partially mediated by emotional regulation competence.

## 4 Discussion

In the present study, we examined the impact of COVID-19-associated containment measures on mental health and domestic violence. In our statistical analyses, we examined differences in gender and between victims of domestic violence and non-victims, and we determined the most significant mediating factors in predicting domestic violence.

In terms of gender effects, we were able to show that, at a descriptive level, the number of female victims of domestic violence was significantly higher than that of male victims. This finding is consistent with previous studies reporting a disproportionate gender distribution in this parameter [9, 32]. The gender distribution of domestic violence victims was not significantly different. In our sample, 25% of the women and 28% of the men reported being victims of domestic violence. For women, this value is comparable to that reported by the Center of Disease Control



**Fig. 3.4** Relationship between negative contact experiences and the incidence of domestic violence, partially mediated by emotional regulation competence. \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$

[33]. The value for men was higher than described in earlier studies [33]. No gender differences were found with respect to the incidence of domestic violence. This could be due to the relatively short reference period of the last 2 weeks.

In a second analysis step, the differences between the victims of domestic violence and the control group who did not experience domestic violence were examined. In terms of parenting, families where domestic violence occurred had significantly more children of kindergarten age than families in the control group. This could be explained by the closure of kindergartens as part of the containment efforts, which may have led to more stress at home and increased tension resulting from taking care of children and working from home at the same time [40]. This possibility is consistent with previous studies which reported that increased exposure to external stressors such as changes in parenting responsibilities can increase the risk for domestic violence [48]. Victims of domestic violence reported significantly more negative contact quality (more disturbing, frightening, stressful, and/or upsetting contact experiences) in the past 2 weeks, compared to control subjects. This result could be explained by the fact that quarantine can lead to negative psychological consequences and, in particular, to increased expression of anger [10, 41]. In addition, due to movement restrictions and social contact reduction measures, opportunities to benefit from protective, positive contact experiences were severely limited during lockdown [43, 46]. Rather than being supported by public services and institutions, victims of domestic violence were in constant contact with the perpetrator, which may have influenced their quality of contact [43, 47]. With

respect to the measures used to assess emotional regulation ability, victims of domestic violence reported more problems in the two subscales surveyed than did controls. Victims of domestic violence reported a lower ability to regulate emotions. They also reported more difficulties in coping with and tolerating their feelings.

No differences between victims and controls emerged in terms of constraints imposed by the containment measures or commitment to the measures. On the one hand, it could be that victims of domestic violence were similarly affected by the containment measures as the control subjects and therefore showed a comparable commitment to these. However, it is possible that both groups felt constrained by the interventions and were affected by the consequences, but other factors, such as negative contact characteristics and difficulties in emotion regulation, were more important determinants of one becoming a victim of domestic violence. It is also possible that the presence of domestic violence influences contact quality and this association is mediated by emotional regulation or resilience competencies. Following this interpretation, it is possible that in the presence of domestic violence, trust in social contacts diminishes, making the affected person more insecure, and further worsening the quality of contact.

Victims of domestic violence have been described as being at an increased risk for various mental health conditions [24, 25, 36]. It is possible that these difficulties in emotion regulation are associated in part with mental illness [65]. Nevertheless, the mechanisms by which domestic violence leads to mental illness are poorly understood. One underlying physiological mechanism that may contribute to stress-related disorders is the possibility of dysfunctions in the HPA axis, which produces the hormone cortisol [37, 66, 67]. The levels of cortisol rise as a natural response to acute stress, helping the organism to cope with homeostatic challenges by adjusting metabolic and cognitive functions and stimulating the “fight or flight” response [68, 69]. Most studies on this have demonstrated that there is a statistically significant relationship between cortisol levels and the experience of violence [69]. As a means of predicting or monitoring the stress response, measurements of salivary cortisol have been successfully used in epidemiological studies as a biological marker of HPA axis activity [70, 71], including females who have experienced domestic violence [72]. In addition, inflammation-related molecules such as C-reactive protein (CRP) have been used as an acute immune activation biomarker, providing a potential link between the experience of domestic violence and poor mental and/or physical health outcomes [73].

Some limitations must be considered when interpreting the present results. First, as we conducted a cross-sectional survey, no long-term data or pre-post comparisons were available. Therefore, it is not possible to draw a conclusion about any increase in the number of domestic violence cases due to the COVID-19 pandemic and related containment efforts. However, there are several studies that did report a substantial increase due to the pandemic, including a tripling effect described in Jianli (Hubei Province, China) [54–56] and a 30% increase recorded in France [57]. Second, considering the cross-sectional design, it was not possible to make conclusions on the direction of the relationship between the three factors: negative contact quality, emotional regulation, and domestic violence. A third limitation relates to

the fact that the start of the online survey occurred at a time when a gradual relaxation of restrictions had already begun in Germany. It would have been important to have also examined the impact of the measurements on mental health and domestic violence in March and during the first half of April, 2020. Fourth, there was a relative imbalance between the larger number of individuals who were not victims of domestic violence compared to the smaller number of domestic violence, which have affected the statistical analysis victims. In addition, all data were based on participant self-reports. However, we did use quality indicators, such as attributing minus points for extremely rapid completion and negative responses to the question about whether participants provided sensible and reliable responses. With regard to domestic violence, a caveat was that we did not have the opportunity to use a standardized questionnaire and therefore did not have normative data. In addition, for test economy reasons, we only collected information on victims of domestic violence and not on perpetrators, which would be of interest for further studies.

## 5 Conclusions and Future Perspectives

In conclusion, there is still much to be explored about the COVID-19 pandemic and the impact it has and will have on mental health, domestic violence, and our society in general. The psychological effects of the lockdowns are far-reaching and can be long-lasting [10]. The effects of the pandemic have also demonstrated that there is an urgent need for more empirical data on domestic violence in the (post)lockdown phases as well as on the long-term effects of domestic violence. It would be of interest to collect biological risk indicators such as salivary cortisol (e.g., diurnal cortisol slope, cortisol awakening response, mean cortisol concentration) and circulating CRP measurements to understand the pathophysiological mechanisms of violence-associated mental disorders and to inform researchers and practitioners about the possibility of using these as risk factors or for diagnosis, prognosis, and treatment [74]. These analytes and other stress-related biomarkers can be measured in parallel using multiplex immunoassay platforms to add further insights into the pathways affected [75–77]. Also, the assays could be translated to user-friendly lab-on-a-chip devices which would allow point-of-care testing [78–80]. In addition, there is a strong need for domestic violence prevention programs. Support networks for victims of domestic violence should be expanded in perspective, and the use of digital technologies, e.g., for remote detection of behavioral changes and tele-counseling [81, 82], should be pushed.

**Ethics Approval and Consent** Approval was obtained from the ethics committee of Otto von Guericke University Magdeburg. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

**Conflict of Interest** The authors have no competing interests to declare that are relevant to the content of this article.

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