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Coping using sex during the coronavirus disease 2019 (COVID-19) outbreak in the UK

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Abstract

Background: The use of sex to cope with negative affective states during the coronavirus disease 2019 (COVID-19) pandemic may be influenced by various socio-demographic and psychological characteristics.

Aim: We aimed to examine the effects of social distancing, loneliness, difficulties in emotion regulation, and self-regulation on participants self-reported coping using sex during lockdown in the UK.

Methods: Participants had to be residents of the UK, aged between 18 – 60 years, fluent in English, and had to have an internet connection. Participants were instructed not to participate if they had consumed alcohol in the previous 24 hours. A total of 789 participants aged 18-59 completed an online survey. Participants completed self-report measures of social distancing, loneliness, and difficulties in emotion regulation. A Go/No-Go task was used to assess self-regulation.

Outcomes: Participants self-reported their use of sex to cope over a 14-day period during lockdown, as well as retrospectively for a 14-day period immediately preceding lockdown. Coping using sex items included consensual and non-consensual themes.

Results: Overall, there was no increase in coping using sex during compared with before lockdown. Findings showed that 30% of participants reported increased coping using sex during lockdown compared with before, 29% reported decreased coping using sex, and 41% reported no change. All regression models included age, gender, ethnicity, diagnosis of psychiatric condition, level of education, being at high-risk for difficulties relating to COVID-19, living alone, and diagnosed or suspected COVID-19 as covariates. Being younger, being male, and greater emotion dysregulation were associated with higher coping using sex total and consent subscale scores during lockdown. Being younger, being male, not

living alone, and less adherence to social distancing advice was associated with coping using sex with a theme of rape/violence during lockdown.

Clinical Translation: A proportion of participants used sex to cope more often during lockdown compared with before. Less adherence to social distancing advice and emotion dysregulation were associated with using sex to cope during lockdown.

Strengths and Limitations: Strengths of this study were the large sample size and inclusion of key socio-demographic characteristics as covariates. The main limitations were the cross-sectional design and a sample that was mostly white, educated, and female.

Conclusion: Participants who had difficulty regulating emotions were more likely to use sex to cope. It is important that support is available for people who have problems regulating their emotions during the pandemic and that they have access to appropriate help and advice.

Keywords: COVID-19; social distancing; coping, sex; emotion regulation; self-regulation; loneliness

Coping using sex during the coronavirus disease 2019 (COVID-19) outbreak in the UK

The coronavirus disease 2019 (COVID-19) outbreak presents a variety of economic, psychosocial, and health related stressors that are likely to have a considerable impact on mental health and well-being for some individuals^{1,2}. The rapid spread of COVID-19 has led to the introduction of social distancing measures in countries all over the world in an effort to reduce the spread of infection. However, these measures are also expected to have short- and long-term adverse consequences for mental health and well-being³, and it is likely that some people will use problematic coping behaviors⁴. In the present study, we investigated the prevalence and correlates of coping using sex during COVID-19 lockdown in the UK.

A review of the evidence on the psychological impact of quarantine, undertaken in response to the COVID-19 outbreak, highlighted a variety of negative impacts observed following quarantines for severe acute respiratory syndrome, Ebola, and H1N1 influenza⁵. Examining responses to past traumatic, environmental, and natural disasters suggests that the negative consequences of COVID-19 might include higher prevalence of substance use disorder, domestic violence, and child abuse⁶, as well as overeating⁷. Ways of coping with isolation during the period of social distancing are likely to include both health harming (e.g., alcohol use, substance use) and health protective (e.g., exercise) behaviours⁷. This is consistent with the Threat Appraisal and Coping Theory⁸, according to which adaptive and maladaptive coping strategies should be considered as a response to cognitive appraisals of a situation or condition. Coping is defined as the person's cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as stressful or exceeding the person's resources⁸. The evaluation of a coping strategy is tied to its adaptive or maladaptive effect on one's well-being in the short- and/or long-term. Adaptive coping involves behaviors that are linked with positive outcomes; for example, exercise, good sleep

hygiene, and social support seeking⁹⁻¹⁴. In contrast, maladaptive coping behaviors are associated with negative outcomes; for example, binge eating, self-injurious behaviour and problem gambling^{15, 16}. A different strategy to cope with negative situations that has not been studied in the context of COVID-19 is the use of sex to cope, including increased pornography consumption, risky and unlawful sexual behaviours.

An increase in consensual sexual activity during prolonged periods at home with a romantic partner may not be unexpected. However, an increase in sexual fantasising, viewing pornography, masturbation, and engaging in sexual acts with others to cope with difficult, stressful, or challenging situations may be associated with adverse outcomes, including more risky sexual behaviours^{17, 18}, and feelings of anxiety, shame, guilt and loneliness¹⁹. Although a link between sex and coping during COVID-19 has not been examined, statistics have shown dramatically increased traffic to Pornhub and other major providers of Internet pornography during the COVID-19 crisis²⁰. This evidence lends support to the hypothesis that for many people, pornography may represent a means to cope with the restrictions imposed by the lockdown measures. Although descriptive, these statistics are consistent with research showing that online pornography can be used as a way to cope with life stressors, including money stress, family stress, and work stress²¹.

Beyond the use of pornography, considerable variation has been reported in the extent to which people experience sexual interest or sexual response during negative affective states²². Negative mood states are typically associated with decreased sexual interest and arousal, yet a proportion of heterosexual male participants have reported increased sexual interest when experiencing negative affect²³. Of those indicating depressed mood, 9.4% reported increased and 42% reported decreased sexual interest when depressed; for anxiety/stress, the percentages were 20.6 and 28.3%, respectively²³. Similar results have also been reported in a sample of female college students, and it was shown that, in general, sexual interest during

negative mood was more commonly reported by male compared with female respondents ²⁴. Qualitative findings indicate that sex when depressed can serve needs for intimacy and self-validation, while sex when anxious appears to be more simply related to the calming effect of sexual release ²³.

In relation to COVID-19 in particular, findings from China ²⁵, and in three South East Asian countries ²⁶, show tentative support for the hypothesis that while most participants might show either reduced or similar levels of sexual behaviors during the pandemic, a small proportion of participants will report more frequent sex. When considering that the COVID-19 pandemic and associated lockdown measures could contribute to changes in negative affect, it is perhaps unsurprising that some people will resort to problematic ways of coping, including using sex to cope, during the period of lockdown.

Other reports have similarly observed a relationship between negative emotions and sex among people who have sexually offended ²⁷. Cortoni and Marshall ²⁸ showed that sexual preoccupation was linked with use of sex to cope, and that consensual and non-consensual coping using sex was associated with feelings of loneliness and intimacy deficits in adults who had sexually offended. Other studies have shown that both sexual offenders with adult and child victims engage in offense-related fantasies to cope with negative emotions ^{29, 30}. As well as negative emotions, some reports have also highlighted feelings of loneliness as a risk factor for sexual offence recidivism ³¹, although this evidence remains tentative and inconsistently supported ³². The role of loneliness may be especially important as it relates to the COVID-19 pandemic, given that limited social contacts due to mobility restrictions could ostensibly trigger feelings of loneliness.

It has been proposed that the use of sex as a means to cope with negative affective states may reflect impairments in general self-regulation and emotion regulation in particular ^{33, 34}. Emotion regulation refers to the process by which individuals use a range of strategies

to exert control over which emotions they experience and when they experience them ³⁵, and includes the ability to engage in goal-directed behaviour and refrain from impulsive actions when distressed ³⁶. There is evidence that difficulties in cognitive reappraisal, that is, in using cognitive resources to construct an emotion eliciting situation in such a way that the emotional impact of the situation is altered, are associated with problems in regulating sexual response ^{37,38}. It has also been shown that difficulties in emotion regulation represent ‘psychologically meaningful’ risk-factors for sexual offending ³². Emotion regulation also plays an important role in the offence process for sexual offenders ^{39,40}, and difficulties in emotion regulation have been identified in men who engage in sexually coercive behaviors ⁴¹⁻⁴⁵.

The current study aimed to examine the use of consenting and non-consenting sex as a means to cope in a UK sample of men and women. We recruited participants online during government enforced lockdown and asked them to report on their use of sex as a means to cope over the last 14 days, and retrospectively over the 14-day period that preceded the introduction of government enforced lockdown. We examined changes in self-reported use of sex as a means to cope following the introduction of strict social distancing measures, and the ways in which physically distancing oneself from people outside of the household, perceived feelings of loneliness, self-regulation and difficulties in emotion regulation were associated with current levels of coping using sex.

Given that sexual coping is not recognised as an adaptive response to negative feelings, and only a small proportion of participants report an increase in sexual interest and response while experiencing low or anxious mood, we did not predict an overall increase in coping using sex during government enforced lockdown in the UK. We predicted that self-reported coping using sex during the period of lockdown in the UK, for both consensual and non-consensual acts, would be associated with increased reports of social distancing and

loneliness, and with more difficulties in self-regulation and emotion regulation. We also examined a series of two-way interactions with social distancing as it was predicted that participants who reported greater social distancing coupled with either feelings of loneliness, difficulties in emotion regulation, or poor self-regulation would show the highest coping using sex scores.

Methods

Participants

Social distancing and lockdown were officially ordered by the UK Government on 23rd March 2020. Participants were recruited via Prolific Academic on 19/04/2020 – 21/04/2020. Prolific Academic provides a platform for conducting paid research ⁴⁶. Participants recruited via Prolific Academic have been found to produce high quality data from a more diverse population than similar recruiting tools (e.g. MTurk, CrowdFlower) ⁴⁶. In order to participate, individuals had to be aged between 18 – 60 years, a resident of the UK at the time, spoke fluent English and had an internet connection. Participants were instructed not to participate if they had consumed alcohol in the previous 24 hours or if sensitive questions about sexual behaviour, or health protective or health harming behaviors were likely to cause distress. Nine-hundred and seven participants accessed the survey. After removal of nine potential duplicate responses, and 109 individuals who failed one or both manipulation checks or did not reach the end of the study, the remaining 789 participants had a mean age of 30.56 (\pm 9.59; range 18 - 59). Most participants were female ($N = 522/ 66.2\%$: male = 257/32.6%, non-binary = 5/0.6%, preferred not to disclose or missing = 5/0.6%). The research was approved by the University of Liverpool, UK, Committee for Ethical Review (Ref: 7635).

Measures

Social Distancing⁴⁷. We modified a social distancing questionnaire that was designed in the context of COVID-19 to assess the extent to which participants were observing social distancing advice⁴⁷. Participants were asked in the previous two weeks how much time they had spent with friends, immediate family, colleagues and usual social network in person, with the anchors 1 (not at all) to 5 (very often). The original scale, which was designed for use with adolescents, was modified for use with adults by replacing an item that asked about “time spent with others (e.g., teachers or neighbours)” with an item that asked about “time spent with others (e.g., colleagues or neighbours).” Items were reverse scored so greater scores indicated increased social distancing. They were also asked about their social media use to connect / play games with friends and family, individuals/groups outside of their usual contacts using the same anchors. Four items for social distancing ($N = 789$; $\omega = .638$) were included in the current analyses, and an additional four items asked about social media use ($N = 789$; $\omega = .735$).

UCLA Loneliness scale⁴⁸. The UCLA loneliness scale is a 20-item Likert scale which measures subjective feelings of loneliness and social isolation (e.g., ‘I lack companionship’), with the anchors ‘I often feel this way’, ‘I sometimes feel this way’, ‘I rarely feel this way’, ‘I never feel this way’. Participants were asked to think about the ‘last two weeks’ when responding. A total score for loneliness is used by summing the scores from each question. Evidence suggests the scale has good psychometric properties⁴⁸. The internal consistency in this data set was excellent ($N = 789$; $\omega = .952$)

Coping Using Sex Inventory (CUSI)²⁸. Participants completed the 16-item CUSI, which provides a series of scenarios and asks participants to indicate using a Likert scale from 1 (not at all) to 5 (very often) how often they engaged in these behaviors. The inventory consists of three subscales, asking about sexual thoughts and behaviors with themes of consent, rape, and child sexual abuse. The scale also yields an overall score, with higher

scores indicating more frequent use of sex to cope. An example of a consensual item is *'I have fantasized about having sex with a consenting adult,'* while an example of a rape item is *'I have forced my regular partner to have sex.'* Two versions of each scenario were asked: (1) in the two weeks before lockdown was introduced by the UK government, and (2) in the last two weeks. Although reports for the last two weeks were used here to understand predictors of coping using sex during COVID-19, retrospective reports were used to estimate the proportion of participants who reported increased or decreased coping using sex. The scale had good internal consistency for both scenarios (before lockdown $N = 760$; $\omega = .803$; two previous weeks $\omega = .698$)

Difficulties in Emotion Regulation Scale 16-item version (DERS-16) ⁴⁹. The DERS-16 is a 16 item Likert scale focusing on behaviour over the previous two weeks (e.g., *'When I have been upset in the past two weeks, I have become out of control.'*), with anchors ranging from 1 (almost never) to 5 (almost always). It captures emotion regulation difficulties across the following domains: difficulties engaging in goal directed behavior when distressed, impulse control difficulties when distressed, limited use of effective emotion regulation strategies, and limited awareness, clarity, and acceptance of emotions. A review of studies using the original Difficulties in Emotion Regulation Scale and its derivatives has shown that the different DERS subscales have limited discriminant validity, likely reflecting general emotion dysregulation ⁵⁰. Hence, the present study relied on the DERS-16 total score. The internal consistency was excellent ($N = 789$; $\omega = .961$).

Worries about COVID19 Questionnaire. Participants were asked to rate on a novel scale how strongly they agree that they were worried about i) catching COVID-19, and ii) they might lose their job due to the COVID-19 crisis (strongly disagree, disagree, unsure, agree, strongly agree). Participants were also asked to rate how worried they were about their i) overall health, ii) financial security and iii) food access compared to before the COVID-19

crisis (a lot more worried, more worried, no more or no less worried, less worried, a lot less worried). Scores were summed across the five items. Each item had a maximum possible score of five. The internal consistency was good ($N = 789$; $\omega = .653$).

Go/No-Go task ⁵¹. Participants completed a Go/No-Go task to assess general self-regulation skills. Specifically, the Go/No-Go task was used to assess participants' behavioral ability to withhold a prepotent motor response. Although general self-regulation and emotion regulation share functional overlaps, these constructs are nonetheless etiologically and biologically distinguishable, and are differentially associated with psychopathology ⁵². Thus, the Go/No-Go task was used to measure a function that is separable to that measured by the DERS-16, supported by the finding that cognitive and behavioural measures of self-regulation are weakly correlated and provide unique information ⁵³. Each trial began with a fixation cross ('+') presented in the centre of the screen for 50 ms followed by a blank screen for 150 ms. Following this, a shape (circle or square) appeared in a random spatial location on the screen for 1000 ms or until a response was made. On 'Go trials' participants were required to press SPACE in response to the shape as quickly as possible, on 'No-Go' trials participants were required to withhold their response to the shape. Feedback was provided if participants made an omission error ('You should have pressed!'), commission error ('You should not have pressed!'), or if their reaction times on go trials was > 600 ms ('Try to be faster!').

There were five experimental blocks each containing 50 trials (40 Go + 10 No-Go) and one practice block of 10 trials (8 Go + 2 No Go: not analysed). The mapping of Go and No-Go stimuli was presented at the beginning of each block. In the first three experimental blocks, a circle was the Go response (square = No-Go). On the fourth block the rules changed, and the square signalled a Go response (circle = No-Go), which remained for the final block. The shift in rules increases the variability in commission errors and allows for the

detection of set-shifting costs^{54, 55}, referring to an increase in error rates for blocks where the Go and No-Go stimuli are reversed. For the Go/No-Go task we calculated the total number of commission errors across the five experimental blocks (Max = 50 errors), and the median Go trial reaction time. A greater number of commission errors is indicative of a reduced ability to withhold a prepotent response (i.e., poorer general self-regulation abilities). The intra-class correlation coefficients on a block-by-block basis for the commission errors was acceptable = .824 (95% CI .802 – 843). The task took approximately four minutes to complete.

Procedure

All measures and the main analyses were preregistered using AsPredicted (#39502), an online platform that allows the authors to pre-register hypotheses, procedures, and planned analyses, and to separate these from exploratory tests, on 19 April 2020. Upon signing up to the study, participants were presented with a landing page discussing the sensitive nature of some of the questionnaires, before reading the information sheet and providing consent. They then completed a series of demographic questions. The survey also included items looking at changes in health behaviours and mental health during lockdown that are reported in a separate manuscript⁷. All additional measures are reported in Supplementary Material One for. Following this, participants completed the Social Distancing questionnaire, UCLA Loneliness scale, CUSI, DERS-16, and COVID-19 questionnaire. Finally, participants completed the Go/No-Go task. Participants were asked attention checks ('Have you ever been to Mars / Jupiter', select 'Strongly Disagree') within the questionnaire battery and immediately prior to the Go/No-Go task. The study took approximately 20 minutes to complete. Participants were paid in line with Prolific Academic fair pay recommendations for the time taken to complete the survey.

Data reduction and analyses

First, we tested the interrelationships between all variable using Spearman's rank correlations. We created binary variables for ethnicity (white – other), psychiatric diagnosis (present – absent), education (educated to degree level and above – not educated to degree level), being in a high risk group for difficulties resulting from COVID-19 (e.g., presence of diabetes) (present – absent), and living status (alone – with others). To examine whether participant characteristics were associated with variability in coping using sex, we used CUSI total and consent subscale scores over the last 14 days as dimensional outcome variables in multiple linear regressions. Because scores on the rape subscale of the CUSI were highly positively skewed (towards zero), we used logistic regression to predict membership based on a binary variable (0 = endorsed none of the rape items, 1 = endorsed at least one rape item). Scores on the CUSI child subscale were also heavily skewed toward zero, with only 1% of participants endorsing at least one of the items. As such, this variable was not used as an outcome measure.

Some minor changes were made to the covariates included in the pre-registered regression models. These are detailed in Supplementary Material Two. In the first step of each regression model, we included participant socio-demographic characteristics (gender, age, ethnicity, highest education level, living status, COVID-19 high-risk health group, and previous diagnosis of psychiatric illness), as covariates. In the second step of each model, we included the extent to which participants had socially distanced themselves physically from others, loneliness, difficulties in emotion regulation, and number of Go/No-Go errors, to explore whether these variables explained any incremental variance in the outcome measures. In the third step of each model, we included the two-way interactions of physical social distancing with (i) loneliness, (ii) difficulties in emotion regulation, and (iii) number of Go/No-Go errors, to explore whether the effects of social distancing were moderated by loneliness, emotion regulation, or general self-regulation abilities. In a series of exploratory

tests (not pre-registered using AsPredicted), we used Generalized Linear Models to examine if the observed effects of social distancing, loneliness, emotion dysregulation and self-regulation on coping using sex were moderated by gender. The pattern of results observed in these analyses is briefly commented on in this manuscript with a fuller description of results contained in Supplementary Material Three. To examine whether worries about COVID-19 accounted for any incremental variance in the outcome measures, we computed exploratory follow-up analyses with the whole sample including worries about COVID-19 scores in the third step of each regression model. Analyses were carried out in jamovi ⁵⁶, running in the R environment ⁵⁷.

For logistic regression, model fit was assessed using Deviance, Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC), with lower values of each representing a better fitting model. Missing data on any of the questionnaires led to those cases being removed list-wise.

Results

Participant demographics

Table 1 shows the minimum and maximum score, mean, standard deviation and median score on each of the key variables. Scores indicated that participants, on average, engaged in high levels of physical social distancing. Coping using sex scores during COVID-19 were minimal for the two non-consensual subscales, with median scores on the rape and child subscales equivalent to the minimum score possible.

Differences between completers vs. non completers / attention check failures

There were no statistically significant differences in the age of completers vs non-completers (Welch's $t(116.18) = 0.63, p = .529$), CUSI total score (Welch's $t(63.96) = 1.44, p = .156$), social distance score (Welch's $t(77.14) = 1.57, p = .120$) or total No-Go errors (Welch's $t(58.69) = 0.75, p = .458$).

Differences in coping using sex

Figure 1 shows that there was no overall increase in coping using sex during COVID-19, comparing retrospective reports for the two weeks immediately preceding government enforced lockdown in the UK with reports for 14 days during lockdown $t(752) = .38, p = .707$. Overall, 30% of participants ($n = 223$) reported increased coping using sex during lockdown compared with before, 29% ($n = 222$) reported decreased coping using sex, and 41% ($n = 308$) reported no change.

Correlations between measures

Participants who reported more social distancing reported less coping using sex (total, consent) over the last 14 days, and were less likely to endorse a rape item. However, the converse was observed for loneliness and difficulties in emotion regulation, with higher scores associated with greater coping using sex over the last 14 days (CUSI total, CUSI consent), and greater likelihood of endorsing a rape item. Participants who made more errors on the Go/No-Go task also reported feeling lonelier and experiencing more difficulties in emotion regulation. Similarly, participants who were more worried about COVID-19 also reported feeling lonelier and experiencing greater difficulties in emotion regulation. See Table 2.

Coping using sex total

For coping using sex total score, the first step accounted for 21% of the total variance ($Adj. R^2 = .21, F(8, 730) = 25.54, p < .001$). As indicated in Table 3, being younger and being male were associated with reporting increased coping using sex. After the second step was added, the overall model accounted for 22% of the total variance and was associated with a significant F change ($Adj. R^2 = .22, F \text{ change } (4, 726) = 4.03, p = .003$). Greater difficulties in emotion regulation were associated with greater coping using sex. The effects of being younger and being male remained significant. The addition of the two-way interactions of

physical social distancing with (i) loneliness, (ii) difficulties in emotion regulation, and (iii) Go/No-Go errors did not significantly improve the model ($Adj. R^2 = .22$, F change (3, 723) = 1.07, $p = .361$). Variance inflation factors (VIFs) suggested no problems with multicollinearity for step one ($1 < VIF < 1.1$) or step two ($1 < VIF < 2.1$). In an exploratory analysis, we replaced the two-way interactions of social distancing in the third step with worries relating to COVID-19. This step did not significantly improve the overall model ($Adj. R^2 = .22$, F change (1, 715) = 0.71, $p = .399$).

A series of generalized linear models that included the two-way interactions of gender with social distancing, loneliness, difficulties in emotion regulation and Go/No-Go errors revealed a significant interaction of loneliness with gender, with higher loneliness scores associated with greater coping using sex in men but not women (see Supplementary Material Three).

Coping using sex consent subscale

For scores on the consent subscale, the first step of the model accounted for 21% of the total variance ($Adj. R^2 = .21$, $F(8, 748) = 25.99$, $p < .001$). As indicated in Table 4, being younger, being male, and being white were associated with higher scores on the consent subscale. After the second step was added, the overall model accounted for 22% of the total variance and was a better fit to the data compared to the first model ($Adj. R^2 = .22$, F change (4, 744) = 2.46, $p = .044$). Greater difficulties in emotion regulation were associated with higher scores on the consent subscale. The effects of being younger and being male remained significant from the first model. The effect of ethnicity was no longer significant. The addition of the two-way interactions of physical social distancing with (i) loneliness, (ii) difficulties in emotion regulation, and (iii) Go/No-Go errors did not significantly improve the model ($Adj. R^2 = .22$, F change (3, 741) = 1.08, $p = .358$). VIFs suggested no problems with multicollinearity for model 1 ($1 < VIF < 1.1$) or model 2 ($1 < VIF < 2.1$). In an exploratory

analysis, we replaced the two-way interactions of social distancing in the third step with worries relating to COVID-19. This step did not significantly improve the overall model (*Adj. R*² = .21, *F* change (1, 733) = 0.78, *p* = .377).

A series of generalized linear models that included the two-way interactions of gender with social distancing, loneliness, difficulties in emotion regulation and Go/No-Go errors again revealed a significant interaction of loneliness with gender, with higher loneliness scores associated with greater coping using sex in men but not women (see Supplementary Material Three).

Coping using sex rape/violence subscale

Logistic regression was used to predict endorsement of items related to rape or violence. Overall, 92 participants (12%) endorsed at least one item on the rape subscale. Model fit and model comparison values are shown in Table 5. The Chi-square likelihood ratio test suggested that the model was a good fit of the data. Being younger and being male were associated with having endorsed at least one item on the rape subscale (Table 6). Adding the second step to the model led to a better fit to the data compared with the first step only, with lower values for Deviance and AIC, and a higher Nagelkerke *R*² value. Engaging in less social distancing predicted having endorsed at least one rape item. Being younger and being male remained significant predictors, and not living alone also predicted endorsing at least one item. The addition of the two-way interactions of physical social distancing with (i) loneliness, (ii) difficulties in emotion regulation, and (iii) Go/No-Go errors resulted in a poorer fitting model, with higher AIC and BIC values, and a non-significant Chi-square comparison with the second model. VIFs suggested no problems with multicollinearity for model 1 ($0.9 < \text{VIF} < 1.2$) or model 2 ($1 < \text{VIF} < 2.1$). In an exploratory analysis, we replaced the two-way interactions of social distancing in the third step with worries relating to

COVID-19. This step resulted in a poorer fitting model, with higher AIC and BIC values, and a non-significant Chi-square comparison with the second model.

A series of generalized linear models that included the two-way interactions of gender with social distancing, loneliness, difficulties in emotion regulation and Go/No-Go errors revealed a significant interaction of loneliness with gender, and a significant interaction of difficulties in emotion regulation with gender. Simple effects analyses showed that higher loneliness scores were associated with a greater likelihood of endorsing one or more items on the rape/violence subscale in men but not women, while higher difficulties in emotion regulation scores were associated with a greater likelihood of endorsing one or more items on the rape/violence subscale in women, but not men (see Supplementary Material Three).

Discussion

In this study, we examined the associations of physical social distancing, loneliness, difficulties in emotion regulation, and general self-regulation with the tendency to cope using sex during difficult or challenging situations over a 14-day period during lockdown in the UK. Our findings showed that, overall, there was no significant change in mean levels of coping using sex during lockdown compared to retrospective reports relating to the 14-day period immediately preceding lockdown. For 30% of participants, using sex to cope increased during lockdown compared with before, but for a similar proportion of participants, using sex to cope decreased. The observation of similar numbers of participants increasing and decreasing their frequency of sexual behaviors would be expected over the course of 28 days irrespective of COVID-19 lockdown.

Zero-order correlations showed that participants who reported being lonelier, experiencing greater difficulties in emotion regulation, and who adhered less to physical social distancing advice reported higher coping using sex scores. When looking at predictors of coping using sex during lockdown, we showed that being male, being younger, and

experiencing more difficulties in emotion regulation were associated with higher total reports of coping using sex. The same pattern occurred for the subscale assessing consensual coping using sex. Although social distancing was associated with overall levels of coping using sex, as well as with consensual coping using sex, these associations were no longer significant in the regression analyses. A small proportion of participants reported coping using sex around themes of rape or violence (12%) over the 14-day period during lockdown and these data were strongly positively skewed (toward zero). However, we nonetheless found that participants who reported less social distancing, and those who reported being male, being younger, and not living alone, were more likely to have endorsed at least one rape item on the CUSI. Overall, the effect sizes reported were small and we would urge some caution around over-interpretation of results.

Our findings support earlier research by showing that sexual interest during negative mood (as measured by the CUSI) was more commonly reported by male compared with female respondents²⁴. Although the underlying reasons for why some people experience increased sexual interest during negative affect are unclear, it has been reported that sex may serve needs for intimacy and self-validation, and that feelings of sexual release may have a calming effect²³. Across both female and male respondents, participants in this study who reported greater coping using sex also experienced more difficulties in emotion regulation. Our findings are consistent with earlier work showing that difficulties in cognitive reappraisal of emotion, that is, in restructuring the emotional experience in such a way that the emotional impact is altered, were associated with problems in regulating sexual response^{37, 38}. Further, our exploratory analyses examining gender interactions, presented in Supplementary Material Three, revealed that loneliness was associated with greater coping using sex (overall and for the consent subscale) only in men, tentatively suggesting that, when feeling lonely, men and

women resort to different coping strategies, and that coping using sex is motivated by loneliness in men more so than in women.

In order to deal with the potential adverse mental health effects of COVID-19, immediate actions that have been identified include improved monitoring and reporting of mental health and determining the efficacy of mechanistically based digital and non-digital interventions ⁵⁸. In line with these recommendations, participants who experience difficulties in emotion regulation may be encouraged to engage with online or offline mindfulness practice, which is associated with benefits in regulating negative affective states ^{39,40}. As highlighted by others, a priority for COVID-19 research should be to establish the benefits of different online interventions for improving mental health and resilience ⁵⁸. A limitation of the results reported here is that it remains unclear whether or not coping using sex when experiencing negative mood was associated with any adverse outcomes. Future research should seek to examine this possibility, especially when considering that coping using sex was reported more often among people who were experiencing more difficulties in emotion regulation.

For the rape/violence subscale, being male, being younger, and not living alone predicted having endorsed items related to rape/violence. Participants who engaged in fewer physical social distancing behaviors were more likely to have endorsed items relating to rape/violence. Even though emotion dysregulation was associated with endorsement of rape items at the zero-order level, this association was no longer significant in the multiple regression analyses. The finding that less social distancing predicted endorsement of rape items could indicate that these participants were more likely to cross social boundaries and defy social norms more generally. Indeed, recent findings show that empathy represents a basic prosocial motivation for engaging in social distancing during COVID-19 ⁵⁹. This interpretation is also supported by findings that antisociality is associated with aggressive

sexual fantasy and sexual coercion against women⁶⁰, and represents a psychologically meaningful risk factor for sexual offending³². In addition, our exploratory analyses, presented in Supplementary Material Three, suggested that predictors of having endorsed at least one rape item on the CUSI may differ across gender. In particular, we showed that men who feel lonely, and women who reported difficulties in emotion regulation, were more likely to endorse rape items, but not the other way around. This may indicate that rape fantasies or behaviors could have different motivations in men and women. The extent to which these findings are specific to pandemic conditions is difficult to ascertain. Earlier research has shown that rates of intimate partner violence increased during emergencies and natural disasters, including hurricanes, floods, and oil spills⁶¹. A similar increase has emerged during the period of lockdown to prevent the spread of COVID-19 infections^{62,63}. It is possible that similar motivations that may underpin increased coping using sex with a theme of rape/violence among men (e.g., loneliness) also contribute to higher rates of intimate partner violence, including sexual violence. Future research should seek to explore this possibility.

In contrast to our hypotheses, for the total score and the subscale scores of the CUSI, none of the effects of social distancing were moderated by feelings of loneliness or difficulties in self- or emotion regulation. Worries about COVID-19 were also unrelated to CUSI total or consent subscale scores, suggesting that any effects of adhering (or not) to social distancing regulations are independent of experienced feelings of loneliness or emotion regulation.

Although our findings are revealing about some of the correlates of coping using sex in a period of lockdown to prevent the spread of COVID-19, they are subject to limitations. First, participants only completed measures at one timepoint during lockdown, and data corresponding to a 14-day period immediately preceding the introduction of lockdown was

based on retrospective accounts. As such, data for this period may lack some degree of accuracy and make comparisons of CUSI scores for before and during lockdown more difficult. Similarly, our cross-sectional design also means that causal relations of physical social distancing and difficulties in emotion regulation with coping using sex cannot be established. Second, most participants were female (66.2%), white (80%), and educated to degree levels or higher (65%), and as such our sample is not overly representative of the general population of the UK. Third, although 12% of participants endorsed at least one item related to rape/violence, the extent to which these scores are a true reflection of participants' coping use sex is difficult to estimate. Although participants were ensured of their anonymity, some may have experienced fear of reprisal for responding positively to non-consensual items.

Conclusions. Overall, our findings suggest that difficulties in emotion regulation increase the likelihood of using sex to cope with a consensual theme, while less adherence to social distancing was associated with using sex to cope with a theme of rape/violence. A series of exploratory analyses provide some support for gender differences in the factors associated with coping using sex. For example, loneliness was consistently associated with greater coping using sex (total, consent subscale, rape/violence subscale) in men but not women. Conversely, greater difficulties in emotion regulation were associated with greater likelihood of endorsing items related to rape/violence in women, but not men. Our main findings are generally in-line with the pattern of results that would be expected outside of the COVID-19 pandemic. However, with concerns expressed by charitable and law enforcement agencies that lockdown represents a period of increased risk for vulnerable women and children, both in the home and online⁶⁴, it is important that people who are concerned about their sexual thoughts and behaviors can seek appropriate support. Coping using sex, including excessive pornography use, may also be associated with adverse consequences in

the long term^{19, 65}. As such, it is important that the long-term effects of coping using sex during the COVID-19 pandemic are investigated and understood.

References

- [1] Druss BG. Addressing the COVID-19 pandemic in populations with serious mental illness. *Jama Psychiat.* 2020.
- [2] Reger MA, Stanley IH, Joiner TE. Suicide Mortality and Coronavirus Disease 2019—A Perfect Storm? *Jama Psychiat.* 2020.
- [3] Galea S, Merchant RM, Lurie N. The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention. *JAMA Internal Medicine.* 2020.
- [4] Li J, Yang A, Dou K, Wang L, Zhang M, Lin X. Chinese public's knowledge, perceived severity, and perceived controllability of the COVID-19 and their associations with emotional and behavioural reactions, social participation, and precautionary behaviour: A national survey. *PsyArXiv Preprints.* 2020.
- [5] Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet.* 2020;**395**: 912-20.
- [6] Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. *Psychol Med.* 2008;**38**: 467-80.
- [7] Robinson E, Gillespie SM, Jones A. Weight-related lifestyle behaviors and the COVID-19 crisis: An online survey study of UK adults during social lockdown. *Obesity Science & Practice.* n/a.
- [8] Lazarus RS, Folkman S. *Stress, appraisal, and coping.* New York: Springer; 1984.
- [9] Bergland A, Thorsen K, Loland NW. The relationship between coping, self-esteem and health on outdoor walking ability among older adults in Norway. *Ageing and Society.* 2010;**30**: 949-63.
- [10] Cecil J, McHale C, Hart J, Laidlaw A. Behaviour and burnout in medical students. *Medical Education Online.* 2014;**19**: 25209.
- [11] Matthews KA, Hall MH, Cousins J, Lee L. Getting a Good Night's Sleep in Adolescence: Do Strategies for Coping With Stress Matter? *Behavioral Sleep Medicine.* 2016;**14**: 367-77.
- [12] Panagioti M, Gooding PA, Taylor PJ, Tarrier N. Perceived social support buffers the impact of PTSD symptoms on suicidal behavior: Implications into suicide resilience research. *Compr Psychiat.* 2014;**55**: 104-12.
- [13] Theadom A, Cropley M, Humphrey K-L. Exploring the role of sleep and coping in quality of life in fibromyalgia. *Journal of Psychosomatic Research.* 2007;**62**: 145-51.
- [14] Zablotzky B, Bradshaw CP, Stuart EA. The Association Between Mental Health, Stress, and Coping Supports in Mothers of Children with Autism Spectrum Disorders. *J Autism Dev Disord.* 2013;**43**: 1380-93.
- [15] Farhat LC, Roberto AJ, Wampler J, et al. Self-injurious behavior and gambling-related attitudes, perceptions and behaviors in adolescents. *J Psychiatr Res.* 2020;**124**: 77-84.
- [16] Sulkowski ML, Dempsey J, Dempsey AG. Effects of stress and coping on binge eating in female college students. *Eating Behaviors.* 2011;**12**: 188-91.
- [17] Bancroft J, Janssen E, Carnes L, Goodrich D, Strong D, Long JS. Sexual activity and risk taking in young heterosexual men: The relevance of sexual arousability, mood, and sensation seeking. *The Journal of Sex Research.* 2004;**41**: 181-92.
- [18] Bancroft J, Janssen E, Strong D, Carnes L, Vukadinovic Z, Long JS. Sexual Risk-Taking in Gay Men: The Relevance of Sexual Arousability, Mood, and Sensation Seeking. *Arch Sex Behav.* 2003;**32**: 555-72.

- [19] Twohig MP, Crosby JM, Cox JM. Viewing Internet Pornography: For Whom is it Problematic, How, and Why? *Sexual Addiction & Compulsivity*. 2009;**16**: 253-66.
- [20] The Economist. Pornography is booming during the covid-19 lockdowns. 2020.
- [21] Black P, Hendy HM. Perceived powerlessness as a mediator between life stressors and deviant behaviors. *Deviant Behavior*. 2019;**40**: 1080-89.
- [22] Janssen E, Macapagal KR, Mustanski B. Individual differences in the effects of mood on sexuality: The revised mood and sexuality questionnaire (MSQ-R). *The Journal of Sex Research*. 2013;**50**: 676-87.
- [23] Bancroft J, Janssen E, Strong D, Carnes L, Vukadinovic Z, Long JS. The Relation Between Mood and Sexuality in Heterosexual Men. *Arch Sex Behav*. 2003;**32**: 217-30.
- [24] Lykins AD, Janssen E, Graham CA. The relationship between negative mood and sexuality in heterosexual college women and men. *The Journal of Sex Research*. 2006;**43**: 136-43.
- [25] Li W, Li G, Xin C, Wang Y, Yang S. Changes in sexual behaviors of young women and men during the coronavirus disease 2019 outbreak: A convenience sample from the epidemic area. *The Journal of Sexual Medicine*. 2020: S1743-6095(20)30597-X.
- [26] Arafat SMY, Alradie-Mohamed A, Kar SK, Sharma P, Kabir R. Does COVID-19 pandemic affect sexual behaviour? A cross-sectional, cross-national online survey. *Psychiat Res*. 2020;**289**: 113050.
- [27] Whitaker DJ, Le B, Karl Hanson R, et al. Risk factors for the perpetration of child sexual abuse: A review and meta-analysis. *Child Abuse & Neglect*. 2008;**32**: 529-48.
- [28] Cortoni F, Marshall WL. Sex As a Coping Strategy and Its Relationship to Juvenile Sexual History and Intimacy in Sexual Offenders. *Sexual Abuse: A Journal of Research and Treatment*. 2001;**13**: 27-43.
- [29] McKibben A, Proulx J, Lusignan R. Relationships between conflict, affect and deviant sexual behaviors in rapists and pedophiles. *Behav Res Ther*. 1994;**32**: 571-75.
- [30] Proulx J, McKibben A, Lusignan R. Relationships between affective components and sexual behaviors in sexual aggressors. *Sexual Abuse: A Journal of Research and Treatment*. 1996;**8**: 279-89.
- [31] Hanson RK, Harris AJR, Scott T, Helmus L. Assessing the risk of sexual offenders on community supervision: The Dynamic Supervision Project. Ottawa, Ontario; 2007.
- [32] Mann RE, Hanson RK, Thornton D. Assessing risk for sexual recidivism: Some proposals on the nature of psychologically meaningful risk factors. *Sexual Abuse*. 2010;**22**: 191-217.
- [33] Ward T, Gannon TA. Rehabilitation, etiology, and self-regulation: The comprehensive good lives model of treatment for sexual offenders. *Aggress Violent Beh*. 2006;**11**: 77-94.
- [34] Ward T, Hudson SM, Keenan T. A self-regulation model of the sexual offense process. *Sexual Abuse: A Journal of Research and Treatment*. 1998;**10**: 141-57.
- [35] Gross JJ, John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*. 2003;**85**: 348-62.
- [36] Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *J Psychopathol Behav*. 2004;**26**: 41-54.
- [37] Moholy M, Prause N, Proudfit GH, Rahman AS, Fong T. Sexual desire, not hypersexuality, predicts self-regulation of sexual arousal. *Cognition and Emotion*. 2015;**29**: 1505-16.
- [38] Winters J, Christoff K, Gorzalka BB. Conscious regulation of sexual arousal in men. *The Journal of Sex Research*. 2009;**46**: 330-43.

- [39] Gillespie SM, Mitchell IJ, Fisher D, Beech AR. Treating disturbed emotional regulation in sexual offenders: The potential applications of mindful self-regulation and controlled breathing techniques. *Aggress Violent Beh.* 2012;**17**: 333-43.
- [40] Gillespie SM, Beech AR. Theories of Emotion Regulation. In: Boer DP, ed. *The Wiley Handbook on the Theories, Assessment and Treatment of Sexual Offending*; 2016:245-63.
- [41] Gillespie SM, Garofalo C, Velotti P. Emotion regulation, mindfulness, and alexithymia: Specific or general impairments in sexual, violent, and homicide offenders? *Journal of Criminal Justice.* 2018;**58**: 56-66.
- [42] Craig AN, Peterson ZD, Janssen E, Goodrich MBAD, Heiman JR. The Impact of Sexual Arousal and Emotion Regulation on Men's Sexual Aggression Proclivity. *Journal of Interpersonal Violence.* 2020: 0886260520915544.
- [43] Gratz KLP, Paulson AP, Jakupcak MP, Tull MTP. Exploring the Relationship Between Childhood Maltreatment and Intimate Partner Abuse: Gender Differences in the Mediating Role of Emotion Dysregulation. *Violence and Victims.* 2009;**24**: 68-82.
- [44] Mouliso ERMS, Calhoun KSP, Rosenbloom TGBS. Impulsivity and Sexual Assault in College Men. *Violence and Victims.* 2013;**28**: 429-42.
- [45] Shorey RC, Brasfield H, Febres J, Stuart GL. An Examination of the Association between Difficulties with Emotion Regulation and Dating Violence Perpetration. *Journal of Aggression, Maltreatment & Trauma.* 2011;**20**: 870-85.
- [46] Peer E, Brandimarte L, Samat S, Acquisti A. Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology.* 2017;**70**: 153-63.
- [47] Oosterhoff B, Palmer CA. Psychological correlates of news monitoring, social distancing, disinfecting, and hoarding behaviors among US adolescents during the COVID-19 pandemic. *PsyArXiv Preprints.* 2020.
- [48] Russell D, Peplau LA, Ferguson ML. Developing a Measure of Loneliness. *Journal of Personality Assessment.* 1978;**42**: 290-94.
- [49] Bjureberg J, Ljótsson B, Tull MT, et al. Development and Validation of a Brief Version of the Difficulties in Emotion Regulation Scale: The DERS-16. *J Psychopathol Behav.* 2016;**38**: 284-96.
- [50] John OP, Eng J. Three approaches to individual differences in affect regulation: Conceptualization, measures, and findings. In: Gross JJ, ed. *Handbook of emotion regulation.* Second edn. New York: Guilford Press; 2014:321-45.
- [51] Drewe EA. Go - No Go Learning After Frontal Lobe Lesions in Humans. *Cortex.* 1975;**11**: 8-16.
- [52] Hinshaw SP. Impulsivity, Emotion Regulation, and Developmental Psychopathology: Specificity Versus Generality of Linkages. *Annals of the New York Academy of Sciences.* 2003;**1008**: 149-59.
- [53] Mazza GL, Smyth HL, Bissett PG, et al. Correlation Database of 60 Cross-Disciplinary Surveys and Cognitive Tasks Assessing Self-Regulation. *Journal of Personality Assessment.* 2020: 1-8.
- [54] Meule A. Reporting and Interpreting Task Performance in Go/No-Go Affective Shifting Tasks. *Front Psychol.* 2017;**8**.
- [55] Young ME, Sutherland SC, McCoy AW. Optimal go/no-go ratios to maximize false alarms. *Behavior Research Methods.* 2018;**50**: 1020-29.
- [56] The jamovi project. jamovi (Version 0.9) [Computer Software]. 2019.
- [57] R Core Team. R: A Language and environment for statistical computing. [Computer software]. 2018.

- [58] Holmes EA, O'Connor RC, Perry VH, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry*. 2020;**7**: 547-60.
- [59] Pfattheicher S, Nockur L, Böhm R, Sassenrath C, Petersen M. The emotional path to action: Empathy promotes physical distancing during the COVID-19 pandemic. *PsyArXiv Preprints*. 2020.
- [60] Knight RA, Sims-Knight JE. The developmental antecedents of sexual coercion against women: Testing alternative hypotheses with structural equation modeling. *Annals of the New York Academy of Sciences*. 2003;**989**: 72-85.
- [61] Kofman YB, Garfin DR. Home is not always a haven: The domestic violence crisis amid the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2020;**12**: S199-S201.
- [62] Jetelina KK, Knell G, Molsberry RJ. Changes in intimate partner violence during the early stages of the COVID-19 pandemic in the USA. *Injury Prevention*. 2020.
- [63] Roesch E, Amin A, Gupta J, García-Moreno C. Violence against women during covid-19 pandemic restrictions. *BMJ*. 2020;**369**: m1712.
- [64] National Crime Agency. Law enforcement in coronavirus online safety push as National Crime Agency reveals 300,000 in UK pose sexual threat to children. 2020.
- [65] Schneider JP. A Qualitative Study of Cybersex Participants: Gender Differences, Recovery Issues, and Implications for Therapists. *Sexual Addiction & Compulsivity*. 2000;**7**: 249-78.

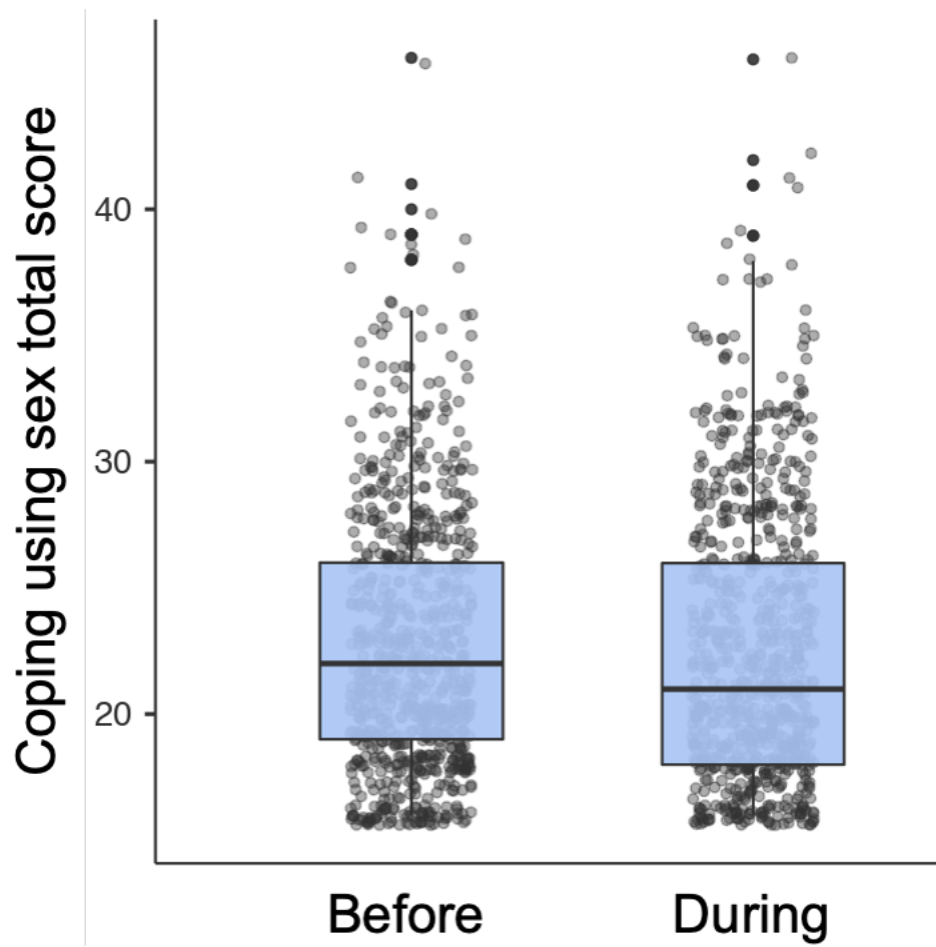


Figure 1. Total scores on the Coping using Sex Inventory for two weeks immediately preceding lockdown and two weeks during lockdown.

Table 1. Descriptive statistics for key variables

Variable (<i>n</i> complete)	Min.	Max.	N (%) / Mean (<i>SD</i>)	Median
Ethnicity (787)				
White			629 (80%)	
Psychiatric condition (781)				
Diagnosis received			249 (32%)	
Education (787)				
Degree or higher			510 (65%)	
High risk condition (789)				
≥1 condition			153 (19%)	
Living status (789)				
Living alone			76 (10%)	
Diagnosed/suspect COVID-19 (785)				
Yes			121 (15%)	
CUSI total during (755)	16	46	22.71 (5.44)	21
CUSI consent during (775)	5	25	11.42 (4.9)	10
CUSI rape during (775)	6	19	6.28 (1.07)	6
CUSI child during (781)	4	7	4.02 (.23)	4
Social distancing (789)	1	5	4.68 (.56)	5
Loneliness (789)	0	58	22.87 (13.76)	22
DERS-16 (779)	16	74	35.52 (14.7)	34
COVID-19 worries (789)	7	25	17.18 (3.18)	17
Go/No-Go errors (789)	0	49	9.46 (6.8)	8

Note. CUSI = Coping using Sex Inventory; DERS-16 = Difficulties in Emotion Regulation Scale 16-item version. Descriptive statistics for each measure are reported for all participants who completed that measure, hence the *n* complete varies by measure. For social distancing, loneliness, difficulties in emotion regulation, COVID-19 worries, and Go/No-Go errors, higher scores indicate increased levels.

Table 2. Spearman's correlations between variables

	1.	2.	3.	4.	5.	6.	7.
1. CUSI total	-						
2. CUSI consent	.1***	-					
3. CUSI rape (dichotomous)	.45***	.39***	-				
4. Physical social distancing	-.09*	-.08*	-.13***	-			
5. Loneliness	.09*	.08*	.17***	-.10**	-		
6. DERS-16	.13***	.12***	.14***	-.06	.65***	-	
7. Go/No-Go errors	.02	.02	.06	-.03	.09*	.15***	-
8. COVID-19 worries	0	-.01	.03	.03	.19***	.23***	.04

Note. CUSI = Coping Using Sex Inventory; DERS-16 = Difficulties in Emotion Regulation Scale 16-item version.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. Results of multiple linear regression on Coping Using Sex Inventory total scores

Predictor	Estimate	SE	95% Confidence		<i>t</i>	<i>p</i>
			Interval			
			Lower	Upper		
Model 1						
Age	-0.14	0.02	-0.18	-0.1	-7.47	< .001***
Gender	4.46	0.39	3.69	5.24	11.34	< .001***
Ethnicity	0.89	0.46	-0.01	1.79	1.95	0.051
Psychiatric						
condition	-0.10	0.40	-0.88	0.68	-0.26	0.798
Education	0.11	0.38	-0.64	0.86	0.28	0.779
High risk group	0.32	0.46	-0.58	1.21	0.70	0.486
Living alone	-0.49	0.61	-1.68	0.71	-0.8	0.425
Diagnosed/suspect						
COVID-19	0.72	0.50	-0.26	1.7	1.44	0.151
Model 2						
Age	-0.12	0.02	-0.16	-0.08	-5.92	< .001***
Gender	4.56	0.39	3.78	5.33	11.54	< .001***
Ethnicity	0.69	0.46	-0.22	1.59	1.49	0.14
Psychiatric						
condition	-0.60	0.42	-1.42	0.22	-1.44	0.15
Education	0.05	0.38	-0.69	0.8	0.14	0.89
High risk group	0.33	0.45	-0.56	1.22	0.73	0.47
Living alone	-0.51	0.61	-1.7	0.68	-0.84	0.40

Diagnosed/suspect						
COVID-19	0.43	0.5	-0.56	1.43	0.86	0.39
Social distancing	-0.56	0.31	-1.17	0.06	-1.78	0.08
Loneliness	2.04E-04	0.02	-0.03	0.03	0.01	0.99
DERS-16	0.05	0.02	0.02	0.08	2.84	0.005**
Go/No-Go errors	-0.03	0.03	-0.08	0.03	-0.92	0.36

Note. DERS-16 = Difficulties in Emotion Regulation Scale 16-item version.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Results of multiple linear regression on Coping Using Sex Inventory consent scores

Predictor	Estimate	SE	95% Confidence		<i>t</i>	<i>p</i>
			Interval			
			Lower	Upper		
Model 1						
Age	-0.14	0.02	-0.17	-0.1	-8.05	< .001***
Gender	3.92	0.35	3.23	4.6	11.14	< .001***
Ethnicity	0.93	0.41	0.12	1.73	2.27	0.02*
Psychiatric condition	-0.12	0.36	-0.82	0.57	-0.35	0.73
Education	0.07	0.34	-0.6	0.75	0.22	0.83
High risk group	0.05	0.41	-0.76	0.85	0.11	0.91
Living alone	-0.32	0.54	-1.39	0.74	-0.6	0.55
Diagnosed/suspect						
COVID-19	0.53	0.45	-0.35	1.41	1.18	0.24
Model 2						
Age	-0.12	0.02	-0.16	-0.09	-6.72	< .001***
Gender	4	0.35	3.3	4.69	11.3	< .001***
Ethnicity	0.77	0.42	-0.05	1.58	1.85	0.06
Psychiatric condition	-0.49	0.38	-1.23	0.25	-1.31	0.19
Education	0.02	0.34	-0.65	0.69	0.05	0.96
High risk group	0.06	0.41	-0.74	0.87	0.15	0.88
Living alone	-0.31	0.54	-1.37	0.76	-0.56	0.57
Diagnosed/suspect						
COVID-19	0.34	0.45	-0.55	1.23	0.76	0.45
Social distancing	-0.27	0.28	-0.83	0.29	-0.96	0.34

Loneliness	0	0.02	-0.03	0.03	-0.22	0.829
DERS-16	0.04	0.02	0.01	0.07	2.43	0.015*
Go/No-Go errors	-0.03	0.02	-0.08	0.02	-1.06	0.289

Note. DERS-16 = Difficulties in Emotion Regulation Scale 16-item version.

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5. Model fit indices for logistic regression on Coping Using Sex Inventory rape endorsement

Model	Deviance	AIC	BIC	R^2_N	Overall model test/comparison			
					χ^2	df	p	
Whole sample								
1	502.40	520.40	562.07	.11	Model 1	46.00	8	<.001
2	477.33	503.33	563.53	.17	Model 1 – Model 2	25.06	4	<.001
3	475.34	507.34	581.43	.18	Model 2 – Model 3	2.00	3	.573
Females								
1	260.88	276.88	310.80	0.07	Model 1	15.06	7	.035
2	252.20	276.20	327.08	0.11	Model 1 – Model 2	8.68	4	.070
3	249.55	279.55	343.16	0.12	Model 2 – Model 3	2.64	3	.450
Males								
1	232.67	248.67	276.68	0.09	Model 1	15.28	7	.033
2	200.61	224.61	266.63	0.28	Model 1 – Model 2	32.06	4	<.001
3	197.40	227.40	279.91	0.29	Model 2 – Model 3	3.22	3	.360

Table 6. Results of logistic regression on Coping Using Sex Inventory rape endorsement

Predictor	Log(Odds)	SE	Z	p	Odds Ratio	95% Confidence Interval	
						Lower	Upper
Model 1							
Age	-0.04	0.01	-3.04	0.002**	0.96	0.93	0.98
Gender	1.14	0.25	4.64	<.001***	3.13	1.93	5.08
Ethnicity	-0.13	0.28	-0.47	0.64	0.88	0.51	1.51
Psychiatric condition	0.14	0.27	0.52	0.60	1.15	0.68	1.94
Education	0.09	0.25	0.38	0.71	1.1	0.67	1.79
High risk group	0.13	0.31	0.43	0.67	1.14	0.63	2.07
Living alone	-1.15	0.61	-1.88	0.06	0.32	0.1	1.05
Diagnosed/suspect COVID-19	0.48	0.29	1.7	0.09	1.62	0.93	2.84
Model 2							
Age	-0.03	0.02	-1.97	0.049*	0.97	0.94	1
Gender	1.22	0.25	4.78	<.001***	3.38	2.05	5.57
Ethnicity	-0.15	0.29	-0.5	0.615	0.86	0.49	1.53
Psychiatric condition	-0.28	0.29	-0.95	0.34	0.76	0.43	1.34
Education	0.12	0.26	0.48	0.63	1.13	0.68	1.87
High risk group	0.08	0.32	0.25	0.80	1.08	0.58	2.02
Living alone	-1.28	0.62	-2.04	0.04*	0.28	0.08	0.95

Diagnosed/susp							
ect COVID-19	0.19	0.3	0.64	0.52	1.22	0.67	2.2
Social							
distancing	-0.52	0.18	-2.95	0.003**	0.6	0.42	0.84
Loneliness	0.02	0.01	1.95	0.05	1.02	1	1.05
DERS-16	0.02	0.01	1.67	0.09	1.02	1	1.04
Go/No-Go							
errors	0.01	0.02	0.46	0.65	1.01	0.97	1.04

Note. DERS-16 = Difficulties in Emotion Regulation Scale 16-item version. Estimates represent the log odds of "Rape = 1" vs. "Rape = 0". Gender reference category = female (vs. male), ethnicity reference category = not white (vs. white), psychiatric condition reference category = no condition (vs. previous diagnosis), education is highest level of qualification with reference category = less than degree level (vs. degree level or higher), high risk condition reference category = no condition (vs. one or more high risk conditions), living alone reference category = not alone (vs. alone).

Supplementary Material One

Other measures included in online survey

The online survey participants completed included a range of measures. For descriptive purposes, below we provide detail on all other measures collected in the survey.

Demographics. Participants completed a range of demographic items. See page 2 onwards for the full list of demographic items and response options.

COVID19 Questionnaire Items. Participants were asked if they had been tested for and diagnosed with COVID-19, and if they were currently symptomatic. They were also asked if they had not been diagnosed with COVID-19 but thought they had had it and were symptomatic. Compared to before the pandemic they were asked how worried about their i) overall health, ii) financial security and iii) food access (a lot more worried, more worried, no more or no less worried, less worried, a lot less worried. Participants were asked about how their feelings and behaviours had changed since the pandemic (I have ... felt lonely / felt depressed / felt anxious / intentionally harmed myself / had suicidal thoughts / exercised / slept / eaten healthily / binged on food / drank alcohol / smoked / experienced conflict with others / been verbally or physically abused by others / had poor physical health) on a 1 – 7 Likert scale (1 = A lot less than usual, 7 = A lot more than usual). See page X onwards for the full list of COVID-19 related items.

Depression Anxiety Stress Scales – 21 (DASS-21; Henry & Crawford, 2005).

Participants completed the 21-item version of the DAS.

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239.

Demographic Items

Gender

Male
Female
Non-binary
Prefer not to say

Age

Ethnicity

White
White and Black Caribbean
White and Black African
White and Asian
Any other mixed background
Indian
Pakistani
Bangladeshi
Any other Asian background
Black Caribbean
Black African
Any other Black background
Chinese
Any other ethnic group
Not stated

Who do you currently live in a household with (tick all that apply to your current situation)?

Living alone
Partner (married/unmarried)
Children
Parents
Siblings
Extended family
Housemates

Which of these describes your employment situation (tick all that apply to your current situation)

Full-time employed
Part-time employed
Not employed for pay
Caregiver (e.g., children, elderly)
Full-time student
Part-time student
Other

If employed, how has social distancing affected how you work?

Going to work as usual or redeployed in a different role (but still going into work)
Working from home
Staying at home without possibility to work (e.g. furloughed)
Been made unemployed due to COVID-19
Not applicable to my current situation

What is your highest educational qualification? If you are a student please select the qualification being studied for.

- o No formal qualifications
- o 1–3 GCSEs or equivalent
- o 4+ GCSEs or equivalent
- o A level or equivalent
- o Certificate of higher education (CertHE) or equivalent
- o Diploma of higher education (DipHE) or equivalent
- o Bachelor or equivalent
- o Master's degree or equivalent
- o Doctorate or equivalent

What is your annual after tax household income, including all earners in your household, in GBP (to the nearest £1000)?

£ _____ (free text; range 0-999,999)

What is your weight?

(response options in KG or stones and pounds)

What is your height?

(response options in cm or feet and inches)

Have you ever been diagnosed with a psychiatric condition (e.g. depression, schizophrenia, anxiety, an eating disorder)?

- Yes
- No

Have you ever been treated unfairly because of your weight?

Yes or No

How would you describe your weight?

Underweight About Right Overweight Very Overweight Obese

In general, how is your health at the moment?

Excellent Very good Good Fair Poor

COVID-19 Questions

Are you pregnant? Yes vs. No

Do you have any of the following:

- A lung condition, such as asthma, COPD, emphysema or bronchitis
- Heart disease, such as heart failure
- Chronic kidney disease
- A liver disease, such as hepatitis
- A condition affecting the brain and nerves, such as Parkinson's disease, motor neurone disease, multiple sclerosis (MS), a learning disability or cerebral palsy
- Diabetes
- Problems with your spleen – for example, sickle cell disease, or if you've had your spleen removed

- A weakened immune system as the result of conditions such as HIV and AIDS, or medicines such as steroid tablets or chemotherapy

- Very overweight (having a BMI of 40 or above)

Have you been formally diagnosed with COVID-19? Yes or No

If yes, do you currently have COVID-19? Yes or No

Do you suspect you have had or currently have COVID-19? Yes or No

If yes, do you currently have COVID-19 symptoms? Yes or No

I feel worried about catching COVID-19

strongly disagree disagree unsure agree strongly agree

I feel worried I might lose my job due to the COVID-19 crisis?

strongly disagree disagree unsure agree strongly agree

Compared to before the COVID-19 virus crisis, I have been feeling:

A lot more worried about my health

More worried about my health

No more or no less worried about my health,

Less worried about my health

A lot less worried about my health

A lot more worried about my financial security

More worried about my financial security

No more or no less worried about my financial security

Less worried about my financial security

A lot less worried about my financial security

A lot more worried about my access to food that I need

More worried about my access to food that I need

No more or no less worried about my access to food that I need

Less worried about my access to food that I need

A lot less worried about my access to food that I need

Compared to before the COVID-19 virus crisis:

I have felt lonely

I have felt depressed

I have felt anxious

I have intentionally harmed myself

I have had suicidal thoughts

I have exercised

I have slept

I have eaten healthily

I have binged on food

I have drunk alcohol

I have smoked

I have experienced conflict with others

I have been verbally or physically abused by others

I have felt connected to family/friends

I have had poor physical health

Response Format: A lot less than usual, Less than usual, A little less than usual, About the Same, A little more than usual, More than Usual A lot more than usual

Attention Checks

Have you ever been to Mars, select strongly disagree?

Strongly disagree disagree unsure agree strongly agree

Have you ever been to Jupiter, select strongly disagree?

Strongly disagree disagree unsure agree strongly agree

Supplementary Material Two

Deviation from pre-registration

Some minor changes were made to the covariates included in the regression models that were pre-registered on AsPredicted. First, previous diagnosis of a psychiatric disorder was included as an additional covariate. This was because a relatively high proportion of the sample reported receiving a diagnosis of a psychiatric disorder (32%), and it has been reported that social distancing measures may have a particular impact on the experience of loneliness and isolation in this population (Druss, 2020). Second, we included highest level of education as a binary measure of socio-economic status rather than household income. This is consistent with previous work that has used this measure as a proxy for socio-economic position (Marty, Jones, & Robinson, 2020). Finally, there was very little missing data across all questionnaires. For example, the CUSI scale had < 1% missing data across all items. Therefore, rather than impute data (which can have unintended consequences (Sterne, 2009) we excluded any participants who did not complete the questionnaire fully as this did not adversely affect our statistical power.

References

- Druss, B. G. (2020). Addressing the COVID-19 pandemic in populations with serious mental illness. *Jama Psychiatry*. doi:10.1001/jamapsychiatry.2020.0894
- Marty, L., Jones, A., & Robinson, E. (2020). Socioeconomic position and the impact of increasing availability of lower energy meals vs. menu energy labelling on food choice: two randomized controlled trials in a virtual fast-food restaurant. *International Journal of Behavioral Nutrition and Physical Activity*, 17, 10. doi:10.1186/s12966-020-0922-2
- Sterne, J. A. C. (2009). Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. *BMJ*, 338, b2393. doi:10.1136/bmj.b2393

Supplementary Material Three

Moderation by gender

We used Generalized Linear Models to examine if the observed effects of social distancing, loneliness, emotion dysregulation and self-regulation on coping using sex were moderated by gender. We included gender, age, ethnicity, highest education level, living status, COVID-19 high-risk health group, and previous diagnosis of psychiatric illness, as well as the extent to which participants had socially distanced themselves physically from others, loneliness, difficulties in emotion regulation, and number of Go/No-Go errors. We also included the two-way interactions of gender with (i) social distancing, (ii) loneliness, (iii) difficulties in emotion regulation, and (iv) the number of Go/No-Go errors. Significant gender interactions were further examined using simple effects analyses. Simple effects were estimated keeping constant all other independent variables in the model. Analyses were performed using the GAMLj module (Gallucci, 2019) in jamovi version 1.1 (The jamovi project, 2019), running in the R environment (R core team, 2018; Fox & Weisberg, 2018).

Coping using sex total. The results of a generalized linear model on coping using sex total score are shown in Table S1 ($R^2 = 0.25$, AIC = 4418.40, Deviance = 16278.55). Being younger, being male, engaging in less social distancing and greater difficulties in emotion regulation were associated with greater coping using sex scores. There was also a significant interaction of loneliness with gender. Simple effects analyses showed that higher loneliness scores were associated with greater coping using sex in men ($\chi^2 = 4.81$, $df = 1$, $B = .07$, $SE = .03$, $z = 2.19$, $p = .028$, 95% CI = .01, .13) but not women ($\chi^2 = 2.17$, $df = 1$, $B = -.03$, $SE = .02$, $z = -1.47$, $p = .141$, 95% CI = -.07, .01).

Coping using sex consent subscale. The results of a generalized linear model on coping using sex total score are shown in Table S2 ($R^2 = 0.24$, AIC = 4391.66, Deviance = 13979.22). Being younger and being male were associated with higher scores on the consent subscale. There was also a significant interaction of loneliness with gender. Simple effects analyses showed that higher loneliness scores were associated with greater coping using sex in men ($\chi^2 = 4.30$, $df = 1$, $B = .06$, $SE = .03$, $z = 2.07$, $p = .038$, 95% CI = .00, .11) but not women ($\chi^2 = 2.79$, $df = 1$, $B = -.03$, $SE = .02$, $z = -1.67$, $p = .095$, 95% CI = -.07, .01).

Coping using sex rape/violence subscale. The results of the binomial logistic generalized linear model on endorsement of one or more items on the rape/violence subscale are reported in Table S3 ($R^2 = 0.16$, AIC = 496.33, Deviance = 462.33). Being younger, being male, not living alone, engaging in less social distancing, and higher loneliness scores were associated with a greater likelihood of endorsing one or more items related to rape/violence on the coping using sex inventory. The main effect of loneliness was qualified by a significant two-way interaction with gender. Simple effects analyses showed higher loneliness scores were associated with a greater likelihood of endorsing one or more items on the rape/violence subscale in men ($\chi^2 = 44.61$, $df = 1$, $\exp(B) = 1.07$, $SE = .02$, $z = 3.82$, $p < .001$, 95% CI = .1.03, 1.11) but not women ($\chi^2 = .70$, $df = 1$, $\exp(B) = .99$, $SE = .02$, $z = -.84$, $p = .402$, 95% CI = .96, 1.02). There was also a significant interaction of difficulties in emotion regulation with gender. Simple effects analyses showed that higher scores for difficulties in emotion regulation were associated with greater likelihood of endorsing one or more items on the coping using sex rape/violence subscale in women ($\chi^2 = 8.51$, $df = 1$, $\exp(B) = 1.05$, $SE = .02$, $z = 2.92$, $p = .004$, 95% CI = 1.01, 1.08) but not men ($\chi^2 = 1.15$, $df = 1$, $\exp(B) = .98$, $SE = .02$, $z = -1.07$, $p = .283$, 95% CI = 0.95, 1.02).

Table S1. Parameter estimates for generalized linear model on Coping Using Sex Inventory total.

Predictor	Effect	Estimate	SE	95% Confidence Interval		z	p
				Lower	Upper		
(Intercept)	(Intercept)	23.16	0.42	22.34	23.99	54.89	< .001
Age		-0.13	0.02	-0.17	-0.09	-6.32	< .001
Gender	Male - Female	4.52	0.40	3.74	5.30	11.35	< .001
Ethnicity	White - Not white	0.70	0.46	-0.20	1.60	1.52	0.130
Psychiatric condition	Yes - No	-0.56	0.42	-1.37	0.25	-1.35	0.178
Education	Degree and above - Lower than degree	0.04	0.38	-0.70	0.78	0.11	0.912
High risk group	High risk condition - No high risk condition	0.30	0.45	-0.59	1.18	0.66	0.512
Living alone	Alone - Not alone	-0.56	0.60	-1.75	0.62	-0.93	0.351
Diagnosed/suspected COVID-19	Yes - No	0.33	0.50	-0.66	1.32	0.66	0.513
Social distancing		-0.67	0.32	-1.29	-0.04	-2.10	0.036
Loneliness		0.02	0.02	-0.02	0.05	0.98	0.327
DERS-16		0.04	0.02	0.01	0.08	2.26	0.024
Go/No-Go errors		-0.02	0.03	-0.08	0.04	-0.70	0.483
Gender*Social distancing		-0.91	0.64	-2.17	0.35	-1.42	0.156
Gender*Loneliness		0.10	0.04	0.03	0.17	2.66	0.008
Gender*DERS-16		-0.02	0.04	-0.09	0.05	-0.46	0.649
Gender*Go/No-Go errors		0.03	0.06	-0.08	0.14	0.52	0.601

Note: DERS-16 = Difficulties in Emotion Regulation Scale 16-item version.

Values in bold are significant ($p < .05$)

Predictor	Effect	Estimate	SE	95% Confidence Interval		z	p
				Lower	Upper		
(Intercept)	(Intercept)	11.73	0.38	10.98	12.47	30.86	<.001
Age		-0.13	0.02	-0.16	-0.09	-6.93	<.001
Gender	Male - Female	3.95	0.36	3.25	4.65	11.05	<.001
Ethnicity	White - Not white	0.75	0.42	-0.07	1.56	1.80	0.073
Psychiatric condition	Yes - No	-0.47	0.38	-1.21	0.27	-1.24	0.216
Education	Degree and above - Lower than degree	0.02	0.34	-0.65	0.69	0.07	0.943
High risk group	High risk condition - No high risk condition	0.04	0.41	-0.76	0.85	0.11	0.916
Living alone	Alone - Not alone	-0.38	0.54	-1.44	0.68	-0.70	0.484
Diagnosed/suspected COVID-19	Yes - No	0.26	0.45	-0.63	1.15	0.58	0.564
Social distancing		-0.33	0.29	-0.90	0.24	-1.15	0.251
Loneliness		0.01	0.02	-0.02	0.05	0.76	0.446
DERS-16		0.03	0.02	-0.00	0.06	1.73	0.083
Go/No-Go errors		-0.02	0.03	-0.07	0.03	-0.78	0.437
Gender*Social distancing		-0.38	0.58	-1.52	0.77	-0.64	0.519
Gender*Loneliness		0.09	0.03	0.02	0.15	2.67	0.008
Gender*DERS-16		-0.03	0.03	-0.10	0.03	-1.06	0.290
Gender*Go/No-Go errors		0.04	0.05	-0.06	0.13	0.70	0.487

Table S2. Parameter estimates for generalized linear model on Coping Using Sex Inventory consent subscale.

Note: DERS-16 = Difficulties in Emotion Regulation Scale 16-item version.

Values in bold are significant ($p < .05$)

Table S3. Parameter estimates for binomial logistic generalized linear model on Coping Using Sex Inventory rape/violence subscale.

Names	Effect	Estimate	SE	exp(B)	95% Exp(B) Confidence Interval		z	p
					Lower	Upper		
(Intercept)	(Intercept)	-2.87	0.40	0.06	0.02	0.12	-7.16	< .001
Age		-0.04	0.02	0.96	0.93	0.99	-2.33	0.020
Gender	Male - Female	1.07	0.30	2.92	1.64	5.25	3.62	< .001
Ethnicity	White - Not white	-0.21	0.30	0.81	0.46	1.47	-0.71	0.477
Psychiatric condition	Yes - No	-0.30	0.30	0.74	0.41	1.31	-1.02	0.309
Education	Degree and above - Lower than degree	0.15	0.26	1.17	0.70	1.97	0.59	0.558
High risk group	High risk condition - No high risk condition	0.13	0.32	1.13	0.58	2.10	0.39	0.700
Living alone	Alone - Not alone	-1.51	0.65	0.22	0.05	0.67	-2.34	0.019
Diagnosed/suspected COVID-19	Yes - No	0.14	0.31	1.15	0.61	2.09	0.44	0.657
Social distancing		-0.62	0.19	0.54	0.38	0.78	-3.35	< .001
Loneliness		0.03	0.01	1.03	1.00	1.05	2.28	0.023
DERS-16		0.01	0.01	1.01	0.99	1.04	1.12	0.263
Go/No-Go errors		0.00	0.02	1.00	0.96	1.04	0.08	0.939
Gender*Social distancing		-0.41	0.37	0.66	0.31	1.36	-1.10	0.270
Gender*Loneliness		0.08	0.02	1.09	1.04	1.14	3.44	< .001
Gender*DERS-16		-0.06	0.02	0.94	0.90	0.98	-2.82	0.005
Gender*Go/No-Go errors		-0.03	0.04	0.97	0.90	1.04	-0.81	0.418

Note: DERS-16 = Difficulties in Emotion Regulation Scale 16-item version. Values in bold are significant ($p < .05$)

References

Fox, J., & Weisberg, S. (2018). *car: Companion to Applied Regression*. [R package]. Retrieved from <https://cran.r-project.org/package=car>.

Gallucci, M. (2019). *GAMLj: General analyses for linear models*. [jamovi module]. Retrieved from <https://gamlj.github.io/>.

R Core Team (2018). *R: A Language and environment for statistical computing*. [Computer software]. Retrieved from <https://cran.r-project.org/>.

The jamovi project (2019). *jamovi*. (Version 1.1) [Computer Software]. Retrieved from <https://www.jamovi.org>