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RESEARCH

COVID-19 lockdown impact on cognitions and emotions experienced during sexual intercourse[☆]



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KEYWORDS

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COVID-19;
Sexual emotions;
Sexual cognitions;
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Summary

Objectives. – To study the impact of COVID-19 lockdown on cognitions and emotions felt during sexual intercourse by analyzing the responses of 1079 French-speaking subjects (338 men, 741 women, median age: 31 years) who participated in an online survey between April 27 and May 11, 2020.

Method. – Negative sexual cognitions (NSC), positive sexual emotions (PSE) and negative sexual emotions (NSE) are assessed using a tool inspired by the Sexual Mode Questionnaire. Data are crossed with sociodemographic indicators, information on lockdown modalities, indices on sex life, information on psychological functioning and sexual satisfaction.

Main results. – One third of the participants saw a decrease in the frequency of their sexual activities or in their sexual satisfaction. Changes in NSCs were found in 74.4% of subjects (increase: 38.4%; decrease: 36%). Emotional changes are found in between 50.7% (NSC: increase: 20.2%; decrease: 30.5%) and 60.9% (PSE: increase: 24.6%; decrease: 36.3%) of participants. The effect of lockdown on NSC, NSE, and PSE depends on gender at birth, intensity of depressive symptoms, and attachment styles. Women appear to be more vulnerable to lockdown than men. Insecure or depressed subjects also appear more vulnerable. The lockdown impact also depends on changes in the frequency of physical/digital intercourse during lockdown and the modalities of confinement. Changes in NSC, NSE, and PSE had a significant effect on sexual satisfaction during lockdown.

Conclusion. – The lockdown impact on sexual emotions and cognitions is non-negligible and greater than the impact on sexual behaviors. Whether it is positive or negative, it asks about the post-confinement repercussions: what becomes of a positive impact with deconfinement? Will the negative impacts be one-off or will vulnerabilities be expressed over the long-term?

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Introduction

Context

The first cases of SARS COV-2 coronavirus infection officially appeared in Hubei Province (China) in November 2019. Initially confined to China, the coronavirus disease (COVID-19) quickly spread around the world. On January 30, 2020, the World Health Organization (WHO) declared a public health emergency of international concern. On March 11, the outbreak of COVID-19 was declared a pandemic by the WHO. Faced with the exponential increase in cases of COVID-19, many countries have adopted localized or generalized lockdown measures for their populations. In France, the first lockdown began on March 17 and ended on May 11. A second lockdown was started on Friday, October 30 until December 1, 2020. We will focus here exclusively on the impact of the first lockdown.

During this first lockdown, French people were under house arrest. Social interactions had to be limited to the strict minimum. Educational institutions were closed to the physical presence of students. Only stores considered essential were allowed to remain open. Daily recreational outings were only allowed for a maximum of one hour, within one kilometer of the home, alone or only with household members.

The sanitary situation and the lockdown related to coronavirus disease have had a deleterious effect on mental health. The prevalence of mood, anxiety and sleep disorders is higher (Gualano et al., 2020; Pierce et al., 2020; Salari et al., 2020) than commonly observed (Baxter et al., 2013; Fond et al., 2019; Lim et al., 2018). Lockdown impacts were found within the family group (Brown et al., 2020; Günther-Bel et al., 2020) and within the couple (Luetke et al., 2020; Moreira and da Costa, 2020).

While many studies have evaluated the effects of lockdown on well-being and physical and mental health, fewer have examined its effects on sexuality. However, sexuality is an important dimension of health (WHO, 2006) with significant individual and social repercussions (Ford et al., 2019). In order to contribute to this emerging field of research, we propose to study the repercussions of COVID-19 lockdown on the automatic thoughts – cognitions – and emotions experienced during sexual relations, in line with socio-cognitive approaches to sexuality (Byers et al., 1998; Else-Quest, 2014; Nobre and Pinto-Gouveia, 2008; Moyano et al., 2016; Renaud and Byers, 1999; Sprecher, 2014; Tavares et al., 2020; Verbeek et al., 2020). Because sexual satisfaction is associated with mental health and quality of life for individuals and couples (Flynn et al., 2016; Peixoto et al., 2018; Sánchez-Fuentes et al., 2014), we also study the impact of these cognitions and emotions on sexual satisfaction in line with recent international literature (Li et al., 2020; Panzeri et al., 2020).

Literature review

Works on the lockdown impact on sexuality have primarily focused on sexual behaviour: changes in masturbatory practices, lockdown impact on the frequency of sexual intercourse, cybersexuality usage, consumption of pornography

(Arafat et al., 2020; Landry et al., 2020; Lehmillier et al., 2020; Mestre-Bach et al., 2020; Stephenson et al., 2020). Overall, these studies show that while the lockdown impact on sexuality exists, it is not unidirectional (Doring, 2020). It depends on a plurality of individual, relational and contextual factors (Dewitte et al., 2020):

- overall, it appears that women are more vulnerable to the effects of lockdown than men. It is explained in particular by greater economic precariousness (Milliken et al., 2020), increased difficulties in accessing essentials products (for example: period product, cf. Crawford and Waldman, 2020) or difficulties in accessing sexual and reproductive care (Burki, 2020), gender norms leading to an asymmetry in the division of labour within the household as well as a higher probability of being confronted with domestic violence (UN Women, 2020);
- the lockdown impact also depends on the modalities of lockdown. It cannot be identical depending on whether one has been confined alone or in a couple, with a new partner or with a regular partner (Doring, 2020; Luetke et al., 2020), with or without children (Günther-Bel et al., 2020);
- the lockdown impact depends on habitual sexual functioning and the ability to create/innovate in one's sexual life (Jacob et al., 2020; Lehmillier et al., 2020; Lopes et al., 2020). Lockdown then raises the question of the impact of cybersexualities (cf. Doring and Mohseni, 2018).

Among the factors explaining the variability of the lockdown effect, those related to psychological and relational functioning have not yet been fully investigated. In a study published at the end of September 2020 (Panzeri et al., 2020), depressive symptoms and anxiety – evaluated at DDASS-21 – would have had a negative impact on the sexual life of participants during lockdown. This study is based on a limited number of subjects ($n=124$). Moreover, the links between emotional disorders and sexuality are complex. While sexuality may be negatively impacted by these, it can be "used" by participants to manage negative emotions (Bancroft et al., 2003; Cooper et al., 1998; Meston and Buss, 2007). It, therefore, needs to be supplemented by studies on other samples.

Psychological and relational functioning cannot be reduced to psychopathological symptoms. We can assume, in support of the models proposed in adult attachment theory (Birnbaum et al., 2006; Dewitte, 2012; Gouvernet et al., 2015; Mikulincer and Shaver, 2016; Zayas and Ram, 2009), that the way in which relationships with the intimate partner are thoughts and anticipated contributes to shape the emotions and cognitions felt during sexual relations. In doing so, we can assume that the lockdown impact on sexual thoughts and emotions cannot be the same for different attachment styles. It is likely that for the most secure individuals – those with a positive view of themselves and their relationships with their partners – the cognitive-emotional impact is less intense than for insecure individuals. For insecure individuals, it is also likely that the impact is also different depending on whether the subjects present an anxious (negative self-image but positive partner image), avoidant

(positive self-image but negative partner image) or fearful (negative self and partner image) attachment style.

Objectives

The questions addressed in this work are the following: Did lockdown have an impact on the cognitions and emotions experienced during sexual relations? If this is the case, can we highlight individual, relational and/or contextual specificities explaining the lockdown impact on sexual cognitions and emotions? Has the cognitive and emotional lockdown impact influenced sexual satisfaction?

Method

General considerations

This research is part of a larger online survey conducted from April 27th to May 11th, 2020. In this survey, a plurality of dimensions and behaviors were identified (sexual motivations, masturbatory behaviors, contraception...). In this article, we focus on the response concerning the impact of lockdown on the emotions and cognitions experienced during sexual relations involving a partner(s).

The recruitment of participants was carried out via social networks and relayed by journalists from mainstream news media. The questionnaire was created with Limesurvey software. Data were stored on a secure university server. No information allowing identification was requested. Neither IP addresses nor cookies were recorded. Before being able to access the survey, the participants had to give their electronic assent via a form presenting the context of the research, its objectives, the average time required to respond and the possible repercussions of the research. Prior to the release of the survey, a specialist in sexuality issues, independent of the principal investigators of the research, was asked to review it.

Measures

Evaluation of negative sexual cognitions (NSC)

We investigated the NSC using the items from the Sexual Mode Questionnaire (SMQ), created and validated by [Nobre and Pinto-Gouveia \(2003\)](#). The SMQ allows for the identification of automatic negative sexual cognitions during sexual relations. It consists of 30 items for the male version and 33 items for the female version. For each item, subjects must indicate on a 5-point likert scale how often they have experimented different thoughts and images (1: never to 5: systematically). The items for the male version are grouped into 5 components: failure anticipation thoughts, thoughts related to erection difficulties, thoughts related to age or body, negative thoughts about sexuality, lack of erotic thoughts. The items in the feminine version refer to 6 categories of negative cognitions: thoughts related to sexual abuse, thoughts of failure and lack of motivation, lack of partner attention, passive sexuality and control, lack of erotic thoughts, negative body image. In the present research, we selected from the SMQ: 15 items for the male version and 18 items for the female version. The choice of

items was made on psychometric bases based on the article by [Nobre et al. \(2003\)](#). We selected the three most saturated items for each of the five dimensions of the male SMQ and the three most saturated items for each of the six dimensions of the female SMQ. We created a composite NSC score by averaging the 15 male items for men and the 18 female items for women in order to obtain an overall NSC score. The evaluation of the internal consistency shows the good qualities of this measure, both for the "usually" modality and for the "during lockdown" modality (all $\alpha > 0.70$).

Evaluation of the emotions felt during sexual relations (negative sexual emotions [NSE]; positive sexual emotions [PSE])

The SMQ identifies 10 emotions related to sexuality. Of these 10 emotions, 8 are negative sexual emotions (NSE): they have a negative valence (anger, sadness, disillusionment, fear, shame, guilt, feeling hurt) while only two – pleasure, satisfaction – are positive sexual emotions (PSE). In order to counterbalance this imbalance, we added 6 positive emotions (fun, joy, hope, pride, surprise, serenity), inspired by the work of [Fredrickson \(Fredrickson, 2001\)](#). We evaluated the relevance of this two-dimensional conception of sexual emotions using principal component analysis (varimax rotation) after estimating the number of components to be retained using Horn's parallel analysis ([Costello & Osborne, 2005](#)). The internal consistency of the two-dimensional scale created was satisfactory (positive emotions: usually: $\alpha = 0.83$, during lockdown: $\alpha = 0.87$; negative emotions: usually: $\alpha = 0.81$, during lockdown: $\alpha = 0.84$).

Assessment of anxiety level: GAD7

Anxiety was assessed using the General Anxiety Disorder Scale (GAD7, [Micoulaud-Franchi et al., 2016](#); [Spitzer et al., 2006](#)). Originally designed to screen for generalized anxiety disorder, the GAD7 can also be used to assess the presence of anxiety disorders of various forms. Subjects respond on a 4-point likert scale regarding the frequency they have been bothered by 7 problems in the last two weeks. The psychometric qualities of GAD7 have been demonstrated ([Johnson et al., 2019](#)). We also find good psychometric qualities ($\alpha = 0.84$). Subjects were categorized as follows: $GAD7 < 10$: no or few anxiety disorders; $GAD7 < 15$: moderate anxiety disorders; $GAD7 \geq 15$: severe anxiety disorders.

Assessment of depressive symptoms: MDI

We investigated the presence of depressive symptoms using the Major Depression Inventory developed by the WHO ([Bech et al., 2001](#)). This questionnaire is composed of 12 items evaluating the frequency of recent depressive symptoms (last 2 weeks) on a 5-point likert scale. The psychometric qualities reported in the literature are good ([Bech et al., 2015](#)), as are those found in the present research ($\alpha = 0.84$). We used the following criteria to discriminate between subjects: no depression or mild depression: $MDI \leq 25$; moderate depression: $25 > MDI > 31$; severe depression: $MDI \geq 31$.

Evaluation of attachment styles: ECR-RS

We assessed the attachment to intimate partner using the Relationship Structures questionnaire of the Experiences in Close Partner Attachment Scale. Relationships-Revised

(Chaperon and Dandeneau, 2017; Fraley et al., 2011). It is composed of 9 items presented in the form of proposals. Subjects are asked to indicate their degree of agreement on a 7-point likert scale. The questionnaire allows 2 scores to be obtained: an anxious attachment score and an avoidance attachment score. The psychometric qualities found in the literature are good. These properties are also good for the present research (anxiety scale: $\alpha = 0.85$; avoidance: $\alpha = 0.73$). We categorized subjects according to the classification proposed by Bartholomew and Horowitz (Bartholomew and Horowitz, 1991): subjects for whom both anxiety and avoidance scores were below the median were categorized as having a secure attachment style. Subjects with scores above the median on the anxiety dimension but below the median on the avoidance dimension were categorized as having an anxious attachment style. Subjects with avoidance scores above the median but anxiety scores below the median were considered avoidant. Finally, subjects with scores above the median for both the anxiety and avoidance dimensions were categorized as fearful.

Assessing the frequency of sexual intercourse

We studied the frequency of two types of sexual relations: face-to-face (physical) sexual relations and "digital" sexual relations (digitally mediated). For these two behaviors, subjects were asked to indicate, on a 7-point likert scale (0: never; 6: always), how often they had had sex according 2 modalities: usually and during lockdown.

Assessment of sexual satisfaction

Subjects were asked to rate their sexual satisfaction using a single item presented as a 5-point likert scale (1: very dissatisfied; 5: extremely satisfied). The value of using a single item to assess sexual satisfaction has already been noted elsewhere (Mark et al., 2014). Participants were asked to respond according 2 modalities: usually and during lockdown.

Statistical data processing and analysis planning

We calculated the number of subjects who experienced an increase, decrease or no change for each of the variables by comparing the response obtained in the lockdown modality with those obtained in the usual modality. Variations in response regarding emotions and NSC were crossed with sociodemographic variables, variables related to lockdown, variables related to sexual life, and variables related to psychological functioning. Statistical analyses were performed using R software. Multivariate analyses were conducted with multinomial regression analyses, which are the extension of logistic analyses to non-binary categorical response. Multinomial regression analyses were also conducted to determine whether emotional and cognitive variations were associated with fluctuations in sexual satisfaction.

Table 1 Participants' characteristics.

	Total	
	<i>n</i>	%
Gender at birth		
Male	338	31.3
Female	741	68.7
Age		
18–24	318	29.5
25–29	199	18.4
30–39	338	31.3
40–49	177	16.4
50+	47	4.4
In couple during lockdown		
No	223	20.7
Yes	856	79.3
Children during lockdown		
No	723	67
Yes	356	33
Physical intercourse change		
No change	469	43.5
Increase	246	22.8
Decrease	364	33.7
Digital intercourse change		
No change	892	82.7
Increase	87	8.1
Decrease	100	9.3
GAD7		
<10	906	84
<15	120	11.1
≥15	53	4.9
MDI		
≤25	868	80.4
<31	97	9
≥31	114	10.6
ECR-RS		
Secures	371	34.4
Anxious	213	19.7
Fearfull	296	27.4
Avoidant	199	18.4

Results

Participant characteristics

Table 1 presents the characteristics of participants ($n = 1079$). Our sample is predominantly female (68.7%, $n = 741$). Nearly 4 out of 5 participants are under 40 years old (79.2%, $n = 855$), 79.3% of them were confined in couples ($n = 856$). One third (33%, $n = 356$) of participants were confined in the presence of children. For a third of the participants (33.7%, $n = 364$) the frequency of physical sex decreased during lockdown. The frequency of increased digital sex increased almost as much as the frequency of decreased digital sex (9.3% [$n = 100$] vs. 8.1 [$n = 87$]). Eighty-four percent of subjects ($n = 906$) had no or minor anxiety disorders (GAD7 < 10) and 4.9% had major anxiety disorders (GAD7 > 15). In all, 80.4% ($n = 868$) of subjects have no depressive disorder or only minor depressive disorder

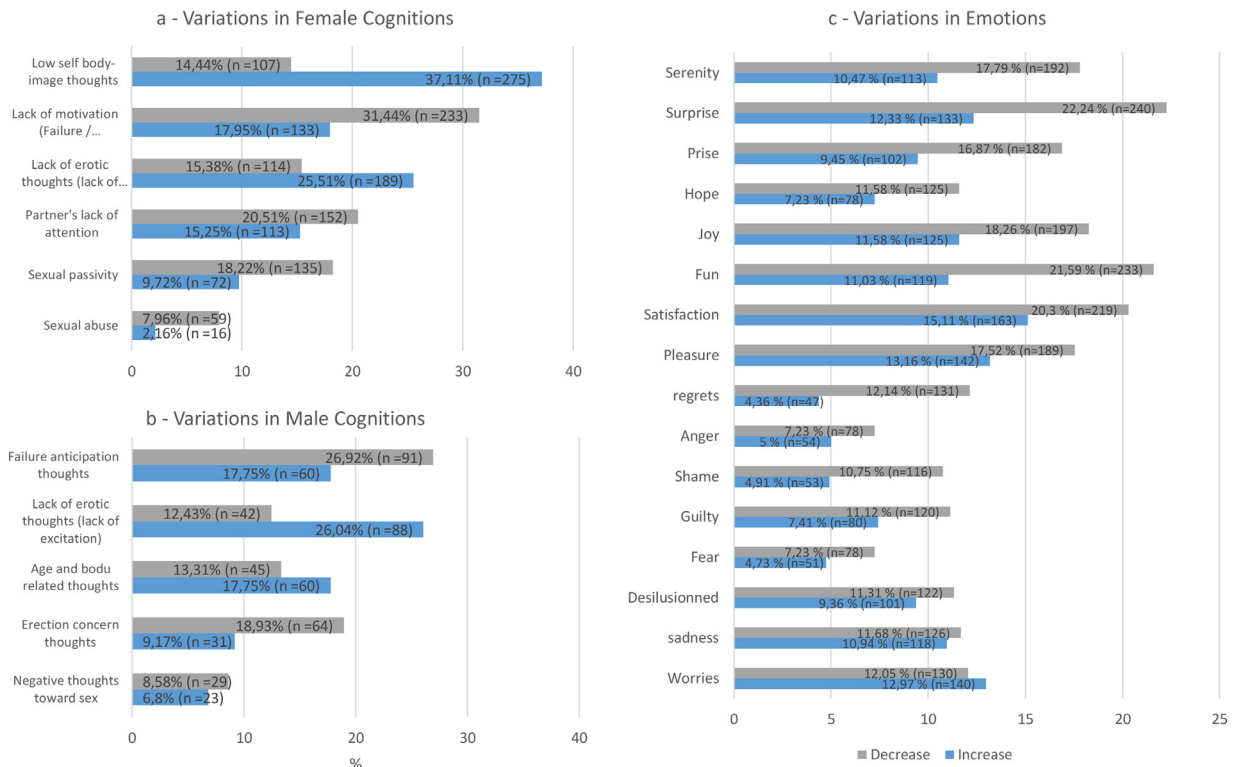


Figure 1 Lockdown impact cognitions and emotions (all emotions and cognitions).

(MDI < 25); 10.6% ($n = 114$) have major depressive disorder (MDI > 30). More than a third of subjects were categorized as having a secure attachment to their partner (34.4%, $n = 371$). More than a quarter of the subjects (27.4%, $n = 296$) have a fearful attachment. Anxious or avoidant profiles represent less than a fifth of the subjects (respectively: 19.7% [$n = 213$] and 18.4% [$n = 199$]).

Lockdown impact on sexual emotions and cognitions

Fig. 1 presents the lockdown impact on each of the NSC evaluated in this research. At this level of analysis, it appears that all NSC were impacted by lockdown, but to varying degrees. Some of them were mostly increased during lockdown. Others also experienced a significant decrease. For women (Fig. 1a), NSC related to physical appearance or lack of arousal were most likely to increase with lockdown. While abuse-related cognitions decreased for 7.96% ($n = 59$) of respondents, they increased for 2.16% ($n = 16$). For men (Fig. 1b), NSC related to lack of arousal and age-related concerns increased the most during lockdown. Examination of the effects of lockdown on each of the PSE and NSC (see Fig. 1c) shows a general trend towards a decrease in emotions experienced, whether positive or negative. At this level of analysis, it appears that PSE were more impacted than NSE, particularly those related to the playful aspects of sexual relations or those related to pleasure and satisfaction.

Fig. 2 shows the overall variation in emotion and NSC categories during lockdown. After categorization, the following results can be highlighted:

- NSC: 25.8% ($n = 278$) of subjects did not experience changes in NSC during lockdown. For 38.4% ($n = 413$), NSC increased during lockdown. For 36% ($n = 388$), they decreased;
- NSE: almost half of the subjects did not experience any change in NSE during lockdown (49.3%, $n = 532$). An increase in NSE was observed for one fifth of the subjects (20.2%, $n = 218$). For 30.5% ($n = 329$), they decreased;
- PSE: changes in PSE concern 60.9% of participants ($n = 657$). For nearly a quarter of the subjects, they increased during lockdown (24.6%, $n = 265$). For more than a third of them, they decreased (36.3%, $n = 392$).

Lockdown impact on sexual satisfaction

Fig. 3 shows the variation in sexual satisfaction during lockdown. For more than half of the subjects (56.3%, $n = 608$), lockdown had no effect on sexual satisfaction. The impact was negative for a third of them (33.5%, $n = 361$). Only 10.2% of subjects ($n = 110$) experienced an improvement in sexual satisfaction.

Identification of protective and risk factors

The multinomials statistical models fit the data (Table 2). The predictor variables contribute significantly to understand changes in NSC ($\chi^2 (36) = 177, P < 0.001$; $RN^2 = 0.104$),

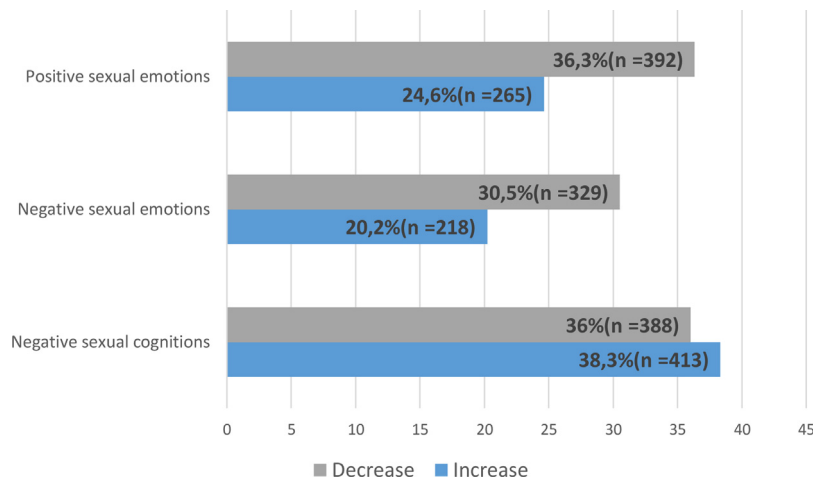


Figure 2 Lockdown impact on emotions and cognitions by categories.

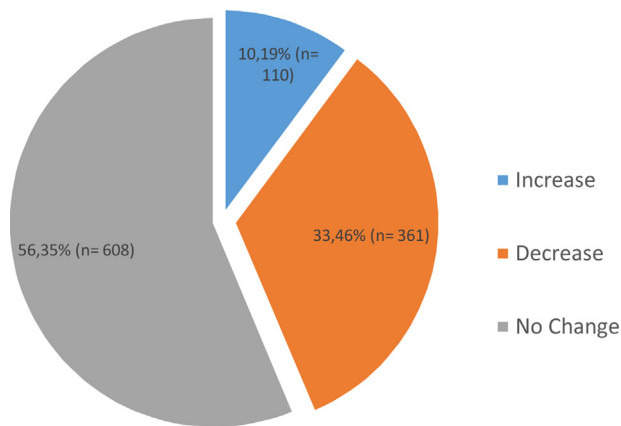


Figure 3 Lockdown impact on sexual satisfaction.

changes in NSE ($\chi^2(36) = 149, P < 0.001; RN^2 = 0.090$), and changes in PSE ($\chi^2(36) = 224, P < 0.001; RN^2 = 0.13$).

Sociodemographic variables

Women appear to be more vulnerable to lockdown than men: they experienced more increases in NSC (AOR = 1.609, 95 CI = 1.123–2.306, $P = 0.010$) and NSE (AOR = 1.487, 95 CI = 1.001–2.21, $P = 0.049$) during lockdown. Age provides little information to understand lockdown impact. Only Participants in their thirties stand out from the others by being more frequently subject to a decrease in PSE (AOR: 1.755, 95 CI = 1.135–2.713, $P = 0.011$).

Lockdown modalities

Individuals confined in couples had an increased risk of increased NSC (AOR = 1.828, 95 CI = 1.187–2.816, $P = 0.006$). A trend towards a smaller increase in NSC among people in couples was also observed at the threshold $\alpha = 0.10$ (AOR = 0.671, 95 CI = 0.446–1.012, $P = 0.057$). The presence of children does not appear to have had a significant effect on participants' sexual cognitions and emotions.

Variables related to sexual activity

An increase in the frequency of physical sex during lockdown is associated with a decreased in NSE (AOR = 1.851, 95 CI = 1.297–2.639, $P < 0.001$), a decreased in NSC (AOR = 3.012, 95 CI = 2.006–4.423, $P < 0.001$) and an increased in PSE (AOR = 3.746, 95 CI = 2.556–5.488, $P < 0.001$). An increase in digital sex is also associated with a decrease in NSE during lockdown (AOR = 2.193, 95 CI = 1.304–3.686, $P = 0.003$).

A decrease in the frequency of sexual intercourse is significantly associated with both an increase in NSC and NSE and a decrease. The probability that the decrease in the frequency of sexual intercourse has a negative effect on sexual cognitions and emotions is, however, greater than the probability that it has a positive effect (increase in NSC: AOR = 2.355, 95 CI = 1.624–3.414, $P < 0.001$ vs. AOR = 1.484, 95 CI = 1.001–2.220, $P = 0.05$; Increase in NSC: AOR = 2.545, 95 CI = 1.741–3.719, $P > 0.001$ vs. AOR = 1.511, 95 CI = 1.073–2.128, $P < 0.018$).

Psychological dimensions

Attachment styles. Insecure subjects, whether anxious, avoidant or fearful, were more likely to have experienced an increase in NSE during lockdown compared to secure subjects (anxious: AOR = 2.678, 95 CI = 1.628–4.403, $P < 0.001$; fearful: AOR = 2.631, 95 CI = 1.678–4.125, $P < 0.001$; avoidant AOR = 2.137, 95 CI = 1.28–3.568, $P = 0.004$).

Fearful subjects were particularly vulnerable also cognitively (AOR = 2.771, 95 CI = 1.801–4.266, $P < 0.001$). The same was true for subjects with an anxious attachment style who, although to a lesser extent, were also cognitively impacted (AOR = 1.704, 95 CI = 1.069–2.717, $P = 0.025$). Results concerning the cognitive impact of lockdown in avoidant subjects suggest some cognitive vulnerability at $\alpha < 0.00$ threshold (AOR = 1.463, 95 CI = 0.931–2.298, $P = 0.099$).

Fearful subjects were also more likely to experience a decrease in their PSE during lockdown (AOR = 1.633, 95 CI = 1.12–2.38, $P = 0.011$). Only this attachment style was significantly associated with a change in PSE at the threshold $\alpha = 0.05$. At the threshold $\alpha = 0.00$, a trend toward decreased PSE was observed in anxious subjects (AOR = 1.463, 95

Table 2 Sexual cognitions and emotions: multinomial regressions.

	Negative cognitions		Negative emotions		Positives emotions	
	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value
Age (ref = 18–24 yo)						
25–29	0.828 [0.509–1.348], <i>P</i> : 0.449	0.802 [0.487–1.319], <i>P</i> : 0.384	1.399 [0.848–2.306], <i>P</i> : 0.189	1.145 [0.747–1.755], <i>P</i> : 0.535	1.13 [0.698–1.83], <i>P</i> : 0.619	1.368 [0.879–2.13], <i>P</i> : 0.165
30–39	1.109 [0.679–1.814], <i>P</i> : 0.679	1.185 [0.723–1.941], <i>P</i> : 0.502	1.361 [0.822–2.253], <i>P</i> : 0.231	1.256 [0.827–1.908], <i>P</i> : 0.284	1.317 [0.813–2.134], <i>P</i> : 0.264	1.755 [1.135–2.713], <i>P</i>: 0.011
40–49	0.614 [0.337–1.120], <i>P</i> : 0.112	0.733 [0.407–1.322], <i>P</i> : 0.302	1.224 [0.65–2.304], <i>P</i> : 0.531	1.077 [0.635–1.829], <i>P</i> : 0.783	0.744 [0.404–1.37], <i>P</i> : 0.342	1.153 [0.669–1.987], <i>P</i> : 0.608
50+	0.492 [0.208–1.163], <i>P</i> : 0.106	0.775 [0.352–1.710], <i>P</i> : 0.528	1.868 [0.816–4.272], <i>P</i> : 0.139	0.499 [0.202–1.235], <i>P</i> : 0.133	1.162 [0.49–2.757], <i>P</i> : 0.733	1.597 [0.738–3.457], <i>P</i> : 0.235
Gender at birth (ref = male)						
Female	1.609 [1.123–2.306], <i>P</i>: 0.010	1.191 [0.838–1.693], <i>P</i> : 0.329	1.487 [1.001–2.21], <i>P</i>: 0.049	1.145 [0.831–1.578], <i>P</i> : 0.406	1.195 [0.825–1.729], <i>P</i> : 0.346	1.039 [0.747–1.446], <i>P</i> : 0.819
In couple during lockdown						
Yes	1.828 [1.187–2.816], <i>P</i>: 0.006	0.871 [0.583–1.300], <i>P</i> : 0.498	1.101 [0.711–1.706], <i>P</i> : 0.667	0.874 [0.606–1.261], <i>P</i> : 0.472	<u>0.671</u> [<u>0.446–1.012</u>], <u><i>P</i>: 0.057</u>	1.299 [0.881–1.915], <i>P</i> : 0.187
Children during lockdown (ref = no)						
Yes	0.769 [0.504–1.173], <i>P</i> : 0.222	0.743 [0.490–1.127], <i>P</i> : 0.163	1.03 [0.66–1.608], <i>P</i> : 0.897	0.87 [0.597–1.269], <i>P</i> : 0.469	1.01 [0.655–1.555], <i>P</i> : 0.965	0.844 [0.574–1.24], <i>P</i> : 0.387
Physical intercourse (ref = no change)						
Increase	0.886 [0.560–1.404], <i>P</i> : 0.607	3.012 [2.006–4.523], <i>P</i>: < 0.001	1.068 [0.66–1.729], <i>P</i> : 0.788	1.851 [1.297–2.639], <i>P</i>: < 0.001	3.746 [2.556–5.488], <i>P</i>: < 0.001	0.71 [0.457–1.102], <i>P</i> : 0.127
Decrease	2.355 [1.624–3.414], <i>P</i>: < 0.001	1.484 [1.001–2.200], <i>P</i>: 0.050	2.545 [1.741–3.719], <i>P</i>: < 0.001	1.511 [1.073–2.128], <i>P</i>: 0.018	1.397 [0.912–2.139], <i>P</i> : 0.124	3.305 [2.373–4.601], <i>P</i>: < 0.001
Digital intercourse (ref = no change)						

Table 2 (Continued)

	Negative cognitions		Negative emotions		Positives emotions	
	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value	Increasing AOR [95 CI], <i>P</i> -value	Decreasing AOR [95 CI], <i>P</i> -value
Increase	1.136 [0.587–2.198], <i>P</i> : 0.704	1.458 [0.785–2.709], <i>P</i> : 0.233	0.837 [0.411–1.706], <i>P</i> : 0.625	2.193 [1.304–3.686], <i>P</i> : 0.003	1.367 [0.769–2.431], <i>P</i> : 0.286	0.771 [0.425–1.399], <i>P</i> : 0.393
Decrease	1.665 [0.906–3.062], <i>P</i> : 0.101	1.412 [0.760–2.624], <i>P</i> : 0.276	1.384 [0.795–2.413], <i>P</i> : 0.25	1.251 [0.761–2.058], <i>P</i> : 0.377	1.401 [0.795–2.469], <i>P</i> : 0.243	1.336 [0.796–2.243], <i>P</i> : 0.273
GAD7 (ref = GAD < 10)						
<15	1.096 [0.604–1.990], <i>P</i> : 0.763	1.189 [0.649–2.175], <i>P</i> : 0.575	1.459 [0.838–2.541], <i>P</i> : 0.182	1.705 [1.029–2.823], <i>P</i> : 0.038	<u>0.586</u> [<u>0.318–1.079</u>], <i>P</i> : 0.086	1.075 [0.656–1.762], <i>P</i> : 0.774
>15	0.645 [0.276–1.508], <i>P</i> : 0.312	0.969 [0.409–2.297], <i>P</i> : 0.943	0.717 [0.339–1.515], <i>P</i> : 0.383	0.538 [0.239–1.213], <i>P</i> : 0.135	<u>0.352</u> [<u>0.122–1.017</u>], <i>P</i> : <u>0.054</u>	1.419 [0.695–2.896], <i>P</i> : 0.336
MDI (ref = MDI < 25)						
<30	<u>1.716</u> [<u>0.919–3.203</u>], <i>P</i> : <u>0.090</u>	1.238 [0.642–2.385], <i>P</i> : 0.524	2.588 [1.503–4.457], <i>P</i> : < 0.001	1.077 [0.618–1.88], <i>P</i> : 0.793	1.296 [0.693–2.424], <i>P</i> : 0.418	<u>1.586</u> [<u>0.938–2.683</u>], <i>P</i> : <u>0.085</u>
>30	1.644 [0.856–3.160], <i>P</i> : 0.135	1.159 [0.589–2.280], <i>P</i> : 0.669	3.187 [1.772–5.73], <i>P</i> : < 0.001	1.446 [0.809–2.584], <i>P</i> : 0.213	1.609 [0.844–3.068], <i>P</i> : 0.148	1.444 [0.828–2.521], <i>P</i> : 0.196
ECR-RS (ref = secure)						
Anxious	1.704 [1.069–2.717], <i>P</i> : 0.025	1.605 [1.012–2.544], <i>P</i> : 0.044	2.678 [1.628–4.403], <i>P</i> : < 0.001	<u>1.481</u> [<u>0.989–2.219</u>], <i>P</i> : <u>0.057</u>	1.349 [0.852–2.137], <i>P</i> : 0.202	<u>1.463</u> [<u>0.961–2.229</u>], <i>P</i> : <u>0.076</u>
Fearful	2.771 [1.801–4.266], <i>P</i> : < 0.001	1.959 [1.270–3.024], <i>P</i> : 0.002	2.631 [1.678–4.125], <i>P</i> : < 0.001	1.29 [0.89–1.869], <i>P</i> : 0.179	1.189 [0.776–1.82], <i>P</i> : 0.426	1.633 [1.12–2.38], <i>P</i> : 0.011
Avoidant	<u>1.463</u> [<u>0.931–2.298</u>], <i>P</i> : <u>0.099</u>	1.211 [0.775–1.893], <i>P</i> : 0.401	2.137 [1.28–3.568], <i>P</i> : 0.004	1.381 [0.92–2.073], <i>P</i> : 0.119	<u>1.517</u> [<u>0.96–2.398</u>], <i>P</i> : <u>0.075</u>	1.388 [0.904–2.131], <i>P</i> : 0.134
Overall model's statistics						
χ^2 (36)	177		149		224	
<i>P</i> -value	<0.001		<0.001		<0.001	
R ² N	0.104		0.090		0.130	

GAD7: General Anxiety Disorder scale; MDI: Major Depression Inventory; ECR – RS: experiences in close relationships – revised scale (attachment styles); yo: years-old. Significant at *P* < .05 in bold; marginally significant (*P* < .10) are underlined

Table 3 Sexual satisfaction: multinomial regressions.

	Change in sexual satisfaction (multinomial regression)	
	Increase AOR [95 CI], <i>P</i> -value	Decrease AOR [95 CI], <i>P</i> -value
Negative cognitions (ref = no change)		
Increase	1.725 [0.807–3.689], <i>P</i> =0.160	1.980 [1.340–2.956], <i>P</i> <0.001
Decrease	2.718 [1.340–5.513], <i>P</i> =0.006	1.082 [0.706–1.660], <i>P</i> =0.715
Negative emotions (ref = no change)		
Increase	1.323 [0.653–2.679], <i>P</i> =0.436	2.395 [1.624–3.532], <i>P</i> <0.001
Decrease	1.615 [0.964–2.705], <i>P</i> =0.068	1.706 [1.182–2.463], <i>P</i> =0.004
Positive emotions (ref = no change)		
Increase	4.035 [2.302–7.073], <i>P</i> <0.001	0.599 [0.379–0.947], <i>P</i> =0.028
Decrease	1.043 [0.506–2.149], <i>P</i> =0.909	3.085 [2.187–4.351], <i>P</i> <0.001
Overall model's statistics		
χ^2 (12)	310	
<i>P</i> -value	<0.001	
R ² N	0.199	

CI=0.961–2.229, *P*=0.076) and an increase in PSE for avoidant participants (AOR=1.517, 95 CI=0.96–2.398, *P*=0.075).

Depression. The intensity of depressive symptoms is mainly associated with fluctuations in NSE (moderate depression [26 < MDI < 30]: AOR=2.588, 95 CI=1.503–4.457, *P*<0.001; severe depression [MDI > 30]: AOR=3.187, 95 CI=1.772–5.73, *P*<0.001). The impact of depressive symptoms on cognition appears to be more limited, appearing only in a trend manner (*P*<0.10) and only in subjects with moderate depressive symptoms (AOR=1.716, 95 CI=0.919–3.203, *P*=0.09).

Anxiety. Anxiety, assessed by GAD, is significantly predictive only of a decrease in negative emotions at the threshold α =0.05. This result is only for moderately anxious subjects (AOR=1.705, IC90=1.029–2.823, *P*=0.038). At the threshold α =0.10, the results suggest a tendency for a smaller increase in positive sexual emotions in anxious subjects, compared to subjects with no anxiety symptoms (10 < GAD < 15: AOR=0.586, 95 CI=0.318–1.079, *P*=0.086; GAD > 15: AOR=0.352, 95 CI=0.122–1.017, *P*=0.054).

Impact of cognitive and emotional changes on sexual satisfaction

The results presented in Table 3 show the impact of variations in NSC, PSE and NGS on changes in sexual satisfaction levels due to lockdown. The statistical model is fitted to the data (χ^2 (12)=310, *P*<0.001). NSC, NSE and PSE explain nearly 20% of the variance in changes in sexual satisfaction scores during lockdown (R²N=0.199).

An increase in NSC is associated with a decrease in sexual satisfaction during lockdown (AOR=1.980, 95 CI=1.335–2.936, *P*<0.001). Conversely, a decrease in NSC is associated with increased sexual satisfaction (AOR=2.718, 95 CI=1.340–2.956, *P*=0.006).

Variations in sexual emotions are also associated with variations in the level of sexual satisfaction. An increase in PSE is associated with an increase in sexual satisfaction (AOR=4.035, 95 CI=2.302–7.073, *P*<0.001) and

a decreased likelihood of decreased sexual satisfaction (AOR=0.599, 95 CI=0.379–0.947, *P*=0.028). The relationships appear to be more complex for NSE. A change in NSE, either an increase or a decrease, is associated with a decrease in sexual satisfaction (respectively: AOR=2.395, 95 CI=1.624–3.532, *P*<0.001 and AOR=1.706, 95 CI=1.182–2.463, *P*=0.004 respectively).

Discussion

This work finds a certain number of results in the literature, either concerning the lockdown impact on sexual life, concerning female vulnerabilities or concerning the effect of psychopathological symptoms. Following the work on adult attachment, we also find that insecure subjects appear more fragile than secure ones. This work underlines the richness of the cognitive and emotional components of sexual and dual relationships. The impact of lockdown on sexuality is manifest and global. If it concerns behaviors, sexual satisfaction and emotions, it concerns first the thoughts experienced during sexual relations. While the restriction of sexual relations due to physical distancing can be a factor of vulnerability, as noted elsewhere (Doring, 2020; Lopes et al., 2020), the living experience of sexual relations has been impacted, independently of the fluctuations in the frequency of sexual relations, which have been statistically controlled in statistical analyses. These thoughts and emotions experienced during sexual intercourse in turn affected the satisfaction experienced.

Some subjects were weakened by lockdown. For others, although fewer in number, lockdown has fostered a richer or more fulfilling sexuality, promoting the construction of new intimacy (Jacob et al., 2020; Lehmler et al., 2020; Lopes et al., 2020). In particular, we find that the increase in digital sex has contributed to minimizing the likelihood of NSE. Cybersexuality is therefore not de facto pathological or synonymous with risky behaviour, contrary to the still dominant representations (Doring and Mohseni, 2018). However, attention must be paid to the possible long-term repercussions of these digital relationships. If they promote a better

knowledge of oneself and the other and allow the maintenance of dual relationships in times of lockdown, they raise the question of the future of cyber-exchanges: risk of diffusion of contents outside the private sphere (e.g. revenge porn), harassment, blackmail and digital scams (Doring and Mohseni, 2018).

Consistent with the literature, women appear to be more vulnerable than men: they were 1.6 times more likely than men to have an increase in NSC and 1.49 times more likely to have an increase in NSE. It is unlikely that this result can be explained by an intrinsically feminine biological vulnerability. Indeed, the literature has struggled to find consistent gendered differences in the frequency of NSC or sexual emotions (Byers et al., 1998; Else-Quest, 2014; Fisher et al., 2012; Moyano et al., 2016; Renaud and Byers, 1999; Verbeek et al., 2020). Because depression affects women more than men (Lim et al., 2018; Fond et al., 2019), the hypothesis that our female population is more prone to depressive symptoms could be raised. However, the levels of depression were controlled for in the statistical analyses. It is therefore more likely that this result reflects a differential impact of lockdown in women and men as suggested in the literature on the gendered impact of lockdown (Burki, 2020; Crawford and Waldman, 2020; Milliken et al., 2020; UN Women, 2020). This impact is to be thought both in its interpersonal aspect – as evidenced by the increase in cognitions associated with a lack of attention from the partner for 20% of women participants – and/or in its sexual aspect – a quarter of women participants report a decrease in their level of arousal during lockdown. This impact is also to be thought at an intra-individual level via the question of negative concerns related to self-image and body image. Indeed, these cognitions increased for more than a third of the women in our study. These female vulnerabilities should not, however, hide the impact of lockdown on men, who also show a decrease in their level of arousal during lockdown as well as an increase in NSC linked to an anticipation of potential failures or age-related NSC.

Following the study by Panzeri et al. (2020), depressive symptoms have a negative impact on sexuality. It manifests itself here by a potentiation of NSE. It is also observed, although in a tendential way ($P < 0.10$), at the level of the CSNs and the PSE. The results concerning anxiety symptoms are more paradoxical: moderate anxiety symptoms seem to play a salutary role by decreasing the probability of negative emotional experiences. It is possible that, for moderately anxious subjects, sexuality was a means of coping with anxiety about the sanitary situation. Such an interpretive hypothesis would lead to further investigation of the functions of sexuality for these subjects in order to understand what motivated them to have sex during lockdown. In this regard, the Meston and Buss YSEX inventory (Meston and Buss, 2007) could be useful. Such an investigation could be all the more necessary since links between sexuality mobilized to cope with aversive situations is significantly associated with an increased likelihood of risky sexual behaviour (Cooper et al., 1998).

By investigating the links between attachment style and sexual life in a French-speaking population, this research was part of an emerging field of study in France. In continuity with other studies (Birnbaum et al., 2006; Dewitte,

2012; Gouvernet et al., 2015), we find that the sexual life of insecure individuals was more affected by lockdown than the sexual life of secure ones. In line with the theoretical models of adult attachment (Mikulincer and Shaver, 2016), it emerges that these vulnerabilities are not identical according to the type of attachment insecurity. Thus, a hierarchy of psychological vulnerabilities can be highlighted according to the types of attachment: fearful subjects – both anxious and avoidant – were more vulnerable than anxious subjects, who were more fragile than avoidant subjects.

Among the three insecure attachment categories, avoidant subjects appear to be the least vulnerable, since the impact is illustrated only by an increase in NSC. However, we note a tendency ($P < 0.10$) to an increase in negative cognitions as well as a trend increase in PSE during lockdown. This last point suggests that the lockdown may have led to emotional ambivalence for them. The fact that avoidants tend to favour interpersonal distance and emotional detachment probably explains the potential positive impact on the PSE: by being confined they were able to minimise their social interactions.

By favouring a categorical approach to attachment styles (Bartholomew and Horowitz, 1991), we were able to observe important and specific vulnerabilities of fearful subjects. These results underline the need to take into account the effects of interactions between the anxious and avoidant dimensions of partner attachment, in line with the proposals of Zayas et al. (Zayas and Ram, 2009). If fearful subjects are as vulnerable as anxious subjects with regard to negative sexual emotions, they seem more vulnerable than anxious subjects on the cognitive level. Furthermore, the fearful style is the only attachment style that has an increased likelihood of a decrease in PSE during lockdown.

Anxious and fearful subjects were vulnerable both emotionally and cognitively. Moreover, ambivalence/dissonance was observed on the cognitive level for these two groups of subjects who presented, jointly, an increased probability of increasing negative cognitions and an increased probability of decreasing them. Because these two groups of subjects are specified by a high level of anxiety, it is likely that this cognitive dissonance results from attachment anxiety. Attachment anxiety is characterized by an ambivalent approach to sexuality, used as a means of experiencing the quality of the bond to the partner and to compensate for a negative self-image that intensifies the fear of being abandoned (Dewitte, 2012). Lockdown may have had a positive impact on anxious subjects by allowing them to be with their partner on a daily basis and thus meet their need for closeness. However, the promiscuity imposed for several weeks, combined with the anxious subjects' constant need for reassurance, may also have been a source of tension within the couple (Luetke et al., 2020) by increasing their fears of not living up to the other's expectations. The constant need for closeness and reassurance may have been confronted with a decrease in the partner's desire for sexual relations. Fears in anticipation of lockdown experienced as an anticipation of abandonment may also have emerged. These explanatory hypotheses call for increased attention to the individual and dyadic impact of lockdown but also to the effect of delockdown on individual and inter-individual functioning.

Limitations of the study

Several limitations of this study need to be recognized. The information form sent to the participants before they took part in the research described the context and objectives of the study and targeted people living their lockdown in France. However, it is possible that other participants, French-speakers but non-residents of France, may have wished to take part in the study. Also, we did not assess whether our participants had themselves been affected by COVID-19, either directly or indirectly as a relative of an infected person. It is also possible that some of the participants may have been health care providers or relatives of health care providers, which could have impacted sexual cognitions and emotions, for example through fear of infecting one's partner. Like other studies, our sample is predominantly female. Similarly, like other studies that have investigated the lockdown impact, this research was based on a web-survey data collection, which resulted in a selection bias in our sample. Only those with Internet access and comfortable with computers participated. This potentially excluded people living in geographic areas of "digital deserts" or older audiences who may be less comfortable with computers or social networking.

The calls for participation involved a specific audience corresponding to a media target in a category of mainstream press. We find a higher prevalence of anxiety and depressive disorders than is commonly observed (Baxter et al., 2013; Lim et al., 2018; Fond et al., 2019). This prevalence is, however, lower than that found in work questioning the psychopathological impact of the health situation (Salari et al., 2020). It is therefore possible that our subjects belong to a segment of the population that is less vulnerable than the average. The context in which the subjects had to answer the questionnaires must also be considered. Given the lockdown, it is likely that the subjects responded to the questionnaires from their place of residence. However, for nearly 80% of them, they were confined as a couple. Therefore, they agreed to give us their testimonies about their sexual life even though their partner could be present. These constraints, intrinsically linked to the situation of lockdown, prevent us from having de facto access to people for whom the relationship with their partner could be very conflictual.

The impact of nine variables on CSN, ESN and ESP was studied. However, other factors, not considered in this research, may also have had an impact on sexual cognitions and emotions. It would also have been interesting to consider the impact of possible difficulties in accessing contraception or sexual risk reduction. In the same way, if we studied variations in the frequency of physical or digital sexual relations, it would also have been interesting to consider the existence and impact of situations involving extra-marital partners.

These limitations should prompt us to be cautious about generalizing our results to other contexts. However, even within this atypical sample, potentially shielded from the most negative lockdown impact, the implications of lockdown for psychological and sexual health are numerous. However, it is possible that these impacts may be underestimated due to the characteristics of our sample.

Conclusion

The impact of COVID-19 lockdown on sexuality is complex. It is not simply a situation that is passively experienced. It has to be thought out taking into account the specificities of the situation, individual peculiarities, dyadic functioning and gender norms. Therefore, a psycho-sexological accompaniment will have to be based on a bio-psycho-social approach. The post-lockdown psycho-sexological accompaniment will gain by taking into account the thoughts and emotions felt during sexual intercourse as well as the behavioral modifications induced by the lockdown. The investigation of the cognitive-emotional lockdown impact on sexuality will be all the more important as:

- sexuality is an important component of health (WHO, 2006), affecting both individuals and societies (Ford et al., 2019);
- negative sexual cognitions and emotions are associated with increased levels of sexual difficulty (Nobre and Pinto-Gouveia, 2008; Tavares et al., 2020);
- sexual cognitions and emotions affect sexual satisfaction;
- that sexual satisfaction is associated with mental health and individual and couple quality of life (Flynn et al., 2016; Peixoto et al., 2018; Sánchez-Fuentes et al., 2014).

The proposed accompaniment should make it possible to evaluate the negative effects of lockdown but also its potential positive effects. In this regard, the investigation of sexual creativity during lockdown, especially through the use of new technologies, may be proposed.

Whether positive or negative, the repercussions of lockdown on sexuality and the life of the couple should be considered: what will become of a positive impact with deconfinement? Will the negative repercussions be one-off or will the vulnerabilities be expressed over the long-term?

Disclosure of interest

The authors declare that they have no competing interest.

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