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Solitary and Joint Online Pornography Use During the First COVID-19 Lockdown in Portugal: Intrapersonal and Interpersonal Correlates

David L. Rodrigues

Iscte - Instituto Universitário de Lisboa, CIS-Iscte, Lisbon, Portugal

Abstract

The onset of the COVID-19 pandemic forced several people into social isolation and research has shown a paradoxical effect on people's sexual functioning. Some people experienced decreases in sexual desire and sexual satisfaction, whereas others experienced heightened sexual desire and made new additions to their sexual repertoire, including more online pornography use, during the lockdown. Yet, studies failed to examine its interpersonal and intrapersonal correlates, distinguish between solitary and joint use, or explore differences between partnered and single people. We examined if changes in solitary or joint online pornography use since the lockdown were associated with sexual functioning, sexual satisfaction, perceived health, and sleep quality. We conducted an online cross-sectional study with convenience sampling in Portugal (N = 303 participants; 56.3% men; $M_{age} = 31.32$, $SD = 10.55$; 71.0% in a relationship) during May and July 2020. Partnered participants who reported increases in solitary online pornography use also reported decreases in their sex life quality. For partnered and single participants, increases in joint online pornography use were associated with increases in sex life quality. Single participants who reported increases in solitary online pornography use also perceived better health and sleep quality, and those who reported increases in joint online pornography use also reported more intimacy with casual partner(s) and better sleep quality. These findings suggest that online pornography might have been used as a sexual pleasure tool to connect with a stable or casual partner(s) in a time when social interactions were restricted.

Keywords: Pornography use; COVID-19; sexual intimacy; sex life quality; well-being

Introduction

Since the COVID-19 outbreak was declared a global pandemic on March 11th, authorities worldwide issued social distancing and lockdown policies (Balmford et al., 2020), forcing most people to be socially isolated. Portugal was no exception, and the government issued a nationwide lockdown on March 19th. After this period of confinement, the first phase of the deconfinement plan started on May 2nd with several social restrictions and was revised every other week depending on the infection rates. Throughout this period, public health measures (e.g., wearing face masks) and social distancing measures were mandatory, and confinement was advised to everyone.

Research has shown that social disruptions had negative implications not only on psychological and physical health and well-being (e.g., more anxiety and worse sleep quality; Franceschini et al., 2020; Martínez-de-Quel et al., 2021; Tommasi et al., 2020), but also on interpersonal relationships (e.g., more conflicts; Balzarini et al., 2020). Research has shown an overall *decrease* in sexual functioning since the COVID-19 outbreak (for a review, see Delcea et al., 2021). However, some people experienced *more* sexual desire during this time, which was associated with feeling less lonely, having more sex life quality, and experimenting with new sexual activities such as online

pornography use (e.g., Lehmillier et al., 2021). Pornhub (2020) reported significant increases in average worldwide traffic since March 11th with a peak of traffic on March 25th when the company offered free premium service to all users. Still, no research to date has examined possible intrapersonal and interpersonal correlates of online pornography use. Building upon this scarcity of evidence, we explored if perceived changes in online pornography use since the lockdown—while distinguishing between solitary pornography use and joint pornography use with partner(s)—were associated with interpersonal functioning, and examined perceived changes in sex life quality, perceived intimacy with partner(s), and sexual satisfaction. We also explored if perceived changes in online pornography use extended to intrapersonal functioning and examined associations with perceived health and sleep quality. Given that partnered and single people had distinct sexual experiences during the lockdown (Dewitte et al., 2020; Döring, 2020; Lopes et al., 2020), we examined if the above-mentioned associations differed according to relationship status to gain insights on the role of online pornography as a sexual pleasure-seeking tool in times of distress and when social interactions were restricted. We also ruled out alternative explanations by examining if the associations remained significant after controlling for known correlates of pornography use, such as frequency of use, frequency of masturbation, gender, and religiosity (e.g., Carroll et al., 2017; Grubbs, Perry, et al., 2019; Perry, 2020a).

COVID-19 and Interpersonal Relationships

Social isolation imposed by the pandemic caused several threats for people to meet their most basic needs (e.g., need for affiliation) and for their mental health (Matias et al., 2020). Given that social connection is a robust predictor of health and well-being (Holt-Lunstad et al., 2010), some authors highlighted the importance of being socially connected to cope with the distress caused by the pandemic (Abel & McQueen, 2020). For example, people with more social connections during self-isolation reported less anxiety and better sleep quality (Xiao et al., 2020), and those with more social support reported less depression severity, health anxiety, and loneliness (Tull et al., 2020).

People faced different challenges to meet their affective and sexual needs during the pandemic, either because they were confined at home alone, did not have a romantic partner, had restricted physical social interactions, had less sex drive, or had difficulties dealing with pandemic-related stressors (e.g., Balzarini et al., 2020; Dewitte et al., 2020; Döring, 2020; Lopes et al., 2020; Matias et al., 2020). For example, Rodrigues, Balzarini et al. (2021) found that single people driven by security motives perceived more pandemic-related threats and engaged in sexual activity less frequently later on. In another study, Luetke and colleagues (2020) found that partnered people who experienced more pandemic-related conflicts engaged in affective (e.g., hugging, kissing) and sexual behaviors (e.g., oral sex, intercourse) less frequently, experienced fewer orgasms, and felt more emotionally distant from their partner when having sex. Lastly, Balzarini and colleagues (2021) found that partnered people who experienced more pandemic-related stressors reported more depressive symptoms and lower sexual desire over time.

A recent review of literature has shown that most people have reported worse sexual functioning during the first months of the pandemic (Delcea et al., 2021). For example, Karagoz and colleagues (2020) found that both women and men were less sexually satisfied and had worse orgasm quality during (vs. before) the pandemic. Notwithstanding, several studies have shown a paradoxical pattern of experiences in sexual desire, sexual frequency, sexual behavior, and sexual satisfaction during the first months of the pandemic. For example, Karsiyakali and colleagues (2021) found that most participants reported a decreased frequency of sexual intercourse during the first wave of the pandemic, but at the same time an increased frequency of masturbation. The authors also found similar percentages of participants who reported decreases or increases in sexual desire. In other studies, Cocci and colleagues (2020) and Cito and colleagues (2021) found that most participants reported equal or increased sexual desire during the lockdown, most masturbated about the same or more during this period, and most used online pornography alone. However, most of these participants also reported less sexual satisfaction compared to a pre-lockdown period. Moreover, Wignall and colleagues (2021) found a similar number of participants who engaged in sexual behaviors more often during the lockdown (including masturbating alone or solitary pornography use) and who engaged in said behaviors less often. When asked about the reasons for having masturbated more since the outbreak, both single and partnered people indicated pleasure motives, desire to have sex, and having no one readily available (Hille et al., 2021). Coping with boredom and passing the time were also reasons to explain the higher frequency of masturbation during the pandemic, whereas lack of alone

time and less sex drive were reasons to masturbate less (Cascalheira et al., 2021). These findings suggest that acting upon one's sexual desire during lockdown was not necessarily beneficial for sexual satisfaction, especially when people engaged in solitary behaviors. However, Lehmiller and colleagues (2021) found that one in five participants made new additions to their sex life at the onset of the pandemic, which included trying a new sexual position, using sex toys, or using online pornography with their partner. Those who made new additions to their sex life also reported that their sex life improved, had more desire for their partners and perceived more sex life quality. The fact that some people have been reporting positive experiences may have to do with partnered sexual activity. Indeed, Mollaioli and colleagues (2021) found that sexually active (vs. inactive) participants during the pandemic reported less anxiety, less depression, and more dyadic adjustment. These findings also resonate with research showing that positive sexual experiences are associated with sexual satisfaction (Schoenfeld et al., 2017), and that sex life quality is associated with subjective well-being (e.g., Buczak-Stec et al., 2019; Kashdan et al., 2018) and perceived physical health (e.g., Lindau & Gavrilova, 2010).

Neither of the studies conducted during the pandemic examined single and partnered people separately and therefore did not disentangle behavioral patterns according to relationship status. An exception is a study by Coombe and colleagues (2021), showing that people in relationships were more likely to have sex with their partners at the onset of the pandemic, whereas single people were less likely to have casual sex. As discussed elsewhere (Dewitte et al., 2020; Döring, 2020; Lopes et al., 2020), both single and partnered people had different experiences with sexuality and intimacy during the pandemic and had to find alternative or new ways to satisfy their sexual needs while socially isolated. Building upon the available evidence, online pornography may have been particularly relevant in this context.

Pornography Use During the Pandemic

Apart from anecdotal evidence (Pornhub, 2020), research showed significant increases in pornography-related searches on Google (Zattoni et al., 2020) and pornography use (Grubbs et al., 2021) at the onset of the pandemic. Aligned with other findings (e.g., Grubbs, Wright, et al., 2019), some authors have discussed that online pornography was likely used to cope with the stress and anxiety caused by the pandemic, and as a way to meet one's sexual needs (e.g., Gillespie et al., 2021; Mestre-Bach et al., 2020; Pennanen-lire et al., 2021; Sharma & Subramanyam, 2020). To the extent that coping strategies have been key for well-being and sleep quality during the COVID-19 pandemic (e.g., Ahmed et al., 2021; Cheng et al., 2021; Götmann & Bechtoldt, 2021; Kim et al., 2021), online pornography use might have also played a role in health and well-being during this period.

Online pornography provides an accessible and affordable way of pursuing sexual gratification (Cooper, 1998). Pornography use is often associated with masturbation (e.g., Carvalheira et al., 2015; McNabney et al., 2020) and can serve different motivations, including seeking pleasure, increasing sexual satisfaction, feeling intimate with a partner, or coping with negative emotions (e.g., Bóthe et al., 2021; Esplin et al., 2021; Grubbs, Wright, et al., 2019; Kohut et al., 2017). There has been a long debate in the literature about the association between pornography use and intrapersonal and interpersonal functioning (Campbell & Kohut, 2017). On a personal level, research has shown that people who use pornography more frequently tend to report more stress, more susceptibility to boredom, more depressive symptoms, and more frustration with basic psychological needs (Bóthe et al., 2020). On a relational level, studies have focused on partnered people and examined differences between solitary and joint pornography use (Campbell & Kohut, 2017; Vaillancourt-Morel et al., 2019). Research has shown that partnered people who use pornography alone more frequently tend to report less relationship quality (e.g., Lambert et al., 2012; Perry, 2020b; Willoughby et al., 2016; Wright et al., 2017), are more likely to engage in extradyadic behaviors (Gwinn et al., 2013), and are more likely to break-up with their partner (Perry & Davis, 2017; Perry & Schleifer, 2018). These negative correlates of solitary pornography use are particularly evident when one partner uses pornography and the other does not (e.g., Daneback et al., 2009; Kohut et al., 2018; Willoughby et al., 2016). In contrast, partnered people who use pornography more frequently together with their partners tend to report more relationship quality (e.g., Kohut et al., 2018, 2021; Maddox et al., 2011; Willoughby & Leonhardt, 2020), including more sexual intimacy and sexual satisfaction (Huntington et al., 2021; Rodrigues, Lopes, et al., 2021). These findings parallel with the discourses people have about pornography use. Indeed, people often attribute both positive (e.g., improve sexual experiences) and negative effects (e.g., sexual disinterest in the partner) to pornography use in the context of a relationship (Kohut et al., 2017), and these perceived effects tend to be dependent on whether people use pornography alone or together with their partner (Olmstead et al., 2013).

Studies examining solitary pornography use often focus on partnered people and overlook the correlates of online pornography for those who are single. An exception is a study by Wright and colleagues (2018), in which solitary pornography use was found to be negatively associated with sexual satisfaction for both single and partnered people. However, there is a dearth of research examining the intrapersonal and interpersonal correlates of online pornography use at the onset of the pandemic for both partnered and single people. Furthermore, researchers are yet to understand whether single people used online pornography with casual partner(s) during the lockdown and the implications of this behavior. Research on long-distance relationships has shown that partnered people use online sexual activity to keep their sexual connection while apart (Goldsmith & Byers, 2020). Extending this reasoning to the COVID-19 lockdown context, single people might have used similar strategies to connect with prospective partners and fulfill their interpersonal needs.

Current Study and Hypotheses

The lockdown period restricted the opportunities for single people to meet with potential partners and have casual sex (e.g., Coombe et al., 2021), increased relationship difficulties (e.g., Balzarini et al., 2020), and disrupted partnered sexual activity (e.g., Luetke et al., 2020). Drawing on the evidence that some people maintained or increased their pornography use during this period (e.g., Cocci et al., 2020; Lehmillier et al., 2021; Wignall et al., 2021), we argue that online pornography had an important role in helping people meet their sexual needs. However, different interpersonal outcomes should emerge from this behavior depending on whether online pornography is used alone or with a partner.

Solitary pornography use has been negatively associated with sexual satisfaction overall (Wright et al., 2018), and for partnered people it has also been associated with worse relational outcomes (e.g., Willoughby et al., 2016; Wright et al., 2017). Using pornography alone is related to masturbation (e.g., Carvalheira et al., 2015; McNabney et al., 2020), which was driven by feelings of boredom and sexual desire when partners were unavailable during the pandemic (Cascalheira et al., 2021; Hille et al., 2021). Hence, partnered and single participants who report increases in solitary online pornography use since the lockdown should report decreases in their sex life quality (H1) and less sexual satisfaction (H2). This perceived change should also be associated with less perceived intimacy with the partner for people in a relationship (H3). We advanced no *a priori* hypothesis for those who are single.

Joint pornography use has been positively associated with relational outcomes (e.g., Kohut et al., 2018; Rodrigues, Lopes, et al., 2021; Willoughby & Leonhardt, 2020), by adding sexual novelty, increase feelings of intimacy, and improve sexual satisfaction (Kohut et al., 2017; Olmstead et al., 2013). Aligned with this, partnered people who jointly used online pornography during the pandemic have also experienced increases in sex life quality and desire (Lehmillier et al., 2021). Hence, partnered participants who report an increase in joint online pornography use since the lockdown should report increases in their sex life quality (H4), more intimacy with their partner (H5), and more sexual satisfaction (H6). Given the dearth of studies examining if single people use online pornography with casual partners or the correlates of such use, we did not advance specific hypotheses for these participants.

The stress caused by the pandemic also had negative consequences for several personal outcomes (e.g., Franceschini et al., 2020; Martínez-de-Quel et al., 2021; Tommasi et al., 2020). However, some people have used online pornography as a coping strategy and a way to meet sexual needs (Gillespie et al., 2021; Mestre-Bach et al., 2020; Pennanen-Iire et al., 2021; Sharma & Subramanyam, 2020). Given that certain coping strategies have been associated with improved individual functioning (Ahmed et al., 2021; Cheng et al., 2021; Götmann & Bechtoldt, 2021; Kim et al., 2021), we expected partnered and single people who report increases in online pornography use since the lockdown—either alone with a partner—to perceive better health (H7) and more sleep quality (H8).

Lastly, we examined if the pattern of associations for partnered and single participants was consistent after considering variables that are relevant to the pornography use literature. Specifically, we controlled for the frequency of pornography use (solitary and joint) before lockdown, frequency of and masturbation using online pornography (e.g., Perry, 2020a), frequency of attendance to religious beliefs (e.g., Grubbs, Perry, et al., 2019), gender (e.g., Carroll et al., 2017), and age (e.g., Solano et al., 2020).

Method

Participants

A total of 634 participants assessed the online survey. Participants who did not provide informed consent ($n = 6$) or did not use online pornography in the 12 months preceding the survey ($n = 203$) were automatically redirected to the end of the survey. We additionally removed 122 participants who abandoned before completing the survey. The final sample included 303 people living in Portugal (56.3% men), with ages ranging from 18 to 69 years ($M = 31.32$, $SD = 10.55$). Most participants identified as heterosexual (83.0%), lived in metropolitan areas (81.3%), were employed (60.1%), and were in a romantic relationship (71.0%) for an average of nine years ($M = 8.70$, $SD = 8.66$). Nearly half the sample had a university degree (45.8%) and was not religious (52.5%). Table 1 summarizes the sample characteristics.

Table 1. Demographic Characteristics.

	Overall ($n = 303$)	Relationship status	
		Partnered ($n = 215$)	Single ($n = 88$)
	$M (SD)$ or %	$M (SD)$ or %	$M (SD)$ or %
Age	31.32 (10.55)	33.03 (11.00)	27.10 (7.95)
Gender			
Female	43.7	46.3	37.5
Male	56.3	53.7	62.5
Sexual orientation			
Heterosexual	83.0	88.3	70.1
Lesbian/gay	9.7	7.5	14.9
Bisexual	7.0	4.2	13.8
Other (e.g., heteroflexible)	0.3	-	1.1
Education level			
High school	25.2	24.3	27.6
University graduate	45.8	46.3	44.8
Post-graduate degree	28.9	29.4	27.6
Residence			
Metropolitan area	81.3	81.7	80.5
Rural area	18.7	18.3	19.5
Occupation			
Employed	60.1	63.6	51.7
Working student	12.6	14.0	9.2
Student	17.3	13.6	26.4
Unemployed	8.6	7.0	12.6
Retired	1.3	1.9	-
Religious beliefs			
No religion	52.5	46.7	66.7
Catholic	38.2	45.3	20.7
Christian	7.0	5.6	10.3
Other (e.g., Agnostic, Evangelic, Paganism)	2.3	2.3	2.3
Relationship length (years)	-	8.70 (8.66)	-

Measures

Demographic Variables

Participants were asked to provide their age, gender, and sexual orientation using open-ended questions. Responses were categorized *a posteriori*. Participants were also asked to indicate their highest level of completed education (1 = *Less than high school*, 2 = *High school*, 3 = *University degree*, 4 = *Post graduate degree*, 5 = *Other, please specify* [open-ended response]), area of residence (1 = *Metropolitan area*, 2 = *Rural area*), their occupation (1 = *Employed*, 2 = *Working student*, 3 = *Student*, 4 = *Unemployed*, 5 = *Retired*, 6 = *Other, please specify* [open-ended response]), their religious beliefs (1 = *No religion*, 2 = *Catholic*, 3 = *Christian*, 4 = *Other, please specify* [open-ended response]), and their frequency of attendance to religious services (1 = *Never* to 7 = *Every day*). Lastly, participants were asked to indicate their relationship status (1 = *Single without a romantic relationship*, 2 = *In a romantic relationship*) and partnered participants were asked to indicate their relationship length in years and months (open-ended question).

Perceived Changes in Online Pornography Use

We defined online pornography as any material containing explicit sexual visual depictions with one or more adults, viewed on any electronic device (Rodrigues, Lopes, et al., 2021). After presenting this definition, participants were asked "Did you use online pornography in the last 12 months" (1 = *No*, 2 = *Yes*). For participants who used online pornography, we then assessed solitary pornography use by asking "How frequently did you use online pornography alone in the last year?" (1 = *A few times in the last 12 months*, 2 = *A few times in the last 6 months*, 3 = *A few times in the last month*, 4 = *A few times in the last week*, 5 = *A few times in the last days*, 6 = *Several times in the last days*) and "Compared to the typical use before the COVID-19 pandemic, my current use of online pornography alone is..." (1 = *Less than before the outbreak* to 7 = *More than before the outbreak*). As a control measure, we also asked "How frequently did you use online pornography to masturbate alone?" (1 = *Never*, 2 = *A few times in the last 6 months*, 3 = *A few times in the last month*, 4 = *A few times in the last week*, 5 = *A few times in the last days*, 6 = *Several times in the last days*).

To assess joint online pornography use, participants were asked "How frequently did you use online pornography together with your partner(s) in the last year" (1 = *Never*, 2 = *A few times in the last 12 months*, 3 = *A few times in the last 6 months*, 4 = *A few times in the last month*, 5 = *A few times in the last week*, 6 = *A few times in the last days*, 7 = *Several times in the last days*) and "Compared to the typical use before the COVID-19 pandemic, my current use of online pornography together with a partner(s) is..." (1 = *Less than before the outbreak* to 7 = *More than before the outbreak*). Partnered participants were asked to think about pornography use with their partner, and single participants were asked to think about pornography use with casual partner(s).

Perceived Changes in Sex Life Quality and Intimacy

We asked participants "Since the beginning of the COVID-19 pandemic, my sex life..." (1 = *Got worse* to 7 = *Got better*) and "How intimate do you feel with your partner(s)?" (1 = *Not at all* to 7 = *Very much*). Again, partnered participants were asked to think about their partner, and single participants were asked to think about casual partner(s).

Sexual Satisfaction

We used the short form of the New Sexual Satisfaction Scale (Brouillard et al., 2020; Portuguese version by Pechorro et al., 2016). This scale includes 12 items and assesses individual satisfaction (six items, e.g., "Thinking about your sexual activities, how would you rate the quality of your orgasms?") and relational satisfaction (six items, e.g., "Thinking about your sexual activities, how would you rate the balance between what you give and receive in sex?"). Responses were given in 5-point scales (1 = *Not at all satisfied* to 5 = *Extremely satisfied*) and averaged within each subscale. Higher scores indicate more individual ($\alpha = .89$) and relational sexual satisfaction ($\alpha = .87$).

Perceived Health and Sleep Quality

Participants were asked "Since the beginning of the COVID-19 pandemic, would you say your health is..." (1 = *Poor*, 2 = *Fair*, 3 = *Good*, 4 = *Very good*, 5 = *Excellent*; Ware et al., 1996) and "Since the beginning of the COVID-19 pandemic, how would you rate your sleep quality overall?" (1 = *Terrible*, 2 = *Poor*, 3 = *Fair*, 4 = *Good*, 5 = *Excellent*; Snyder et al., 2018).

Procedure

This study followed the Ethics guidelines of Iscte - Instituto Universitário de Lisboa. Data was collected in Portugal between May and July 2020, during the first nationwide lockdown. We posted advertisements on social media websites (e.g., Facebook, Instagram) inviting people to take part in an online survey aimed at understanding individual differences and experiences associated with online pornography use. We also stated that eligible participants had to be 18 years or older, have previously engaged in sexual activity, and have used online pornography in the last 12 months. When assessing the link to the survey provided in the advertisement, prospective participants were informed of their rights (e.g., anonymity and confidentiality of responses) and had to provide informed consent to proceed to the survey. Participants were then presented with all the measures. Throughout the survey, participants were reminded of questions left unanswered but were allowed to proceed with the survey. In the end, participants were thanked and debriefed.

Analytic Plan

First, we examined differences between partnered and single participants across our main measures using *t*-tests. We then computed correlations for each group separately. Lastly, we computed partial correlations controlling for the baseline frequency of online pornography use alone and with a partner, frequency of masturbation using online pornography, frequency of attendance to religious services, gender, and age. All analyses were computed with 1,000 bootstrap samples to account for multiple comparisons (for a discussion, see Westfall, 2011).

Results

Differences According to Relationship Status

Table 2. Descriptive Statistics According to Relationship Status.

	Overall (<i>n</i> = 303)	Relationship status comparisons			
		Partnered (<i>n</i> = 215)	Single (<i>n</i> = 88)	<i>p</i>	Hedges' <i>g</i>
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)		
Changes in solitary online pornography use (1-6)	3.91 (1.57)	3.78 (1.48)	4.24 (1.73)	.037	0.29
Changes in joint online pornography use (1-7)	3.06 (1.51)	3.13 (1.43)	2.89 (1.70)	.212	0.14
Perceived changes in sex life quality (1-7)	3.61 (1.65)	3.85 (1.60)	3.02 (1.64)	<.001	0.50
Perceived intimacy (1-7)	5.14 (2.17)	6.13 (1.42)	2.73 (1.78)	<.001	2.18
Individual sexual satisfaction (1-5)	4.07 (0.77)	4.13 (0.73)	3.92 (0.85)	.041	0.27
Relational sexual satisfaction (1-5)	3.76 (0.86)	3.86 (0.85)	3.52 (0.82)	.005	0.38
Perceived health (1-5)	2.98 (1.05)	3.01 (1.03)	2.90 (1.08)	.382	0.09
Perceived sleep quality (1-5)	2.58 (1.11)	2.61 (1.11)	2.52 (1.13)	.606	0.06
Baseline frequency of solitary online pornography use (1-7)	2.86 (1.62)	2.53 (1.45)	3.67 (1.72)	<.001	0.71
Baseline frequency of joint online pornography use (1-7)	1.78 (1.19)	1.81 (1.23)	1.69 (1.10)	.380	0.10
Frequency of masturbation using online pornography (1-6)	3.02 (1.36)	2.76 (1.20)	3.65 (1.48)	<.001	0.68
Frequency of attendance to religious services (1-7)	1.77 (1.06)	1.84 (1.08)	1.61 (1.00)	.087	0.22
Age	31.32 (10.55)	33.03 (11.00)	27.10 (7.95)	<.001	0.58

Note. We computed 1,000 bootstrapped independent sample *t*-tests to account for multiple comparisons.

Overall descriptive statistics and group differences are presented in Table 2. Results showed that partnered participants reported more positive changes to their sex life quality since the lockdown, more intimacy with their partner, more individual sexual satisfaction, and more relational sexual satisfaction. In contrast, single participants reported increases in solitary online pornography use since the lockdown, a higher baseline frequency of solitary online pornography use, and more frequent masturbation using online pornography. No other differences reached significance.

Correlations According to Relations Status

As shown in Table 3, the pattern of correlations showed similarities and differences between the groups. In both groups, participants who reported increases in joint online pornography use since the lockdown also reported increases in their sex life quality, both $p < .046$. Those who perceived increases in sex life quality also perceived more intimacy with their partner(s), both $p < .035$, better health, both $p < .026$, and better sleep quality, both $p < .039$. Perceived intimacy was also positively associated with individual, both $p < .004$, and relational sexual satisfaction, both $p < .001$. Both types of sexual satisfaction were positively correlated, all $p < .001$, and both were associated with the perception of better health, all $p < .022$, and sleep quality, all $p < .018$. Lastly, participants who perceived better health reported better sleep quality, both $p < .001$.

Partnered participants who reported increases in solitary online pornography also reported increases in joint online pornography use, $p < .001$, but decreases to their sex life quality, $p = .019$. Those who reported increases to their sex life quality reported more individual, $p = .003$, and relational sexual satisfaction, $p < .001$.

Single participants who reported increases in solitary online pornography use perceived better health, $p = .035$, and sleep quality, $p = .034$. Those who reported increases in joint online pornography use perceived more intimacy with casual partners, $p = .011$, and better sleep quality, $p = .002$. Lastly, those who perceived more intimacy with casual partners perceived better health, $p = .003$, and sleep quality, $p = .003$.

Table 3. Descriptive Statistics and Correlations According to Relationship Status.

	Correlations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Changes in solitary online pornography use	-	.36***	-.16*	-.08	.02	.00	-.03	-.00	.25***	-.03	.07	.04	.03
2. Changes in joint online pornography use	.15	-	.19**	.02	-.02	.01	.07	.04	.15*	-.11	.09	.05	.10
3. Perceived changes in sex life quality	-.07	.22*	-	.24***	.20**	.28***	.23***	.20**	-.05	.07	.02	-.02	.01
4. Perceived intimacy	.04	.27*	.23*	-	.37***	.50***	.10	.13	-.20**	.11	-.13	-.04	-.16*
5. Individual sexual satisfaction	.03	.07	.09	.31**	-	.66***	.17*	.18*	-.03	.07	-.01	.06	-.15*
6. Relational sexual satisfaction	.01	.11	.17	.36***	.77***	-	.16*	.18**	-.17*	.17*	-.13	-.01	-.23***
7. Perceived health	.23*	.09	.24*	.31**	.33**	.41***	-	.53***	-.01	-.10	.07	-.02	.00
8. Perceived sleep quality	.23*	.33**	.22*	.32**	.25*	.41***	.64***	-	-.04	-.09	-.02	-.02	-.02
9. Baseline frequency of solitary online pornography use	.42***	.28**	.06	-.04	-.14	-.13	.10	.23*	-	.24***	.70***	-.11	.09
10. Baseline frequency of joint online pornography use	.05	-.29**	.11	.13	.09	.14	.16	.07	.09	-	.13	-.03	.15*
11. Frequency of masturbation using online pornography	.33**	.21	.02	.09	-.15	-.14	-.06	.03	.73***	.07	-	-.12	.07
12. Frequency of attendance to religious services	-.10	-.09	.02	-.12	-.20	-.10	-.02	.04	.10	.06	-.02	-	.04
13. Age	-.14	.11	.07	.16	.15	.11	.06	.10	-.14	-.06	-.14**	-.04	-

Note. We computed 1,000 bootstrapped correlations to account for multiple comparisons. Correlations for single participants are presented below the diagonal, and correlations for partnered participants are presented above the diagonal. * $p \leq .050$. ** $p \leq .010$. *** $p \leq .001$.

Additional Analyses

Results also showed significant correlations between our main and control variables, except for the frequency of attendance to religious services (see Table 3), and significant gender differences in some of our main variables

(see Supplemental Materials, Table S1). Partial correlations controlling for these variables showed that the pattern of associations remained largely unchanged with four exceptions (see Supplemental Materials, Table S2). For partnered participants, the positive association between perceived intimacy and sleep quality became significant, $p = .039$. For single participants, nonsignificant associations emerged between solitary pornography use and perceived sleep quality, $p = .113$, and between perceived changes in sex life quality and both perceived intimacy, $p = .101$, and sleep quality, $p = .148$.

Discussion

Results from a cross-sectional study conducted during the first COVID-19 pandemic lockdown in Portugal provided preliminary evidence highlighting the intrapersonal and interpersonal correlates of online pornography use. Overall, we found mixed support to our hypotheses, as well as similarities and differences between solitary and joint online pornography use, and between partnered and single participants. Lastly, our findings were mostly unaffected by past pornography use, masturbation, religiosity, gender, or age.

As expected, partnered people who increased their solitary use of online pornography since the lockdown also perceived decreases in their sex life quality during this period (H1). In contrast, and as expected, partnered people who increased their joint use of online pornography since the lockdown perceived increases to their sex life quality (H4). This was true even after controlling for our covariates. Against our expectation, changes in solitary or joint online pornography use were unrelated to sexual satisfaction (H2 and H6), perceived intimacy (H3 and H5), perceived health (H7), or sleep quality (H8). These findings are partly aligned with past evidence showing negative consequences of solitary pornography use for relationship quality (Lambert et al., 2012; Perry, 2020b; Willoughby et al., 2016; Wright et al., 2017), especially when both partners have discordant patterns of pornography use (e.g., Daneback et al., 2009; Kohut et al., 2018; Willoughby et al., 2016), and positive consequences of joint pornography use to relationship quality (Huntington et al., 2021; Kohut et al., 2018; Rodrigues, Lopes, et al., 2021; Willoughby et al., 2016; Willoughby & Leonhardt, 2020; Wright et al., 2017). Using online pornography alone during lockdown might have been a way to satisfy one's sexual needs at the onset of the pandemic, particularly when the partner was unavailable or uninterested in having sex (Hille et al., 2021). Building upon other studies (Balzarini et al., 2021; Luetke et al., 2020), this behavior possibly added strains to the relationship and may have predisposed people to experience lower sexual desire or sex quality caused by pandemic-related stressors. In contrast, using online pornography with the partner might have been a way to add sexual novelty to the relationship (Lehmiller et al., 2021), possibly helping to ameliorate some of the pandemic-related strains and enhancing perceived sex life quality, but this behavior was not translated into sexual satisfaction or partner intimacy. Likewise, online pornography use—either alone or with the partner—was unrelated to intrapersonal outcomes related to subjective physical well-being. Sexual activity is often related to sexual satisfaction (Dosch et al., 2016; Frederick et al., 2017; McNulty et al., 2016), even though having sex more frequently is not necessarily predictive of sexual or relationship satisfaction (Roels & Janssen, 2020; Schoenfeld et al., 2017). Furthermore, sexual experiences can be shaped by contextual factors (Dewitte & Mayer, 2018). For example, pandemic-related variables (e.g., lifestyle changes; fear of infection) had distinct associations with sexual desire, sex life quality, and relationship quality (Rodrigues & Lehmiller, 2021). Hence, other variables might have mediated or moderated the association between joint online pornography use and sexual satisfaction or personal well-being (e.g., sexual needs fulfillment; Daneback et al., 2013).

For single people, and against our expectations, changes in solitary online pornography use were unrelated to changes in sex life quality (H1) or sexual satisfaction (H2). This behavior was also unrelated to perceived intimacy with casual partners. Instead, as expected, single people who increased their solitary use of online pornography since the lockdown perceived better health and sleep quality (although this last association became non-significant after controlling for our covariates). To the extent that online pornography is a quick and easy way to obtain sexual gratification (Campbell & Kohut, 2017; Cooper, 1998; Grubbs, Wright, et al., 2019), single people might have benefited from using online pornography alone to fulfill sexual or other needs (e.g., stress release) and increase subjective physical well-being, and not necessarily to fulfill their affective needs. Hence, using online pornography alone was arguably used as a tool to improve well-being. No hypotheses for joint use of online pornography were advanced due to a lack of past studies. And yet, some participants did report increases in this behavior. Indeed, single people who increased their use of online pornography with casual partner(s) since the lockdown perceived increases to their sex life quality and more intimacy with casual partner(s) during this period. This behavior was

also associated with better sleep quality. Aligned with past discussions suggesting that single people struggled the most to fulfill their sexual needs during lockdown (Dewitte et al., 2020; Döring, 2020; Lopes et al., 2020), our findings suggest that joint online pornography use was a tool to connect with others and improve sex quality and closeness to others while forced into social isolation, and to cope with the some of the distress caused by the pandemic. In this sense, joint online pornography might have helped some people to maintain sexual connections when physically distant (e.g., Goldsmith & Byers, 2020) and increase social connectedness during the lockdown, which is an important predictor of quality of life and well-being (Holt-Lunstad et al., 2010).

Limitations and Future Studies

Our study has the strength of examining a timely topic to sex research and providing novel evidence on a largely understudied topic in the context of the COVID-19 pandemic. Yet, we must acknowledge some important limitations. First, our measures primarily assessed perceived changes and were comprised of single-item measures, which might compromise the assessment of certain constructs. Second, even though we controlled multiple comparisons using a bootstrap approach, our findings should be taken with caution given our limited sample size—especially the subsample of single participants—and the possibility that Type I/II Error was inflated. Third, some of our non-significant findings might be related to the specific point in time in which the data was collected. During the first months of the pandemic, people had to rethink their intimacy and how to connect to others (including their romantic partner) while coping with uncertainty. Arguably, experimenting with online pornography had faster associations with perceived sex life quality, but implications of such behaviors for other interpersonal and intrapersonal outcomes unfolded more slowly over time and were not captured in this study. Hence, additional studies are required to replicate and extend our exploratory findings. For example, future studies could conceptually replicate our study with partnered and single people (e.g., during other stressful times) using longitudinal data. If perceived changes in sex life quality and intimacy were associated with online pornography use and other outcomes, we can speculate that sex life quality was a potential underlying mechanism explaining why changes in online pornography use during stressful times harmed or benefitted interpersonal dynamics and subjective physical well-being (see also Buczak-Stec et al., 2019; Kashdan et al., 2018). Lastly, and equally important, the cross-sectional nature of our data did not allow us to establish causal links between our variables nor examine dyadic processes. For example, greater use of solitary online pornography by partnered people might have resulted in the perception of a worsened sex life quality during lockdown because they felt emotionally distant from their partner or struggled more with pandemic-related stressors (e.g., more conflicts). However, it could also be the result of pre-existing problems with sex life quality (e.g., unresponsive partner) that were aggravated during the lockdown. Similarly, greater use of joint online pornography by single people might have increased perceived intimacy with physically distant casual partners, but it could also be the result of feeling more intimate with a casual partner after having repeated interactions online. Building upon past findings that romantic partners have poorer sexual communication when both have a discordant, rather than concordant, pornography use (Daneback et al., 2009; Kohut et al., 2018; Willoughby et al., 2016), dyadic studies with partnered people would allow us to examine the implications of online pornography use during the pandemic for individual functioning, for relationship and sexual quality, and for how people deal with the stressors caused by the pandemic. Even though dyadic research is not applicable when examining single people, it would be interesting to understand why, and under which conditions, these people used online pornography with casual partner(s) during the pandemic. Much like partnered people, sexual intimacy with sexual nonromantic partners (e.g., casual acquaintances, friends with benefits; Braithwaite et al., 2015; Furman & Shaffer, 2011) might provide the opportunity to try new sexual behaviors during the pandemic. Future studies should seek to replicate and extend our findings.

Conclusion

This study opens new and interesting venues of research aimed at understanding how partnered and single people fulfilled their sexual needs at the onset of the COVID-19 pandemic, and its implications for subjective well-being. For partnered people, using online pornography alone was associated with perceived decreases in sex life quality, whereas using online pornography with the partner was associated with perceived increases in sex life quality. For single people, using online pornography alone during lockdown was associated with better intrapersonal functioning, whereas using online pornography with casual partner(s) during this period was related to better interpersonal and increases in intrapersonal functioning. Our findings can be used by academics and

professionals to raise awareness about the potential benefits and harms of online pornography use for oneself and relationships, destigmatize this behavior, and inform how it can be used as a sexual-pleasure seeking tool in stress-provoking situations.

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Supplementary Materials

Table S1. Descriptive Statistics According to Gender and Relationship Status.

	Overall gender comparisons				Relationship status x gender comparisons			
	Women		Men		Partnered		Single	
	(<i>n</i> = 132)	(<i>n</i> = 170)	<i>p</i>	Hedges' <i>g</i>	(<i>n</i> = 99)	(<i>n</i> = 115)	(<i>n</i> = 33)	(<i>n</i> = 55)
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)			<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Changes in solitary online pornography use (1-6)	3.73 (1.64)	4.05 (1.50)	.094	0.20	3.69 ^a (1.55)	3.86 ^{a,b} (1.42)	3.88 ^{a,b} (1.92)	4.45 ^b (1.58)
Changes in joint online pornography use (1-7)	2.90 (1.47)	3.17 (1.54)	.117	0.18	3.14 ^a (1.38)	3.10 ^a (1.48)	2.18 ^b (1.53)	3.31 ^a (1.67)
Perceived changes in sex life quality (1-7)	3.56 (1.85)	3.65 (1.49)	.662	0.05	3.89 ^a (1.84)	3.82 ^a (1.38)	2.58 ^b (1.54)	3.29 ^{a,b} (1.65)
Perceived intimacy (1-7)	5.34 (2.26)	4.98 (2.10)	.163	0.16	6.37 ^a (1.24)	5.91 ^a (1.53)	2.23 ^b (1.68)	3.04 ^b (1.78)
Individual sexual satisfaction (1-5)	4.02 (0.73)	4.10 (0.80)	.379	0.10	4.08 ^a (0.72)	4.17 ^a (0.73)	3.85 ^a (0.74)	3.96 ^a (0.92)
Relational sexual satisfaction (1-5)	3.87 (0.78)	3.67 (0.90)	.026	0.24	4.02 ^a (0.74)	3.71 ^b (0.92)	3.42 ^b (0.74)	3.57 ^b (0.86)
Perceived health (1-5)	2.89 (1.08)	3.04 (1.01)	.209	0.15	2.89 ^a (1.09)	3.10 ^a (0.97)	2.88 ^a (1.08)	2.91 ^a (1.09)
Perceived sleep quality (1-5)	2.57 (1.15)	2.61 (1.08)	.780	0.03	2.69 ^a (1.19)	2.56 ^a (1.02)	2.21 ^a (0.96)	2.71 ^a (1.20)

Note. We computed 1,000 bootstrapped independent sample *t* tests to account for multiple comparisons. Different superscripts (^{a,b}) in the Relationship status x gender comparisons column indicate *post-hoc* comparisons with Bonferroni correction, *ps* ≤ .046.

Table S2. Partial Correlations Between Main Variables.

	Correlations							
	1	2	3	4	5	6	7	8
1. Changes in solitary online pornography use	-	.32 ^{***}	-.14 [*]	-.01	.06	.08	-.02	-.01
2. Changes in joint online pornography use	.07	-	.22 ^{***}	.10	.04	.10	.08	.03
3. Perceived changes in sex life quality	-.10	.22 [*]	-	.23 ^{***}	.20 ^{**}	.27 ^{***}	.24 ^{***}	.20 ^{**}
4. Perceived intimacy	.08	.31 ^{**}	.18	-	.36 ^{***}	.45 ^{***}	.12	.14 [*]
5. Individual sexual satisfaction	.11	.10	.04	.27 [*]	-	.67 ^{***}	.17 [*]	.20 ^{**}
6. Relational sexual satisfaction	.08	.16	.12	.33 ^{**}	.75 ^{***}	-	.20 ^{**}	.21 ^{**}
7. Perceived health	.23 [*]	.12	.22 [*]	.35 ^{**}	.33 ^{**}	.40 ^{***}	-	.54 ^{***}
8. Perceived sleep quality	.18	.29 ^{**}	.16	.35 ^{**}	.25 [*]	.43 ^{***}	.62 ^{***}	-

Note. We computed 1,000 bootstrapped partial correlations to account for multiple comparisons. Partial correlations controlling for baseline frequency of solitary online pornography use, baseline frequency of joint online pornography use, frequency of masturbation using online pornography, gender, and age. Correlations for single participants are presented below the diagonal, and correlations for partnered participants are presented above the diagonal. **p* ≤ .050. ***p* ≤ .010. ****p* ≤ .001.

Correspondence to:

David L. Rodrigues
Iscte - Instituto Universitário de Lisboa, CIS-Iscte
Av. das Forças Armadas
1649-026 Lisboa
Portugal
E-mail: [dflrs\(at\)iscte-iul.pt](mailto:dflrs@iscte-iul.pt)

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About Author

David L. Rodrigues, Ph.D. (dflrs@iscte-iul.pt) is a Resercher in the CIS-Iscte research center at Iscte - Instituto Universitário de Lisboa, Portugal. His primary research interests include the role of individual differences and interpersonal processes in well-being, sexuality, sexual behavior, and sexual health decision-making.

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