

1 **Partnership status, living arrangements, and changes in sexual behaviour**
2 **and satisfaction during the COVID-19 lockdown: Insights from an**
3 **observational, cross-sectional online survey in Singapore**

4
5 Running head: COVID-19 and sexual behaviour in Singapore

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24

25 **Acknowledgements:** The study team would like to thank all the participants who
26 took part in the study. We would like to extend our sincerest thanks to the support
27 from the International Sexual Health And REproductive health (I-SHARE)
28 consortium. We would like to extend our sincerest gratitude to the Saw Swee Hock
29 School of Public Health, National University of Singapore for funding this research.

30

31 **Authorship contribution statement:** RKJT and CAO conceptualised the study;
32 RKJT acquired the funding for the study; RKJT, CAO and NK conducted formal
33 analyses; RKJT and CAO conducted the investigation; RKJT, CAO and NK
34 curated the data associated with the study; RKJT wrote the original draft; CAO
35 and NK reviewed and approved of the manuscript prior to submission.

36

37 **Disclosure statement:** No potential competing interest was reported by the
38 authors.

39

40 **Funding details:** This research is supported by the Saw Swee Hock School of
41 Public Health, National University of Singapore.

42

43 **Data availability statement:** The data that support the findings of this study are
44 available on request from the corresponding author, RKJT. The data are not
45 publicly available due to information that could compromise the privacy of
46 research participants.

47 **Abstract**

48 **Background:** The SARS-CoV-2 (COVID-19) pandemic and its concomitant
49 movement control measures have had profound impact on the world. In spite of its
50 potential impact on sexual health, there is a lack of research on how the pandemic
51 and its movement control measures have impacted sexual well-being among
52 Singaporeans.

53 **Methods:** This observational, cross-sectional study was conducted from August to
54 September 2020. Participants were recruited through an online survey instrument
55 promoted through social media. Respondents self-reported their sexual
56 behaviours and levels of sexual satisfaction prior to and during the COVID-19
57 pandemic movement control measures.

58 **Results:** We recruited a total of 562 participants, of whom 338 (n=60.1%) ever
59 had a sexual experience. Singles (n=106, 31.4%) and those not living with their
60 partners (n=115, 34.0%) reported a greater decrease in partnered sexual activities
61 but a greater increase in individual sexual activities such as masturbation, sending
62 and receiving nudes and watching pornography, relative to those who were living
63 with their partners (n=117, 34.6%). Multivariable analyses indicated that relative to
64 singles, those who were not living with their partners were more likely to
65 experience a decrease in sexual satisfaction (aPR=1.42, 95%CI [1.06, 1.90]),
66 while those who were living with their partners were less likely to experience a
67 decrease in sexual satisfaction (aPR=0.44, 95%CI [0.25, 0.78]).

68 **Conclusions:** Interventions may focus on enhancing sexual wellness by
69 educating on and supporting individual or partnered sexual activities that may vary
70 along the lines of partnership status and living arrangements during the
71 implementation of movement control measures.

72 **Keywords:** Asia; Behaviour; Sexual behaviours; Sexual practices; Surveillance

73 **Introduction**

74 The SARS-CoV-2 (COVID-19) pandemic has had a profound impact on
75 economic and social lives globally. Since COVID-19 was declared as a public
76 health emergency of international concern on 30 January 2020 by the World
77 Health Organization (1), countries have enacted varying modes of movement
78 control measures in an effort to curb its spread (2, 3). COVID-19 and its
79 concomitant movement control measures have also inadvertently impacted the
80 sexual well-being of individuals around the world (4).

81 The COVID-19 pandemic has directly impacted the delivery of and access
82 to sexual and reproductive health services among the general population, as well
83 as among vulnerable populations, such as refugees, across the world (5-8).
84 Studies have found that sexual behaviours have been impacted in varying ways
85 across different settings and population subgroups; specifically, the evidence has
86 shown a general decrease in sexual behaviours, as reported by studies among
87 the general population in China as well as among college students in the United
88 States (9-11), and an increase in others, as reported among women in Turkey and
89 gay, bisexual and other men who have sex with men in the United States (12, 13).
90 The findings of some studies have also found that sexual behaviours associated
91 with a heightened risk of acquiring HIV and other sexually transmitted infections,
92 such as inconsistent condom use or the use of substances with sex, have either
93 remained stable or been on the rise during this time in spite of movement control
94 measures, which were reported in a study of heterosexual young adults in
95 Australia and sexual minority men in the United States (14, 15). Correspondingly,
96 a study in Finland found that the pandemic and its lockdown measures had not

97 reduced diagnoses of chlamydia or gonorrhoea, while a study in Italy found that
98 diagnoses of syphilis had not dropped in spite of such measures (16, 17).

99 There have also been attempts to investigate how the quality of one's sex
100 life and sexual well-being has been impacted by the pandemic. Studies in the
101 United States and China have found that while sexual behaviours in general have
102 decreased, individuals are reporting an expanded sexual repertoire of new sexual
103 activities such as an increasing use of pornography, virtual sex, sexting, and trying
104 out new sexual positions (18, 19). Another study on investigating global internet
105 traffic for Pornhub, one of the largest pornography sites, found increases in online
106 traffic across the world (20). Nevertheless, satisfaction with one's sex life and
107 quality of sex life have been on a decline in the general population during this
108 pandemic, which was reflected in online survey studies conducted in Taiwan and
109 Italy (21, 22), though evidence from another study in Italy on couples who were
110 cohabiting during the lockdown period seemed to suggest that the lockdowns did
111 not have a large impact on the sexuality of cohabiting couples, though some
112 participants did report a decrease in satisfaction (23). Sexual wellbeing and
113 satisfaction have been shown to be positively associated with individual mental
114 wellbeing and relationship quality among couples, and are thus important areas of
115 inquiry (24, 25).

116 Singapore is a city-state comprising a population of about 5.7 million (26).
117 Singapore society holds largely conservative views around sexual behaviours,
118 especially towards sexual relations before marriage, sexual relations between two
119 adults of the same sex, and cohabitation before marriage (27). While scholars
120 have largely attempted to characterise risk factors for HIV and other sexually
121 transmitted infections among at-risk populations such as men who have sex with

122 men, sex workers and their clients, as well as adolescents (28-35), there is a gap
123 in published studies on the sexual behaviour of Singaporeans in general,
124 notwithstanding a few studies on sexual health in the general population (36-38).

125 Singapore's version of its 'lockdown', or COVID-19 movement control
126 measures, were also known as the 'circuit breaker' period. This was in effect from
127 7 April until 1 June 2020, and involved the closure of all non-essential workplaces
128 and the implementation of strictly-enforced movement control measures such as
129 mandatory mask-wearing and restrictions on leaving one's home unless for
130 essential services. Individuals were also only allowed to physically interact with
131 other people living in the same household during this time, and individuals who
132 were partnered, but not cohabiting with their partners, were not allowed to visit
133 their partners who were physically living in other households. The term 'circuit-
134 breaker' refers to this set of measures that would curb the continued spread of
135 COVID-19 in the community, and in effect 'break the circuit' of transmission (39).
136 The circuit breaker measures were then gradually eased in phases from 2 June
137 2020.

138 Given the lack of research on sexual behaviours in Singapore in general,
139 and a gap in our understanding of how the pandemic and its movement control
140 measures have impacted sexual well-being among Singaporeans, the objectives
141 of this study are two-fold. First, this study attempts to characterise levels of
142 individual and interpersonal sexual behaviours among an online sample of
143 Singapore residents and investigate how the circuit-breaker had impacted such
144 behaviours; and second, to determine how levels of sexual satisfaction have
145 changed for individuals of varying partnership status and living arrangements.

146

147 **Methods**

148 *Study design and participants*

149 This observational, cross-sectional online survey was conducted in
150 Singapore from August to September 2020. This study is part of a larger global
151 consortium of online surveys on the impact of COVID-19 on sexual and
152 reproductive health, called the International Sexual Health And REproductive
153 health (I-SHARE) survey (40). To be eligible for this study, participants had to
154 report at least 18 years of age, and a Singapore permanent resident or Singapore
155 citizen residing in Singapore at the point of participation.

156

157 *Data Collection*

158 Ethics approval was obtained from the institutional review board at the
159 National University of Singapore (NUS-IRB Reference Code NUS-IRB-2020-58)
160 prior to data collection. Participants were recruited through an advertisement to
161 participate that was promoted through the sharing of the study through posts
162 made by the study team members on social media, as well as through Facebook
163 and Instagram ads. The ads were run in the English language and included the
164 headline: “*Survey on sexual and reproductive health in times of COVID-19 – Get a*
165 *\$10.00 GrabRide [transportation] Voucher for your participation*” (see
166 **Supplemental Figure 1**). The ads were run from August 20 to September 25,
167 2020 and were targeted to all individuals aged 18 and above who were residing in
168 Singapore at the point at which the ads were promoted. Based on a resident
169 population of 5.69 million in Singapore, a sample size of 385 was calculated to
170 provide us with a 5% margin of error at 95% confidence. We opted to recruit

171 beyond 385 participants and targeted a total of 600 participants based on the
172 study's available budget.

173 Upon clicking on or visiting the enrolment link, participants were led to a
174 page where the participant information sheet was embedded, which they could
175 download and keep. Participants who agreed to participate in the survey provided
176 informed consent by clicking on a button at the end of the page to acknowledge
177 that they have read the participant information sheet and agreed to participate in
178 the survey. Participants who completed the survey were asked to provide an email
179 address, to which an SGD10.00 (approximately USD7.50) transport voucher was
180 transmitted as reimbursement for their time. Each survey took an average of 15
181 minutes to complete.

182

183 *Demographic variables*

184 We measured age in years as a continuous variable, sex assigned at
185 birth (male vs female), sexual orientation (heterosexual vs non-heterosexual), race
186 (non-Chinese vs. Chinese), religion (no religion vs. with religion), housing type
187 (public housing vs. private housing; as of 2020, about 80% of the Singapore
188 resident population were living in public housing) (41), gross personal monthly
189 income (below SGD3000 [~ USD 2250] vs. SGD3000 [~ USD 2250] and above,
190 given that SGD2925 [~ USD 2200] was the most recent figure published for
191 median income in Singapore) (42), and educational attainment (degree
192 educational attainment vs. below degree educational attainment). Relationship
193 status was collected through the question: "What is your marital status?", which
194 allowed for the recoding of a categorical variable with options involving
195 permutations of a participant's partnership status (e.g., single, legally married, in a

196 relationship) and if they were living together (e.g., “legally married and living
197 together”). A copy of the survey questionnaire is available in the supplementary
198 material.

199

200 *Sexual behaviour variables*

201 Participants were asked if they ever had a sexual experience, which was
202 defined in the survey instrument as any kind of experience that participants felt
203 was sexually arousing, including kissing, touching, intercourse, masturbation,
204 watching sexually explicit images, or any other form of sex. Participants reported
205 about their sexual behaviours in the three months prior to the circuit-breaker
206 through a series of questions on their self-reported frequencies of engaging in
207 various sexual behaviours. Frequencies were solicited through two sets of
208 potential options; the first being ‘never’, ‘monthly or less’, ‘two to four times a
209 month’, ‘two to three times a week’, and ‘four or more times a week’; the second
210 being ‘never’, ‘rarely’, ‘sometimes’, ‘most of the time’, and ‘always’ for variables
211 such as condom use where the proportion of such behaviors were of interest,
212 rather than the frequency. The sexual behaviours included hugging, kissing or
213 holding hands, sexual activities (including oral, vaginal, anal intercourse or
214 touching), and condom use for sex with a steady sexual partner, sexual activities
215 and condom use for sex with a casual sexual partner (‘someone who you are not
216 in a long-term relationship with’), masturbation, sending and receiving of nude
217 photos, having sex in exchange for money, goods, favors, drugs or shelter,
218 watching of pornography, and engaging in webcam sex. Participants reported how
219 such sexual behaviours had changed during the circuit-breaker period in relation
220 to three months prior, to which they could respond to the following set of options

221 for all sexual behaviours listed above: ‘decreased a lot’, ‘decreased a bit’, ‘stayed
222 the same’, ‘increased a bit’, and ‘increased a lot’.

223 Sexual satisfaction was measured among all participants who reported ever
224 having a sexual experience, and was determined through the question: “How
225 satisfied were you with your sex life *in the three months before* the circuit-
226 breaker?”, as well as “How satisfied were you with your sex life *during* the circuit-
227 breaker?”, to which participants could respond with ‘very’, ‘somewhat’, ‘not very’ or
228 ‘not at all’. We recoded this into a binary variable to reflect increases or decreases
229 in sexual satisfaction, comparing changes in such responses in the three months
230 prior to COVID-19 and during COVID-19. Participants who indicated the same
231 response for both time frames were coded as having ‘stayed the same’, while
232 participants with missing data for this variable on either time frame were excluded
233 for the newly-coded variables.

234

235 *Statistical analysis*

236 Statistical analysis was carried out using the statistical software STATA
237 version 15 (Stata Corp, College Station, TX, USA). As the outcomes of interest for
238 this study included measures of sexual behaviours and sexual satisfaction, we
239 limited our analyses to individuals who reported ever having a sexual experience.
240 We employed descriptive statistics to describe broad patterns in the measures
241 collected for our study. We used bivariable statistics to assess and compare
242 trends in sociodemographic characteristics, sexual behaviours, and levels of
243 sexual satisfaction by one’s partnership status. Chi-square tests were employed to
244 determine if statistically significant differences existed across such comparisons.
245 Multivariable Poisson regression models with robust sandwich variances were

246 used to compute the adjusted PR (aPR) for a reported decrease in one's sexual
247 satisfaction. Poisson regression was chosen over logistic regression as the
248 outcome was considered to be common and exceeded 10% of the study
249 population (43), We controlled for key sociodemographic variables such as age,
250 sex assigned at birth, sexual orientation, race, religion, housing type, income level,
251 and educational attainment. Selection of these variables were informed by key
252 population indicators used in Singapore, as well as measures of the social
253 determinants of health (26, 44). Missing data was less than 5% for variables used
254 in regression analyses, and thus were not likely to have a consequential impact on
255 analyses (45). Statistical significance was set at $p < 0.05$.

256

257 **Results**

258 *Sociodemographic characteristics of sample*

259

<Table 1 about here>

260 The survey advertising campaign reported a total number of 14026
261 impressions and 427 clicks, indicating a clickthrough rate of 3.04%. As the survey
262 only captured responses from eligible participants, we were unable to ascertain a
263 disqualification or eligibility rate. 559 out of 562 participants who were eligible for
264 the study fully completed the online questionnaire, thus providing a survey
265 completion rate of 99.5%. Full completion of the survey was not a criteria for
266 inclusion in the study. Table 1 summarises the sociodemographic characteristics
267 of all individuals who ever had a sexual experience ($n=338$). A total of 106, 115
268 and 117 reported being single (31.4%), not living with their partner (34.0%), and
269 living with their partner (34.6%), respectively. The median age of participants was
270 28, and older respondents were more likely to be cohabiting with their partners.

271 Participants were largely heterosexual (n=192; 57.5%), of the Chinese race
272 (n=275, 83.3%), had no religion (n=98, 29.5%), staying in 4-room HDB flats
273 (n=108, 32.2%), earning an income (n=265, 79.1%), and had educational
274 attainment of a university degree and above (n=182, 54.2%).

275

276 *Sexual behaviours in three months prior to and during the COVID-19 circuit-*
277 *breaker measures*

278 **<Figures 1 and 2 about here>**

279 A total of 338 (n=60.1%) respondents reporting ever having a sexual
280 experience. Figures 1 and 2 summarise the reported sexual behaviours by
281 partnership status in the three months before and during the COVID-19 circuit
282 breaker measures, respectively. Supplementary tables 1 and 2 provide detailed
283 tables for these figures. Of those who ever had a sexual experience, 106, 115 and
284 117 participants reported being single (31.4%), not living with their partners
285 (34.0%), and living with their partners (34.6%), respectively. We assessed the
286 relationship between partnership status and sexual behaviours for both
287 timeframes.

288 For sexual behaviours in the three months prior to COVID-19, participants
289 who were single reported lower levels of activities with a steady sexual partner
290 and higher level of activities with casual sexual partners. Bivariable analysis
291 revealed that respondents who were single or not living with their partners
292 engaged in higher levels of masturbation ($p<0.001$), sending or receiving nudes
293 ($p<0.001$), sex in exchange for money, goods, favors, drugs or shelter ($p=0.021$),
294 watching pornography ($p<0.001$), and engaging in sex on webcam ($p=0.034$). For
295 changes in sexual behaviours during COVID-19 circuit-breaker measures,

296 participants who were single or not living with their partners experienced a greater
297 decrease in sexual activities with steady and casual partners, but a greater
298 increase in masturbation ($p<0.001$), receiving or sending of nudes ($p<0.001$), and
299 watching pornography ($p<0.001$) in relation to those living with their partners.

300 **Supplemental Tables 1 and 2** provide further details of such trends.

301

302 *Sexual satisfaction in three months prior to and during the COVID-19 circuit-*
303 *breaker measures*

304 **<Tables 2 and 3 about here>**

305 Table 2 summarises levels of sexual satisfaction in the three months prior
306 to and during the COVID-19 circuit-breaker measures. In general, there were
307 statistically significant relationships between partnership status with levels of
308 sexual satisfaction across both timeframes, as well as changes in sexual
309 satisfaction. Those who were single reported lower levels of sexual satisfaction
310 than those who were partnered in the three months before the COVID-19 circuit-
311 breaker measures ($p=0.017$), while those who were living with their partners
312 reported the highest levels of sexual satisfaction compared to those who were
313 single or not staying with their partners ($p<0.001$).

314 Table 3 summarises the multivariable Poisson regression models with
315 adjusted prevalence ratios (95%CI) for decrease in sexual satisfaction as a result
316 of COVID-19 circuit-breaker measures. Multivariable analyses revealed that those
317 who were not living with their partners were more likely (aPR=1.42, 95%CI [1.06,
318 1.90]), while those who were living with their partners were less likely (aPR=0.44,
319 95%CI [0.25, 0.78]) to experience a decrease in sexual satisfaction, relative to
320 those who were single. Results indicated that several demographic attributes were

321 associated with decreased sexual satisfaction when stratified by partnership
322 status. Among singles, those who were older in age (aPR=0.96, 95%CI [0.93,
323 0.99]) and being of female sex (aPR=0.52, 95%CI [0.32, 0.86]) were less likely to
324 experience a decrease in sexual satisfaction; among those not living with their
325 partners, those who were older in age (aPR=1.02, 95%CI [1.01, 1.04]) were more
326 likely to experience a decrease in sexual satisfaction; and among those living with
327 their partners, those who were older in age (aPR=0.95, 95%CI [0.93, 0.98]) were
328 less likely to experience a decrease in sexual satisfaction.

329 **Discussion**

330 Findings of this study indicate that changes in sexual behaviour and
331 satisfaction as a result of COVID-19 movement control measures may vary along
332 the lines of an individual's partnership status and living arrangements. Among
333 participants who ever had a sexual experience, those who were single or not living
334 with their partners experienced a greater decrease in sexual activities with steady
335 and casual partners, but a greater increase in individual sexual behaviours such
336 as masturbation, receiving or sending of nudes, and watching pornography. We
337 found that those who were not living with their partners were more likely, while
338 those who were living with their partners were less likely, to experience a
339 decrease in sexual satisfaction, relative to those who were single.

340 We found that all subgroups reported a decrease in partnered sexual
341 activities, though this was greater for those who were single or not living with their
342 partners, compared to those living with their partners. This finding is unsurprising
343 given that the circuit-breaker measures meant that individuals could not visit their
344 partners if they belonged to different households during that time. This finding is
345 also consistent with research showing that those who were staying with their

346 partners did not experience much change in their own sexual activities (23, 46),
347 and in fact were given opportunities to try out novel forms of partnered sexual
348 activities (19). On the other hand, our finding that individuals who were single or
349 not staying with their partners reported a decrease in such partnered activities
350 comports with evidence elsewhere (10, 47), though this finding is not consistent
351 across settings (48), and may be influenced by the extent of each nation's
352 lockdown, as well as cultural or moral norms around social distancing (49, 50).

353 Findings of the study illustrate that participants experienced changes in
354 their levels of sexual satisfaction that varied along the lines of partnership status
355 as well as living arrangements. Specifically, those who were living with their
356 partners were least likely, while those who were not living with their partners were
357 most likely, to experience a decrease in sexual satisfaction. This finding is
358 consistent with some studies which show that levels of sexual satisfaction seem to
359 be the least affected among those who were married or living with their partners
360 during national lockdown or confinement periods (51, 52). Nevertheless, several
361 studies also report how increasing conflicts in romantic relationships as a result of
362 the pandemic may also negatively impact the sexual lives of couples in some
363 settings as well (53, 54).

364 A key strength of this paper would be its contribution to the published
365 literature on the sexual lives of individuals in Singapore, and more importantly, the
366 impact of COVID-19 and the circuit-breaker measures on sexual behaviours
367 across different partnership status, as well as levels of sexual satisfaction. This
368 study also contributes to a gap in sexual behaviours research among general
369 populations in Asia due to conservative attitudes towards sex in the region (55).
370 We are also mindful of the study's limitations. First, the data in this study were not

371 weighted, and the study is not a nationally-representative study, we thus caution
372 generalizing or extrapolating these findings to the general population of
373 Singapore. Furthermore, the low median age of our sample may bias our findings
374 toward younger groups in the Singapore context. Second, due to prevailing
375 conservative attitudes towards sex and sexuality, social desirability bias may have
376 led to the underreporting of certain sexual behaviours that may be stigmatised,
377 such as sex with casual partners or inconsistent condom use. Furthermore,
378 participants who are more conservative might have also chosen not to participate
379 in the survey, thus biasing our results towards participants with more sex-positive
380 or liberal attitudes. Third, we did not account for varying levels of sexual health
381 and sexuality education or knowledge as a potential confounder, which may serve
382 as a factor in the outcomes measured in this study. We also did not measure
383 gender identity as a variable in this study, which may better reflect the role of
384 gender, rather than sex assigned at birth on sexual behaviour and outcomes.

385 We conclude with several recommendations for policymakers. First, given
386 that partnered sexual activities were still taking place during the COVID-19 circuit-
387 breaker measures, sexual and reproductive health services need to remain
388 operational and accessible even as healthcare resources may be channeled
389 towards emergency or primary care units during the pandemic. Second, a
390 decrease in sexual satisfaction was experienced to varying extents across
391 different partnership status and living arrangements; interventions that seek to
392 promote sexual well-being should focus on those most affected by lockdown
393 measures and promoting novel ways of promoting and reinventing intimacy with
394 oneself or a partner in a different household (56). Overall, those who were
395 younger and not living with their partners were most likely to have experienced

396 decreased sexual satisfaction as a result of the pandemic. Given that sexual
397 satisfaction may impact mental wellbeing among young people (57), interventions
398 that seek to promote mental wellbeing should also consider how sexual wellbeing
399 may have been a factor for poorer mental health outcomes in young people as
400 during the COVID-19 pandemic.

401 Finally, our findings indicate how COVID-19 and the circuit-breaker
402 measures have disrupted patterns of partnered and individual sexual behaviours
403 across Singapore residents, and sexual and reproductive health services should
404 anticipate a relative increase in partnered sexual activity to baseline levels as
405 movement control measures are lifted.

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Table 1. Sociodemographic attributes and description of individuals who ever had a sexual experience (n=338)

Demographic Variables	Single (n=106)		Partnered; not cohabiting (n=115)		Partnered; cohabiting (n=117)		Total (n=338)	
	n	%	n	%	n	%	n	%
Age¹ (n=338)	24	24, 31	26	23, 31	34	30, 46	28	23, 36
Sex assigned at birth (n=338)								
Male	55	51.9	67	58.3	68	58.1	190	56.2
Female	51	48.1	48	41.7	49	41.9	148	43.8
Sexual orientation (n=334)								
Heterosexual	46	44.2	71	61.7	75	65.2	192	57.5
Asexual	12	11.5	16	13.9	14	12.2	42	12.6
Bisexual	17	16.4	10	8.7	9	7.8	36	10.8
Queer / Questioning	9	8.7	3	2.6	9	7.8	21	6.3
Gay / Lesbian	15	14.4	8	7.0	5	4.4	28	8.4
Pansexual	5	4.8	7	6.1	3	2.6	15	4.5
Race (n=330)								
Chinese	83	79.8	96	86.5	96	83.5	275	83.3
Malay	8	7.7	7	6.3	11	9.6	26	7.9
Indian	8	7.7	3	2.7	6	5.2	17	5.2
Others ²	5	4.8	5	4.5	2	1.7	12	3.6
Religion (n=332)								
No religion	33	31.4	42	37.2	23	20.2	98	29.5
Buddhism	27	25.7	21	18.6	22	19.3	70	21.1
Christianity	17	16.2	24	21.2	33	29.0	74	22.3
Taoism	10	9.5	9	8.0	7	6.1	26	7.8
Islam	5	4.8	5	4.4	5	4.4	15	4.5
Atheism	5	4.8	5	4.4	10	8.8	20	6.0
Hinduism	2	1.9	3	2.7	3	2.6	8	2.4
Sikhism	4	3.8	2	1.8	4	3.5	10	3.0
Others (e.g. Agnostic, Baha'i faith)	2	1.9	2	1.8	7	6.1	11	3.3
Housing type (n=335)								
HDB Housing 3-Room and Below ³	23	21.9	14	12.3	19	16.4	56	16.7
HDB Housing 4-Room	36	34.3	34	29.8	38	32.8	108	32.2
HDB Housing 5-Room and Executive	30	28.6	42	36.8	23	19.8	95	28.4
Private Housing	16	15.2	24	21.1	36	31.0	76	22.7
Gross monthly personal income (SGD; n=335)								
No income	26	24.8	26	22.8	18	15.5	70	20.9
Less than 1000	0	0.0	0	0.0	0	0.0	0	0.0
1000 to 1999	12	11.4	7	6.1	11	9.5	30	9.0
2000 to 2999	21	20.0	15	13.1	11	9.5	47	14.0
3000 to 3999	18	17.1	24	21.1	13	11.2	55	16.4
4000 to 4999	14	13.3	11	9.7	12	10.3	37	11.0
5000 to 5999	8	7.6	15	13.2	26	22.4	49	14.6
6000 and above	6	5.7	16	14.0	25	21.6	47	14.0
Educational attainment (n=336)								
Secondary school and below	17	16.2	19	16.7	21	18.0	57	17.0
Tertiary level	44	41.9	41	36.0	12	10.3	97	28.9
Degree and above	44	41.9	54	47.4	84	71.8	182	54.2

Abbreviation: HDB, Housing Development Board; SGD, Singapore Dollar

¹Median with lower and upper quartiles

²Singapore identity cards reflect 'Others' for individuals whose race do not fall under 'Chinese', 'Malay', or 'Indian'

³HDB flats are Singapore government-owned, public housing flats

Table 2. Sexual satisfaction and problems before and during the COVID-19 circuit-breaker measures, among individuals who ever had a sexual experience (n=338)

Sexual Satisfaction	Single (n=106)		Not living with partner (n=115)		Living with partner (n=117)		Total (n=338)		Chi- Square Test
	n	%	n	%	n	%	n	%	
Sexual satisfaction in the three months before circuit-breaker (n=332)									
Not at all satisfied	3	2.9	3	2.6	5	4.4	11	3.3	0.017
Not very satisfied	28	27.2	12	10.4	14	12.3	54	16.3	
Somewhat satisfied	50	48.5	60	52.2	59	51.8	169	50.9	
Very satisfied	22	21.4	40	34.8	36	31.6	98	29.5	
Sexual satisfaction: during circuit-breaker (n=330)									
Not at all satisfied	15	14.6	26	22.6	8	7.1	49	14.9	<0.001
Not very satisfied	43	41.8	41	35.7	19	17.0	103	31.2	
Somewhat satisfied	35	34.0	32	27.8	53	47.3	120	36.4	
Very satisfied	10	9.7	16	13.9	32	28.6	58	17.6	
Changes in sexual satisfaction (n=330)									
Decreased satisfaction	42	40.8	64	55.7	16	14.3	122	37.0	<0.001
Stayed the same	56	54.4	44	38.3	92	82.1	192	58.2	
Increased satisfaction	5	4.9	7	6.1	4	3.6	16	4.9	

Abbreviation: COVID-19, Coronavirus Disease 2019

Table 3. Multivariable Poisson regression with adjusted prevalence ratios (95%CI) for decrease in sexual satisfaction as a result of COVID-19 circuit-breaker measures among individuals who ever had a sexual experience (n=338)

Demographic variables	Overall (n=319)			Single (n=101)			Partnered; not cohabiting (n=110)			Partnered; cohabiting (n=108)		
	n/Median	aPR	95% CI	n/Median	aPR	95% CI	n/Median	aPR	95% CI	n/Median	aPR	95% CI
Age	28	0.99	(0.97, 1.00)	24	0.97*	(0.94, 1.00)	26	1.02**	(1.01, 1.04)	34	0.95**	(0.93, 0.98)
Female sex (Ref=Male sex assigned at birth)	246	0.83	(0.63, 1.10)	51	0.48**	(0.30, 0.78)	48	1.04	(0.74, 1.46)	49	0.91	(0.32, 2.55)
Non-heterosexual (Ref=Heterosexual)	142	1.25	(0.94, 1.67)	58	1.44	(0.88, 2.36)	44	0.97	(0.68, 1.38)	40	2.34	(0.66, 8.27)
Non-Chinese (Ref=Chinese race)	55	1.12	(0.78, 1.60)	21	1.08	(0.64, 1.84)	15	1.18	(0.74, 1.86)	19	2.00	(0.51, 7.77)
No religion (Ref=Having a religion)	98	0.94	(0.70, 1.28)	33	0.82	(0.49, 1.39)	42	0.94	(0.64, 1.38)	23	0.89	(0.28, 2.86)
Private housing (Ref=Public housing)	76	1.22	(0.93, 1.61)	16	1.07	(0.68, 1.69)	24	1.13	(0.81, 1.57)	36	3.24*	(1.04, 10.06)
SGD3000 and above (Ref=Below SGD3000)	188	0.97	(0.70, 1.35)	46	1.13	(0.73, 1.74)	66	0.58*	(0.36, 0.95)	76	1.10	(0.24, 5.00)
Degree educational attainment (Ref=Below degree)	182	0.96	(0.69, 1.34)	44	0.92	(0.58, 1.47)	54	1.47	(0.99, 2.18)	84	0.41	(0.15, 1.15)
Relationship status (Ref=Single)												
Partnered; not cohabiting	115	1.42*	(1.07, 1.90)									
Partnered; cohabiting	117	0.45**	(0.25, 0.81)									

Notes

Abbreviation: CI, Confidence Interval; PR, Prevalence Ratio, aPR, Adjusted Prevalence Ratio; SGD, Singapore Dollar

Statistically significant results are bolded; *p<0.05; **p<0.01; ***p<0.001

The outcome variable on experiences of sexual satisfaction was only asked among individuals who ever had a sexual experience (n=338); drops in sample size for models specified above are due to missing data in independent variables, as indicated in Table 1

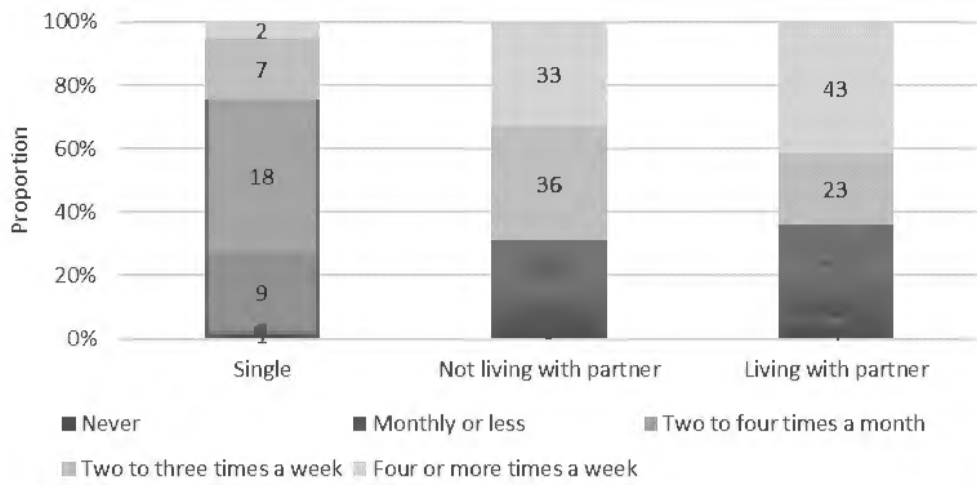
Figure 1. Frequency in sexual behaviors in the three months prior to the COVID-19 circuit-breaker measures

Notes: Chi-Square Test * $p < 0.05$; ** $p < 0.01$; * $p < 0.001$**

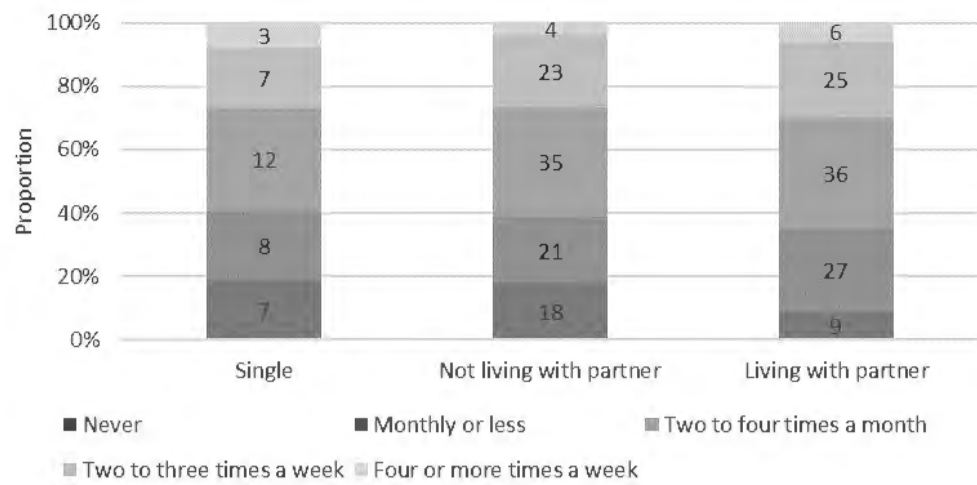
Figure 2. Change in sexual behaviors during the COVID-19 circuit-breaker measures

Notes: Chi-Square Test * $p < 0.05$; ** $p < 0.01$; * $p < 0.001$**

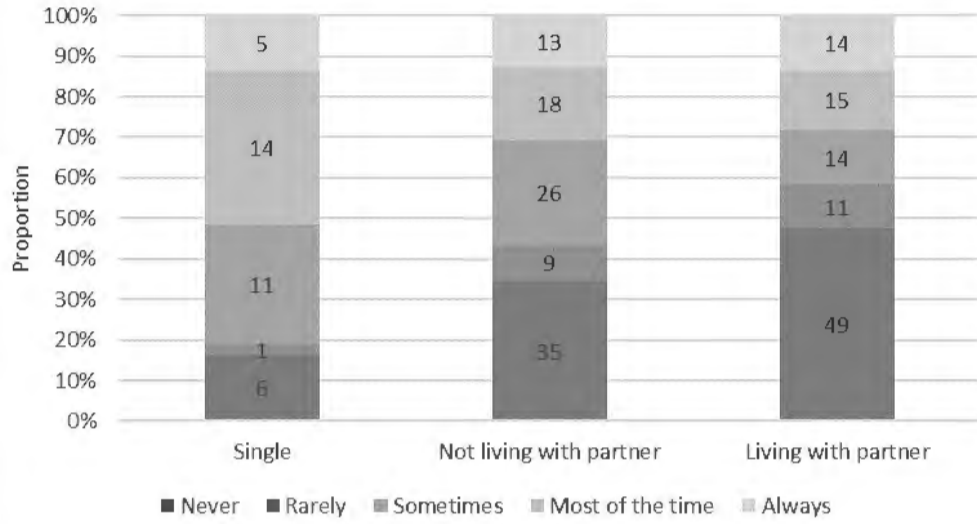
Hugged, kissed or held hands with steady sexual partners (n=240)***



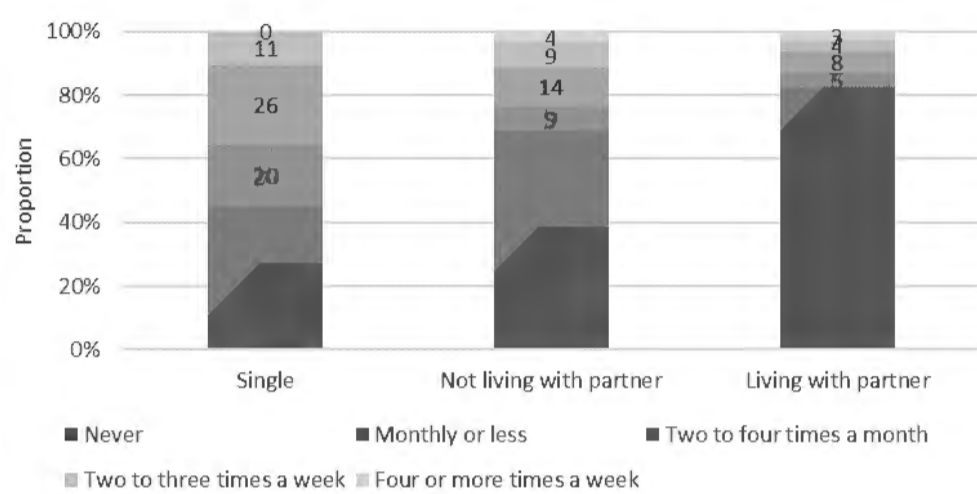
Sexual activities with steady sexual partners (n=241)



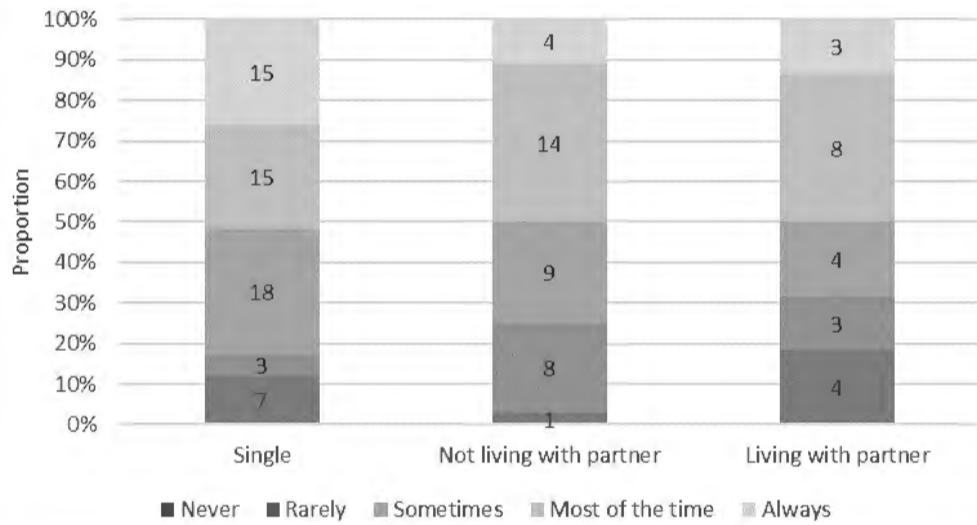
Condom use with steady sexual partners (n=241)**



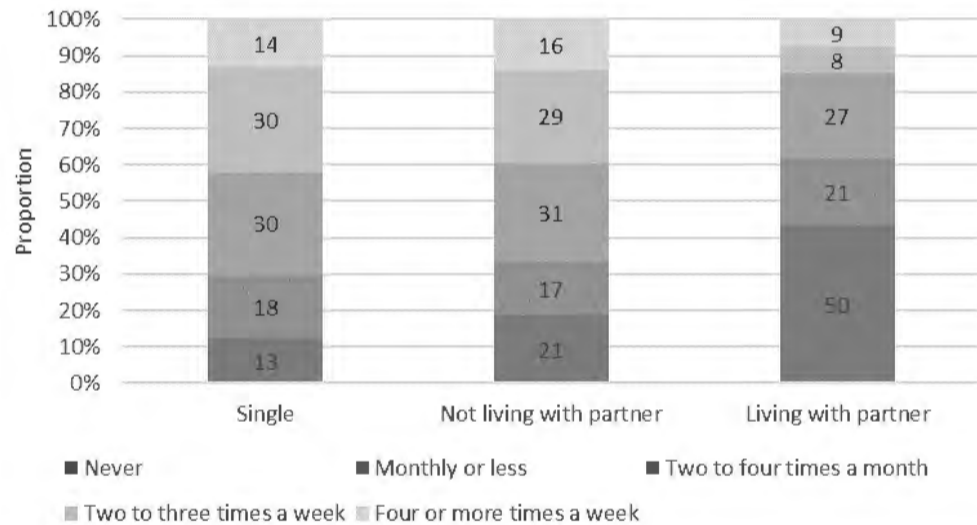
Sexual activities with casual sexual partners (n=333)***



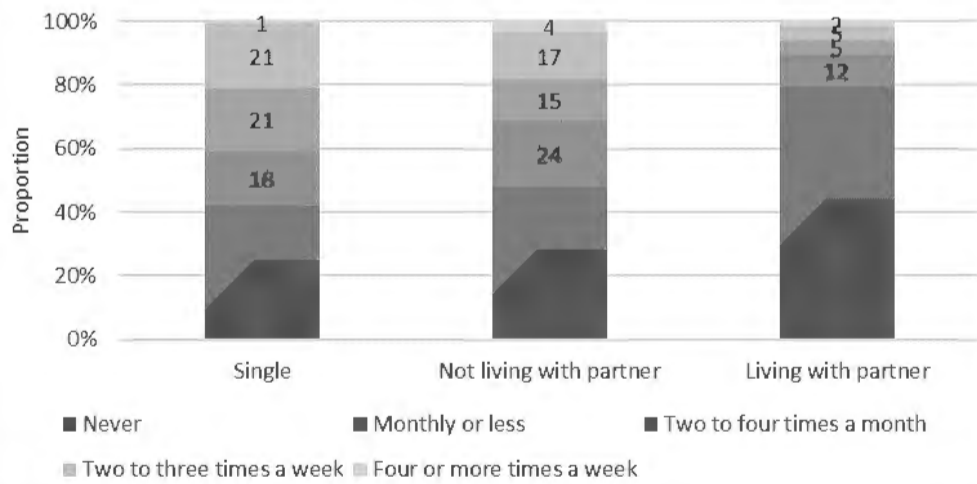
Condom use with casual sexual partners (n=116)



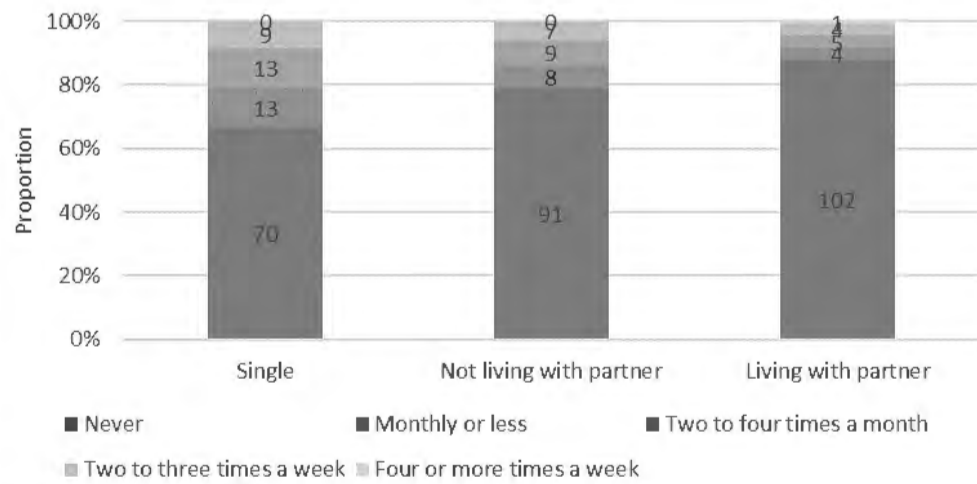
Masturbation (n=334)***



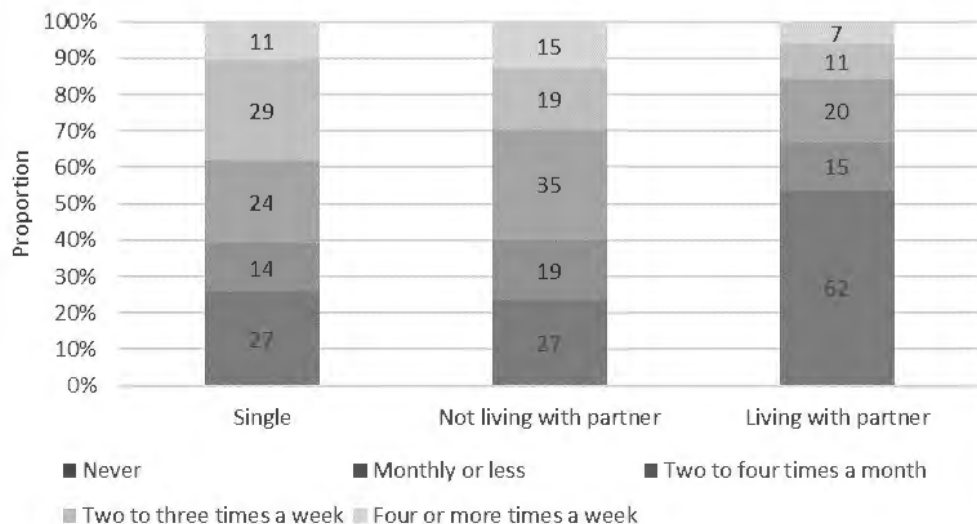
Sent or received naked and semi-naked media (n=336)***



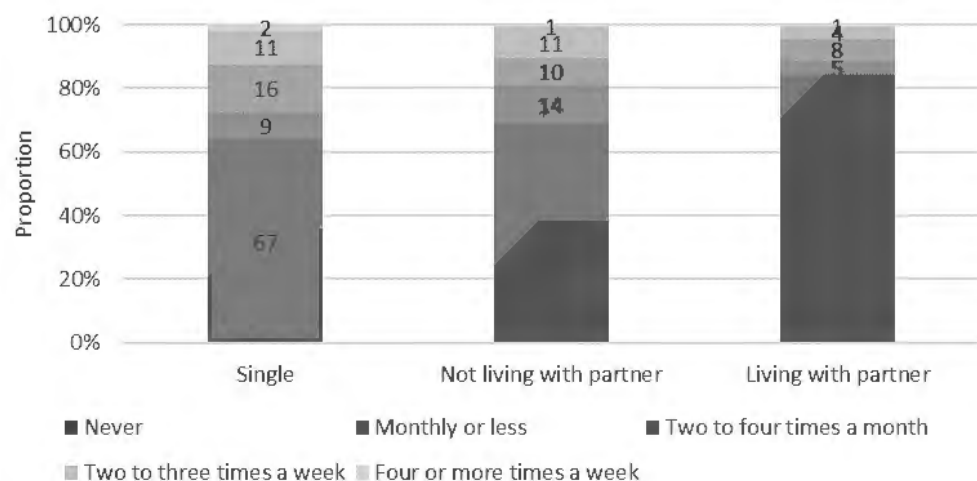
Had sex in exchange for money, food or shelter (n=336)*



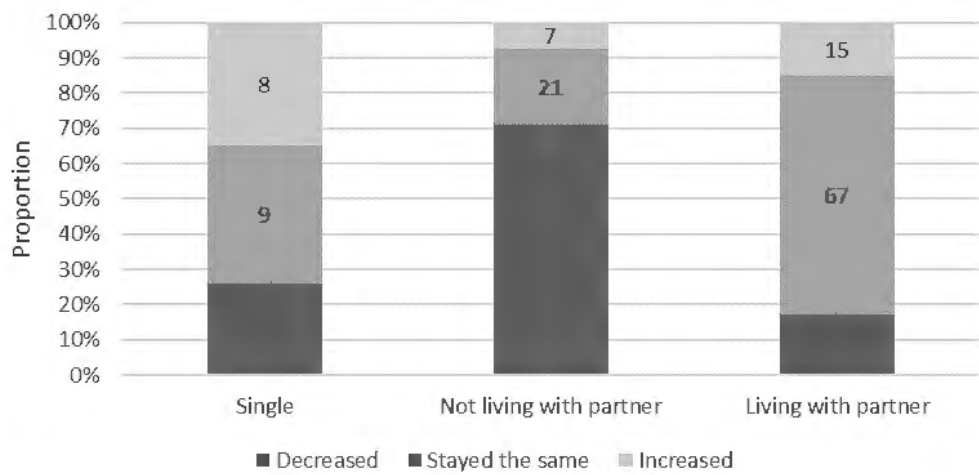
Watched pornography (n=335)***



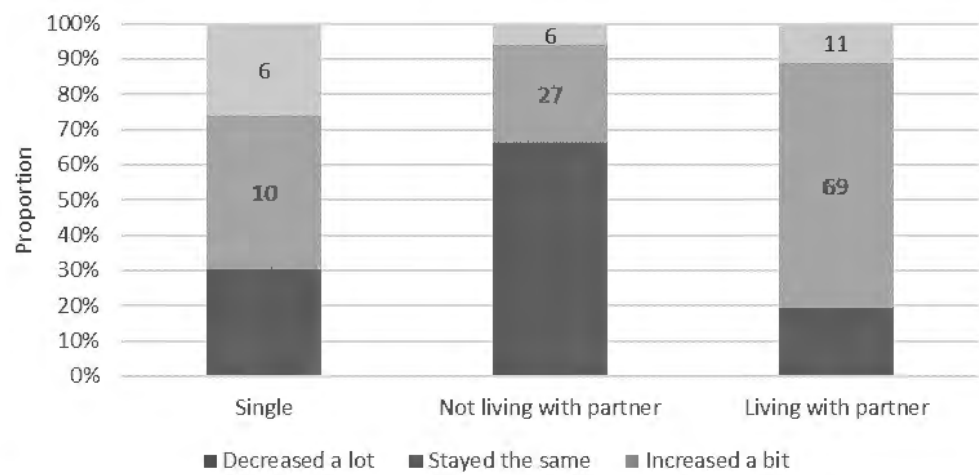
Performed or watched sexual acts over webcam (n=335)*



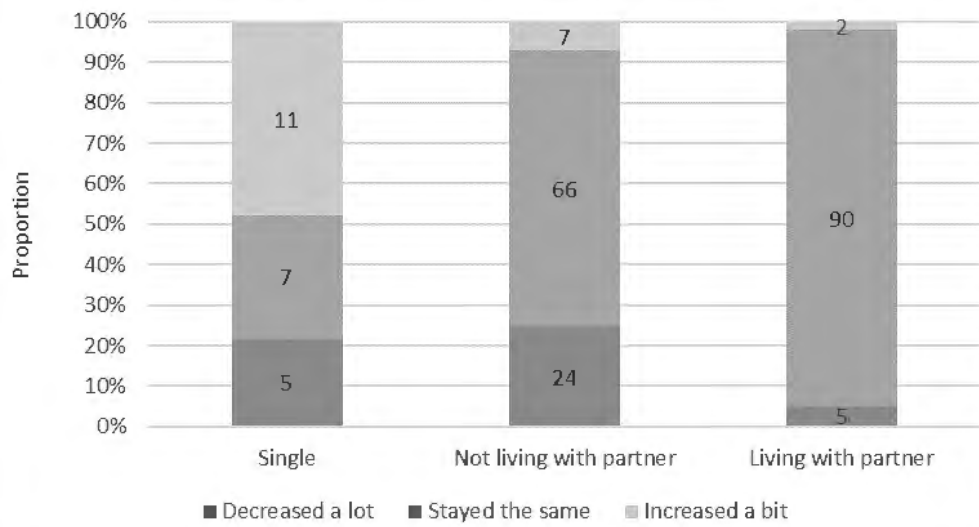
Hugged, kissed or held hands with steady sexual partners (n=240)***



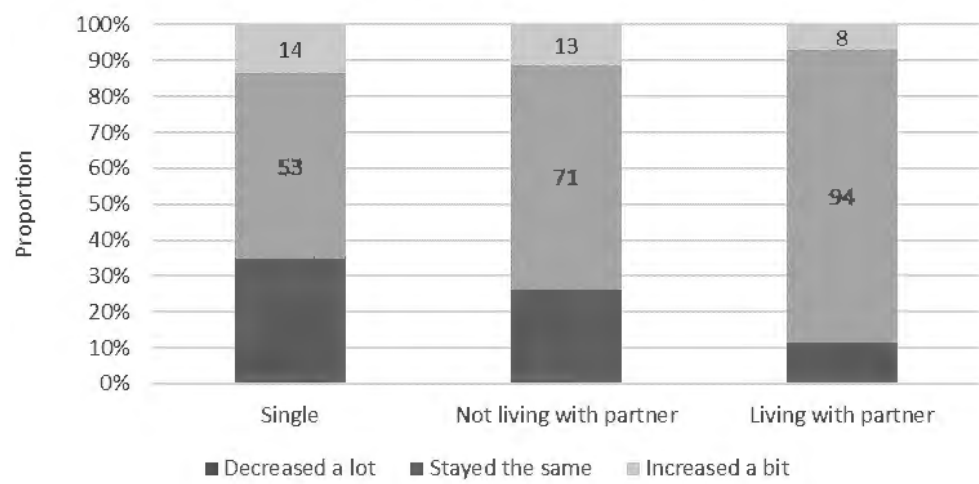
Sexual activities with steady sexual partners (n=219)



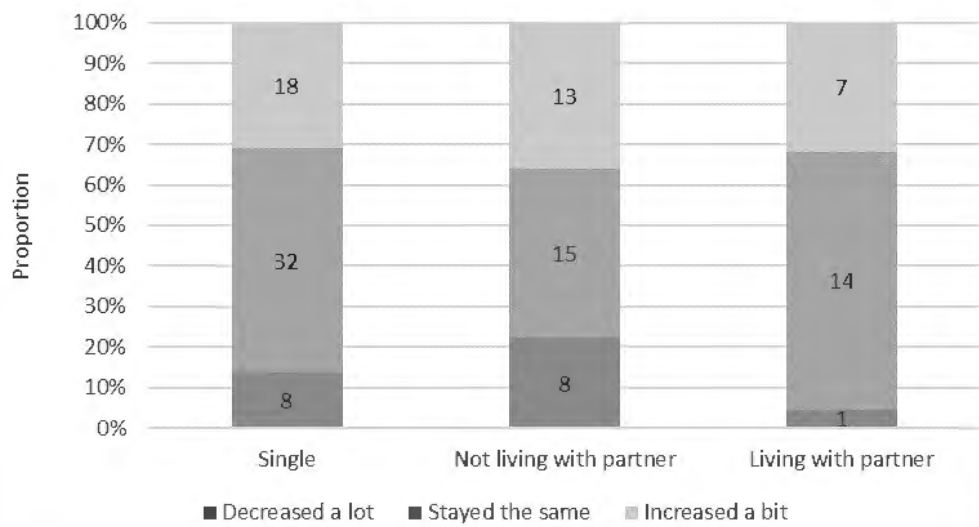
Condom use with steady sexual partners (n=217)**



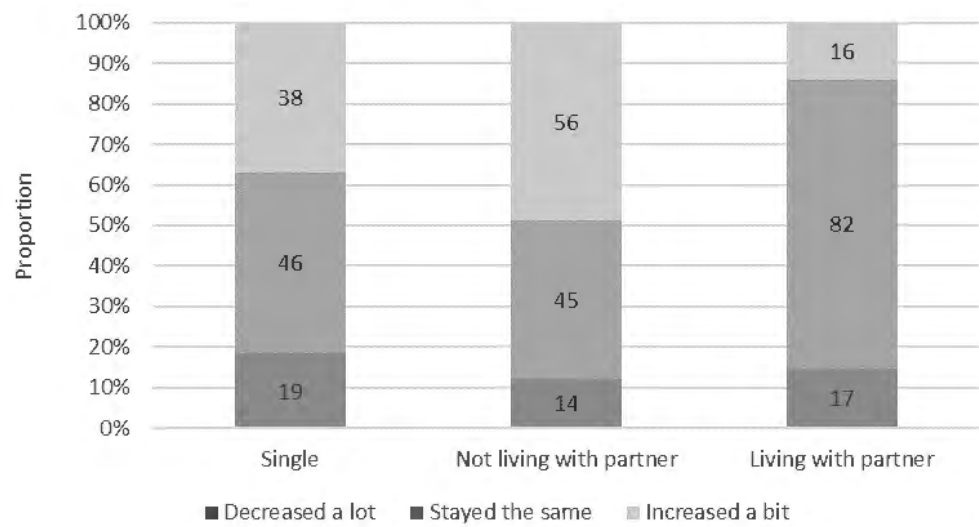
Sexual activities with casual sexual partners (n=332)***



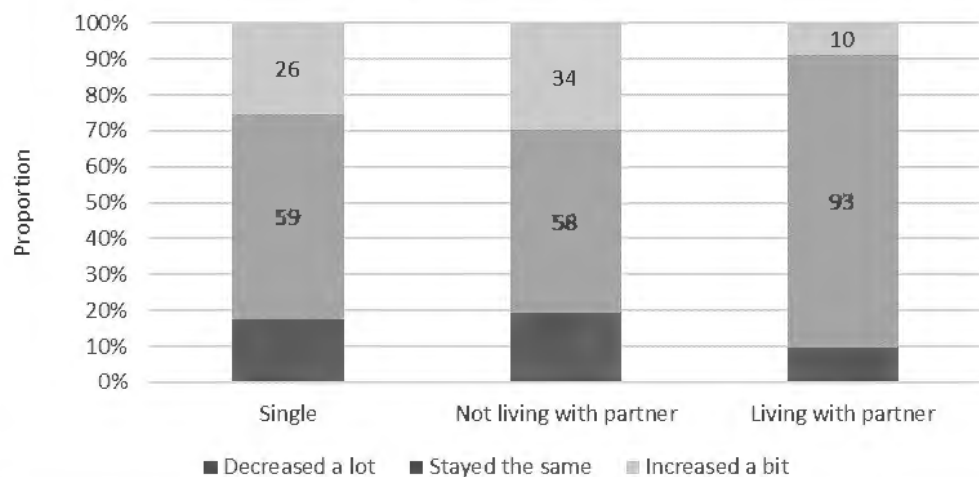
Condom use with casual sexual partners (n=116)



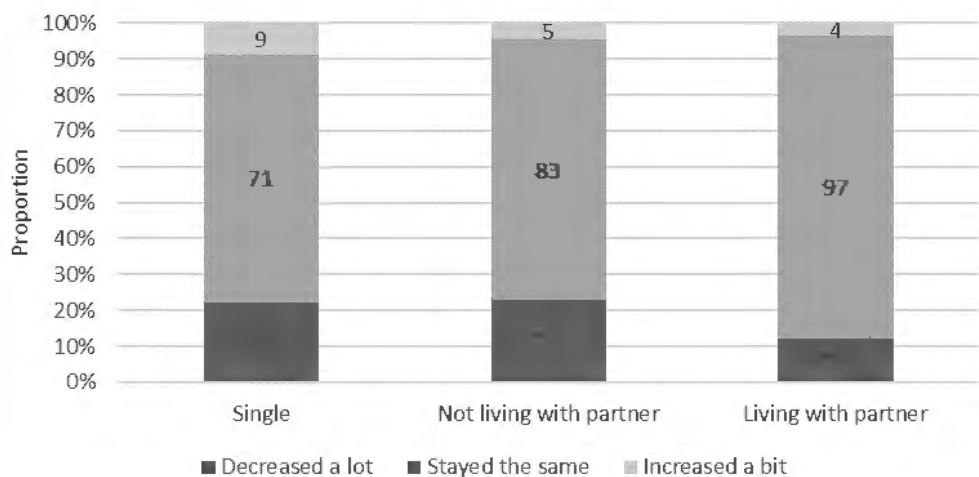
Masturbation (n=333)***



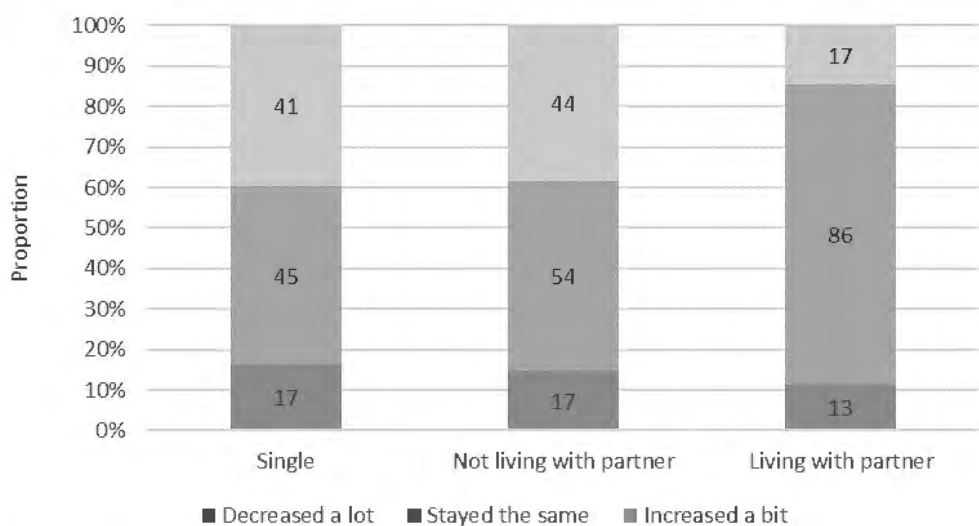
Sent or received naked and semi-naked media (n=331)***



Has sex in exchange for money, goods, favors, drugs, or shelter (n=332)



Watched pornography (n=334)***



Performed or watched sexual acts over webcam (n=329)

