Supplementary Material 1. Selected questions from the cross-sectional questionnaires of the IITEF project. Responses of the listed questions were used in the analyses

<Screening questions>

SC1. Which prefecture do you live?

1. Hokkaido
2. Aomori ken
3. Iwate ken

…

47. Okinawa ken
48. Other

SC2. How old are you?

(   ) years old

SC3. Do you have a spouse (husband, wife, or somebody in a common-law relationship)?

1. Yes, I have a spouse.
2. I have ever been married but have divorced. I currently have no spouse.
3. I have ever been married, but my spouse died. I currently have no spouse.
4. I have never been married.
5. Other

<Main questions>

Q3. What is a zip code of your residence?

If you do not want to answer, please input 999-9999.

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Q4. Please self-rate your health in the last month?

1. Good
2. Reasonably good
3. Fair
4. Poor
5. Bad

Q5. Do you smoke cigarettes habitually (excluding electric cigarettes and heated tobacco products)?

(You "habitually smoke", if you have smoked more than 100 cigarettes or have smoked for more than 6 months and have smoked in the last month.)

1. I have never habitually smoked.
2. I have quit smoking.
3. Currently I smoke.

Q8. Which school did you graduate most recently? Please select one. If you are currently at school, please select the current one.

1. Junior high school
2. High school
3. Vocational school
4. Junior college, technical college
5. University
6. Graduate school
7. Other

Q9. Are you currently engaged in a wage labor? Please select one that best describes your current job status.

1. Full time employee
2. Self employed
3. Temporary employment, part-time job
4. Dispatched employee
5. Contract employee
6. Other (specify:)
7. Student
8. No job (includes housewife and househusband)

Q11 How much was your income in 2019? Please select one answer. For business income please answer the amount after extracting expenses.

1. No income
2. Less than 1 million yen
3. 1–1.99 million yen
4. 2–2.99 million yen
5. 3–3.99 million yen
6. 4–4.99 million yen
7. 5–5.99 million yen
8. 6–6.99 million yen
9. 7–7.99 million yen
10. 8–8.99 million yen
11. 9–9.99 million yen
12. 10–14.9 million yen
13. 15–19.9 million yen
14. 20–49.9 million yen
15. 50+ million yen
16. Do not know/do not want to answer

Q12. We ask you about the average weekly work hours in the last year (2019).

Please answer the total work hours for a paid job (including overtime and part time job).

If you are engaged in multiple jobs, please answer the total work hours.

1. 0 hour
2. 1–14 hours
3. 15–34 hours
4. 35–39 hours
5. 40–49 hours
6. 50–59 hours
7. 60+ hours
8. Do not know

Q13. Do you use any information tools listed below?

Please select all that you used (including only browsing) in the last month.

1. Email
2. Electronic bulletin board
3. Video sharing site (e.g., YouTube, Nico Nico Douga)
4. TikTok
5. LINE
6. Twitter
7. Facebook
8. Instagram
9. Matching app (e.g., Pairs, Tapple, Omiai etc.)
10. Nothing applies

Q17. Do you have any steady partner of the opposite sex?

1. No. I do not have such partner of the opposite sex.
2. I have an opposite-sex friend (*yujin*).
3. I have an opposite-sex partner (*koibito*).
4. I am engaged.
5. Do not know/do not want to answer

The questions will be about private issues such as dating and sexual behavior.

The term "sexual acts with a partner (*aite wo tomonau seikoui*)" is defined as any behavior that results in sexual stimulation and/or sexual pleasure. Sexual behavior with a partner may include, but is not necessarily limited to, sexual intercourse. Thus, it can include any of the following acts: sexual intercourse, fondling, petting, foreplay, or oral sex with a partner of any gender. Sexual acts with a partner do not include masturbation conducted by oneself or with a partner.

Q20. Have you ever had sexual acts with a partner before? (Irrespective of the gender of the partner)

1. Yes
2. No
3. Do not know/do not want to answer

Q23. Did you have sexual acts with a partner in the last month?

1. Yes
2. No
3. Do not know/do not want to answer

Q24. How many sex partners did you have in the last month? Please answer in numbers. It is OK to answer approximate numbers. If you do not know or do not want to answer, please input 999.

(   )

Q25. What type of sex partners did you have in the last month? Please select all that apply.

This questionnaire defines each type of relationship as below.

boyfriend/girlfriend (*koibito*): one-to-one relationship with confession of love

casual acquaintance (*chijin*): includes colleagues and neighbors

sex workers or other forms of paid sex (*seifuzoku no hito*): any forms of paid sex, including sex with hostess (*kyabajou*) and sugar dating (*papakatsu*)

1. spouse/fiancé
2. girlfriend/boyfriend (*koibito*)
3. more than a friend but less than a girlfriend/boyfriend (*tomodachi ijou koibito miman no hito*)
4. friend with benefits (not in a committed relationship but having sex regularly with a person) (*sex friend*)
5. friend or casual acquaintance (*yujin / chijin*)
6. one-night stand (*ikizuri no hito*)
7. sex worker or other forms of paid sex (*seifuzoku no hito*)
8. other

Q29. How frequent did you have sexual acts with a partner in year 2019? Please select one answer choice. (It does not include masturbation).

1. Seven days per week
2. Five to six days per week
3. Three to four days per week
4. Two days per week
5. One day per week
6. Two to three days per month
7. One day per month
8. One to eleven days per year
9. None
10. Do not know/do not want to answer

Q39. Please select diseases/symptoms that you have ever been diagnosed by a medical doctor. Select all that apply.

1. Diabetes
2. Hypertension
3. Erectile dysfunction
4. Depression
5. Mental disorder other than depression

6. None

Q41. Have you ever visited a medical institution for consultation and/or treatment of infertility? Please answer "yes" if you visited a medical institution for your partner's infertility issues.

1. Yes
2. No
3. Do not know/do not want to answer

Table S1. Number of participants by 5-year age category and eight geographic regions. These numbers are relative to the corresponding proportions of the male population in Japan in the 2015 National Census

Age category (year)	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyushu and Okinawa	Total
20–24	18	29	181	86	80	26	12	49	481
25–29	17	28	186	82	74	25	12	46	470
30–34	19	32	190	91	77	27	14	53	503
35–39	22	37	209	100	84	31	15	60	558
40–44	26	42	237	117	99	35	18	67	641
45–49	28	44	269	132	118	39	20	70	720
50–54	25	40	236	114	101	33	17	61	627
Total	155	252	1508	722	633	216	108	406	4000

Table S2. Reported types of sex partners of married men in the past month by non-casual sex (n=923)

		Non-Casual Sex[1]	
	Total (*n* = 923)	Yes (*n* = 810)	No (*n* = 113)
Spouse	88%	100%	0%
Girlfriend/boyfriend (*Koibito*)	7%	2%	40%
More than a friend but less than a girl-friend/boyfriend (*tomodachi ijou koibito miman*)	3%	2%	15%
Friend with benefits (*sex friend*)	7%	3%	28%
Friend or casual acquaintance (*yujin / chijin*)	2%	1%	8%
One night stand (*ikizuri no hito*)	1%	1%	2%
Commercial sex worker (*seifuzoku no hito*)	5%	3%	23%
Other	0%	0%	0%

[1] Had sex with spouse in the past month. Only those who had sex in the past month are included. N=17 men who did not report number of sexual partners in the past month were excluded from the table.

Table S3. Reported types of sex partners of never-married men by non-casual sex (n=479)

		Non-Casual Sex[1]	
	Total (*n* = 479)	Yes (*n* = 349)	No (*n* = 130)
Fiancé	5%	7%	0%
Girlfriend/boyfriend (*Koibito*)	68%	93%	0%
More than a friend but less than a girl-friend/boyfriend (*tomodachi ijou koibito miman*)	9%	4%	21%
Friend with benefits (*sex friend*)	15%	10%	29%
Friend or casual acquaintance (*yujin / chi-jin*)	8%	3%	20%
One night stand (*ikizuri no hito*)	5%	2%	14%
Commercial sex worker (*seifuzoku no hito*)	11%	2%	36%
Other	0%	0%	0%

[1] Had sex with fiancé or girlfriend/boyfriend in the past month. Only those who had sex in the past month are included. N=15 men who did not report number of sexual partners in the past month were excluded from the table.

Table S4. Predictors of sexual behavior in the past month for married men. Each variable was analyzed in separate multinomial logistic regression models while adjusting for age

Predictor Variables	Sexless		Casual Sex	
	RRR (95%CI)	p	RRR (95%CI)	p
Self-rated health (ref: Good)	1.00		1.00	
Poor	0.99 (0.72, 1.36)	0.959	1.24 (0.68, 2.26)	0.478
Depression (ref: No)	1.00		1.00	
Yes	1.00 (0.68, 1.46)	0.986	0.72 (0.3, 1.73)	0.466
Fertility treatment (ref: No)	1.00		1.00	
Yes	1.29 (1, 1.67)	0.055	0.46 (0.22, 0.96)	0.039
Smoking (ref: No)	1.00		1.00	
Yes	0.78 (0.62, 0.97)	0.026	1.29 (0.84, 1.97)	0.239
Education (ref: Less than university)	1.00		1.00	
University or higher	1.15 (0.94, 1.41)	0.174	0.92 (0.61, 1.38)	0.672
Job status (ref: fulltime)	1.00		1.00	
Not fulltime	0.66 (0.47, 0.92)	0.013	0.90 (0.48, 1.69)	0.743
Log income	1.06 (0.83, 1.35)	0.650	1.83 (1.12, 2.98)	0.015
Weekly work hours (ref: < 50)	1.00		1.00	
50-59	1.03 (0.81, 1.30)	0.809	1.09 (0.66, 1.78)	0.738
60+	0.74 (0.55, 1.00)	0.051	1.46 (0.86, 2.49)	0.166
Place of residence (ref: Rural)	1.00		1.00	
Suburban	0.88 (0.63, 1.22)	0.433	1.70 (0.75, 3.83)	0.201
Urban	1.08 (0.80, 1.47)	0.612	2.04 (0.94, 4.42)	0.072
Tiktok use (ref: No)	1.00		1.00	
Yes	0.77 (0.51, 1.15)	0.201	0.96 (0.42, 2.18)	0.922
LINE use (ref: No)	1.00		1.00	
Yes	0.82 (0.61, 1.10)	0.180	1.7 (0.82, 3.5)	0.153
Twitter use (ref: No)	1.00		1.00	
Yes	0.86 (0.7, 1.05)	0.146	1.36 (0.91, 2.04)	0.138
Facebook use (ref: No)	1.00		1.00	
Yes	0.84 (0.69, 1.02)	0.078	1.21 (0.81, 1.80)	0.358
Instagram use (ref: No)	1.00		1.00	
Yes	0.83 (0.67, 1.02)	0.076	1.4 (0.92, 2.11)	0.112
Matching app use (ref: No)	1.00		1.00	
Yes	0.67 (0.33, 1.37)	0.272	4.13 (1.72, 9.92)	0.002

CI: confidence interval. RRR: relative risk ratio.

Table S5. Predictors of sexual behavior in the past month for never-married men. Each variable was analyzed in separate multinomial logistic regression models while adjusting for age

Predictor variables	Sexless		Casual Sex	
	RRR (95%CI)	p	RRR (95%CI)	p
Self-rated health (ref: Good)	1.00		1.00	
Poor	2.02 (1.32, 3.09)	0.001	1.42 (0.74, 2.72)	0.298
Depression (ref: No)	1.00		1.00	
Yes	2.85 (1.49, 5.43)	0.002	1.9 (0.76, 4.73)	0.171
Smoking (ref: No)	1.00		1.00	
Yes	0.49 (0.35, 0.68)	< 0.001	0.94 (0.58, 1.52)	0.790
Education (ref: Less than university)	1.00		1.00	
University or higher	0.58 (0.44, 0.77)	< 0.001	0.52 (0.34, 0.80)	0.003
Job status (ref: fulltime)	1.00		1.00	
Not fulltime	2.88 (2.18, 3.81)	< 0.001	1.63 (1.05, 2.53)	0.029
Log income	0.39 (0.30, 0.49)	< 0.001	0.87 (0.6, 1.26)	0.463
Weekly work hours (ref: < 50)	1.00		1.00	
50-59	0.74 (0.50, 1.08)	0.121	0.89 (0.48, 1.63)	0.700
60+	0.50 (0.31, 0.80)	0.004	0.89 (0.43, 1.81)	0.738
Place of residence (ref: Rural)	1.00		1.00	
Suburban	0.58 (0.34, 0.97)	0.039	0.45 (0.2, 1.01)	0.052
Urban	0.44 (0.27, 0.71)	0.001	0.6 (0.3, 1.22)	0.159
Tiktok use (ref: No)	1.00		1.00	
Yes	0.61 (0.42, 0.88)	0.008	0.7 (0.36, 1.33)	0.273
LINE use (ref: No)	1.00		1.00	
Yes	0.49 (0.33, 0.74)	0.001	1.18 (0.61, 2.27)	0.625
Twitter use (ref: No)	1.00		1.00	
Yes	0.88 (0.67, 1.16)	0.374	0.82 (0.53, 1.27)	0.37
Facebook use (ref: No)	1.00		1.00	
Yes	0.6 (0.46, 0.79)	< 0.001	0.92 (0.59, 1.41)	0.687
Instagram use (ref: No)	1.00		1.00	
Yes	0.48 (0.37, 0.62)	< 0.001	0.61 (0.39, 0.93)	0.022
Matching app use (ref: No)	1.00		1.00	
Yes	0.8 (0.53, 1.22)	0.302	2.62 (1.49, 4.59)	0.001

CI: confidence interval. RRR: relative risk ratio.