

Supplementary Appendices

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Appendix 1: Results from univariable regressions

1.1 Depression (PHQ-9)

Table S1: Univariable regression coefficients for non-modifiable factors as predictors of depression scores

PHQ-9 Total Score (Square-Root Transformed)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Age (per decade)	-0.27**** (0.01)					
Female		0.37**** (0.06)				
Live alone			0.14* (0.06)			
BAME background				0.23** (0.07)		
Key-worker					0.12** (0.04)	
Risk Group ^a Most at Risk						0.46**** (0.11)
Increased Risk						0.00 (0.02)
Constant	3.68**** (0.06)	2.18**** (0.06)	2.47**** (0.02)	2.47**** (0.02)	2.43**** (0.03)	2.47**** (0.02)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I am in neither risk category".

Table S2: Univariable regression coefficients for modifiable factors as predictors of depression scores

PHQ-9 Total Score (Square-Root Transformed)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Perceived loneliness	0.25**** (0.01)			
Positive mood		-0.16**** (0.00)		
COVID-19 worry ^a				
No worry			0.00 (0.06)	
Much of time			0.83**** (0.06)	
Most of time			1.33**** (0.11)	
Perceived risk of COVID-19				0.08**** (0.01)
Constant	1.55**** (0.03)	5.53**** (0.06)	2.33**** (0.03)	2.03**** (0.06)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I occasionally worry about getting COVID-19"

Table S3: Univariable logistic regression coefficients for non-modifiable factors as predictors of depression cases^a

PHQ-9 "Cases"	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]
Age (per decade)	0.68**** [0.65, 0.72]					
Female		1.43** [1.14, 1.78]				
Live alone			1.15 [0.92, 1.43]			
BAME background				1.49** [1.17, 1.91]		
Key-worker					1.16 [1.00, 1.35]	
Risk Group ^b						
Most at Risk						1.59 [1.10, 2.31]
Increased Risk						1.14 [0.93, 1.39]
Constant	2.37**** [1.86, 3.03]	0.34**** [0.28, 0.42]	0.45**** [0.42, 0.49]	0.44**** [0.41, 0.48]	0.43**** [0.38, 0.48]	0.44**** [0.41, 0.48]

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a a "case" is defined as a PHQ-9 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I am in neither risk category".

Table S4: Univariable logistic regression coefficients for modifiable factors as predictors of depression cases ^a

PHQ-9 "Cases"	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]
Perceived loneliness	1.46**** [1.42, 1.51]			
Positive mood		0.72**** [0.70, 0.74]		
COVID-19 worry ^b				
No worry			1.04 [0.84, 1.29]	
Much of time			2.97**** [2.39, 3.69]	
Most of time			8.27**** [5.44, 12.58]	
Perceived risk of COVID-19				1.12**** [1.08, 1.16]
Constant	0.09**** [0.08, 0.11]	156.94**** [99.53, 247.47]	0.35**** [0.32, 0.39]	0.24**** [0.20, 0.30]

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a a "case" is defined as a PHQ-9 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I occasionally worry about getting COVID-19"

1.2 Anxiety (GAD-7)

Table S5: Univariable regression coefficients for non-modifiable factors as predictors of anxiety scores

GAD-7 Total Score (Square-Root Transformed)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Age (per decade)	-0.24**** (0.01)					
Female		0.45**** (0.06)				
Live alone			-0.21** (0.07)			
BAME background				0.17* (0.08)		
Key-worker					0.15**** (0.04)	
Risk Group ^a Most at Risk						0.30** (0.11)
Increased Risk						-0.04 (0.06)
Constant	3.34**** (0.07)	1.87**** (0.06)	2.28**** (0.02)	2.23**** (0.02)	2.17**** (0.03)	2.25**** (0.02)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I am in neither risk category".

Table S6: Univariable regression coefficients for modifiable factors as predictors of anxiety scores

GAD-7 Total Score (Square-Root Transformed)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Perceived loneliness	0.21**** (0.01)			
Positive mood		-0.16**** (0.00)		
COVID-19 worry ^a No worry			-0.22**** (0.06)	
Much of time			1.06**** (0.06)	
Most of time			1.75**** (0.11)	
Perceived risk of COVID-19				0.12**** (0.01)
Constant	1.45**** (0.03)	5.20**** (0.07)	2.08**** (0.02)	1.62**** (0.06)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I occasionally worry about getting COVID-19"

Table S7: Univariable logistic regression coefficients for non-modifiable factors as predictors of anxiety cases^a

GAD-7 "Cases"	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]
Age (per decade)	0.70**** [0.66, 0.75]					
Female		1.56*** [1.22, 1.99]				
Live alone			0.80 [0.62, 1.02]			
BAME background				1.44** [1.11, 1.86]		
Key-worker					1.16 [0.99, 1.36]	
Risk Group ^b Most at Risk						1.47 [0.997, 2.16]
Increased Risk						0.96 [0.77, 1.19]
Constant	1.58*** [1.23, 2.04]	0.24**** [0.19, 0.30]	0.36**** [0.33, 0.39]	0.34**** [0.31, 0.37]	0.33**** [0.29, 0.37]	0.35**** [0.32, 0.38]

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a a "case" is defined as a GAD-7 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I am in neither risk category".

Table S8: Univariable logistic regression coefficients for modifiable factors as predictors of anxiety cases^a

GAD-7 "Cases"	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]	Odds Ratio [95% CI]
Perceived loneliness	1.37**** [1.32, 1.41]			
Positive mood		0.74**** [0.72, 0.76]		
COVID-19 worry ^b No worry			0.93 [0.72, 1.19]	
Much of time			5.03**** [4.02, 6.28]	
Most of time			24.75**** [14.83, 41.31]	
Perceived risk of COVID-19				1.18**** [1.14, 1.23]
Constant	0.09**** [0.08, 0.11]	70.16**** [45.39, 108.44]	0.23**** [0.21, 0.26]	0.14**** [0.11, 0.18]

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a a "case" is defined as a GAD-7 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I occasionally worry about getting COVID-19"

1.3 Stress (PSS-4)

Table S9: Univariable regression coefficients for non-modifiable factors as predictors of stress scores

PSS-4 Total Score	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Age (per decade)	-0.52**** (0.04)					
Female		0.71**** (0.16)				
Live alone			0.13 (0.17)			
BAME background				0.84**** (0.20)		
Key-worker					-0.11 (0.12)	
Risk Group ^a						
Most at Risk						0.97*** (0.30)
Increased Risk						-0.09 (0.16)
Constant	8.84**** (0.18)	5.88**** (0.15)	6.46**** (0.06)	6.40**** (0.06)	6.53**** (0.08)	6.45**** (0.07)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I am in neither risk category".

Table S10: Univariable regression coefficients for modifiable factors as predictors of stress scores

PSS-4 Total Score	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)	Coefficient (Standard Error)
Perceived loneliness	0.62**** (0.02)			
Positive mood		-0.46**** (0.01)		
COVID-19 worry ^a				
No worry			-0.14 (0.15)	
Much of time			1.90**** (0.17)	
Most of time			3.78**** (0.29)	
Perceived risk of COVID-19				0.22**** (0.03)
Constant	4.09**** (0.09)	15.28**** (0.16)	6.10**** (0.07)	5.31**** (0.15)

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I occasionally worry about getting COVID-19"

Appendix 2: Multivariable regression models, excluding perceived risk of COVID-19

Table S11: Regression model showing associations between modifiable explanatory variables and depression scores (excluding perceived risk of COVID-19)

	B	95% CI Lower	95% CI Upper	β	p
PHQ-9 Total Score^a					
Age (per decade)	-0.18	-0.20	-0.16	-0.22	<.0001****
Female	0.20	0.11	0.28	0.06	<.0001****
Live alone	-0.00	-0.10	0.09	-0.00	0.92
BAME background	-0.06	-0.16	0.04	-0.01	0.26
Key-worker	0.07	0.01	0.12	0.03	0.03*
Risk Group ^b					
Most at Risk	0.20	0.05	0.35	0.03	0.01**
Increased Risk	0.15	0.07	0.23	0.05	<.001***
Perceived loneliness	0.10	0.08	0.11	0.22	<.0001****
Positive mood	-0.12	-0.13	-0.11	-0.50	<.0001****
COVID-19 worry ^c					
No worry	0.03	-0.05	0.11	0.01	0.45
Much of time	0.26	0.18	0.35	0.07	<.0001****
Most of time	0.34	0.19	0.50	0.05	<.0001****
Adj R²=.56, p<.0001****					

**** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05

^a A square-root transformation was applied to the dependent variable

^b Comparison reference group "I am in neither risk category".

^c Comparison reference group "I occasionally worry about getting COVID-19"

Table S12: Logistic regression model showing associations between modifiable explanatory variables and depression cases (excluding perceived risk of COVID-19)

	Odds Ratio	95% CI Lower	95% CI Upper	β	p
PHQ-9 "Cases"^a					
Age (per decade)	0.68	0.63	0.73	-1.24	<.0001****
Female	1.20	0.90	1.60	0.14	0.21
Live alone	0.84	0.61	1.15	-0.13	0.28
BAME background	0.98	0.70	1.37	-0.01	0.90
Key-worker	1.22	1.00	1.48	0.21	0.05
Risk Group ^b					
Most at Risk	1.18	0.72	1.94	0.07	0.51
Increased Risk	1.44	1.10	1.89	0.30	0.007**
Perceived loneliness	1.21	1.16	1.26	1.12	<.0001****
Positive mood	0.76	0.74	0.78	-2.96	<.0001****
COVID-19 worry ^c					
No worry	0.93	0.70	1.24	-0.06	0.63
Much of time	1.58	1.21	2.07	0.34	<.001***
Most of time	2.65	1.58	4.43	0.40	<.001***
Pseudo R²=0.34, n=3090					

**** p<0.0001, *** p<0.001, ** p<0.01, * p<0.05

^a a "case" is defined as a PHQ-9 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I am in neither risk category".

^c Comparison reference group "I occasionally worry about getting COVID-19"

Table S13: Regression model showing associations between modifiable explanatory variables and anxiety scores (excluding perceived risk of COVID-19)

	B	95% CI Lower	95% CI Upper	β	p
GAD-7 Total Score^a					
Age (per decade)	-0.16	-0.19	-0.14	-0.20	<.0001****
Female	0.25	0.16	0.33	0.07	<.0001****
Live alone	-0.27	-0.36	-0.17	-0.07	<.0001****
BAME background	-0.08	-0.18	0.03	-0.02	0.14
Key-worker	0.04	-0.02	0.10	0.02	0.17
Risk Group ^b					
Most at Risk	0.01	-0.15	0.17	0.00	0.92
Increased Risk	0.06	-0.02	0.15	0.02	0.13
Perceived loneliness	0.06	0.05	0.07	0.13	<.0001****
Positive mood	-0.12	-0.12	-0.11	-0.48	<.0001****
COVID-19 worry ^c					
No worry	-0.19	-0.27	-0.11	-0.06	<.0001****
Much of time	0.57	0.48	0.66	0.16	<.0001****
Most of time	0.87	0.71	1.03	0.14	<.0001****
Adj R²=.53, n=3090					

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a A square-root transformation was applied to the dependent variable

^b Comparison reference group "I am in neither risk category".

^c Comparison reference group "I occasionally worry about getting COVID-19"

Table S14: Logistic regression model showing associations between modifiable explanatory variables and anxiety cases (excluding perceived risk of COVID-19)

	Odds Ratio	95% CI Lower	95% CI Upper	β	p
GAD-7 "Cases"^a					
Age (per decade)	0.69	0.64	0.75	-1.25	<.0001****
Female	1.23	0.91	1.67	0.17	0.18
Live alone	0.56	0.40	0.79	-0.44	<.001***
BAME background	0.91	0.65	1.29	-0.06	0.61
Key-worker	1.11	0.90	1.36	0.11	0.34
Risk Group ^b					
Most at Risk	0.88	0.53	1.47	-0.05	0.63
Increased Risk	0.93	0.70	1.25	-0.06	0.65
Perceived loneliness	1.13	1.08	1.18	0.76	<.0001****
Positive mood	0.78	0.75	0.80	-2.91	<.0001****
COVID-19 worry ^c					
No worry	0.72	0.53	0.98	-0.28	0.04*
Much of time	3.59	2.76	4.68	0.99	<.0001****
Most of time	12.54	6.97	22.56	1.11	<.0001****
Pseudo R²=0.34, n=3090					

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a a "case" is defined as a GAD-7 score greater than or equal to 10, at which level someone would qualify for high intensity psychological support in the NHS

^b Comparison reference group "I am in neither risk category".

^c Comparison reference group "I occasionally worry about getting COVID-19"

Table S15: Regression model showing associations between modifiable explanatory variables and stress scores (excluding perceived risk of COVID-19)

	B	95% CI Lower	95% CI Upper	β	<i>p</i>
PSS-4 Total Score					
Age (per decade)	-0.25	-0.30	-0.19	-0.11	<.0001****
Female	0.31	0.09	0.52	0.03	0.005**
Live alone	-0.37	-0.61	-0.13	-0.04	0.003**
BAME background	0.21	-0.06	0.47	0.02	0.13
Key-worker	-0.24	-0.40	-0.09	-0.04	0.002**
Risk Group ^a					
Most at Risk	0.14	-0.27	0.54	0.01	0.50
Increased Risk	0.08	-0.13	0.30	0.01	0.43
Perceived loneliness	0.20	0.17	0.24	0.17	<.0001****
Positive mood	-0.38	-0.40	-0.36	-0.59	<.0001****
COVID-19 worry ^b					
No worry	0.01	-0.21	0.22	0.00	0.94
Much of time	0.36	0.12	0.59	0.04	0.003**
Most of time	0.99	0.57	1.40	0.06	<.0001****
Adj R²=.56, n=3090					

**** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

^a Comparison reference group "I am in neither risk category".

^b Comparison reference group "I occasionally worry about getting COVID-19"

Appendix 3: Summary of modifiable and non-modifiable explanatory factors considered in the analysis

Table S16: Explanatory factors considered in the analysis

	Question/scale	Response(s)
Non-modifiable factors		
Gender*	What was your gender at birth?	Male Female Other Prefer not to say
Age	How old are you?	..
Ethnicity*	What is your ethnicity	White – British, Irish, other Asian/Asian British – Indian, Pakistani, Bangladeshi, other Black/Black British – Caribbean, African, other Chinese/Chinese British Mixed race – White and Black/Black British Middle Eastern/Middle Eastern British – Arab, Turkish, other Mixed race – other Other ethnic group Prefer not to say
Key-worker status	Are you currently fulfilling any of the government’s identified ‘key worker’ roles?	Health, social care ore relevant related support worker Teacher or childcare worker still travelling in to work Transport worker still travelling in to work Food chain worker (e.g. production, sale, delivery) Key public services worker (e.g. justice staff, religious staff, public service journalist or mortuary worker) Local or national government worker delivering essential public services Utility worker (e.g. energy, sewerage, postal service) Public safety or national security worker Worker involved in medicines or protective equipment production or distribution

		Other 'key worker' role not listed
		None of these
Living alone/with others	Do you live with someone?	Yes No
Recognised risk group for COVID-19	Which of these 3 COVID-19 risk groups do you think you are in?	I am most at risk (e.g., suffering from advanced cancer, severe asthma/COPD, etc.) I am at increased risk (e.g., being pregnant, aged over 70, etc.) I am in neither risk category.
Modifiable factors		
<i>Perceived loneliness</i> [†]	On a scale of 1-10, how lonely have you felt over the past 2 weeks?	1 (Not at all lonely) - 10 (Extremely lonely)
<i>Perceived risk of COVID-19</i>	On a scale of 1-10, what do you believe your risk of getting COVID-19 is?	1 (I don't think I will get it) - 10 (I know I will most certainly get it)
<i>Positive mood</i> [‡]	In the past 2 weeks, I have felt Positive.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
	In the past 2 weeks, I have felt Good.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
	In the past 2 weeks, I have felt Pleasant.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
	In the past 2 weeks, I have felt Happy.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
	In the past 2 weeks, I have felt Joyful.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
<i>COVID-19 worry</i>	In the past 2 weeks, I have felt Contented.	1=Very rarely or never/ 2=Rarely/ 3=Sometimes/ 4=Often/ 5=Very often or always
	Please read the following statements carefully and then select the one which best describe how you have felt over the past 2 weeks.	I do not worry about getting COVID-19.
		I occasionally worry about getting COVID-19.
		I spend much of my time worrying about getting COVID-19.
		I spend most of my time worrying about getting COVID-19.

*Gender and ethnicity were treated as binary variables in all analyses: gender (male, female), ethnicity (white British, non-white British).

[†] The factors in *Italic* were hypothesised to be associated with an increased risk of adverse mental health outcomes, apart from key-worker status where evidence exists that some key-worker roles are also associated with an increased risk of adverse COVID-19 outcomes. All other factors were hypothesised to be associated with an increased risk of contracting COVID-19 and/or poorer disease outcomes.

[‡]Positive mood was measured using the positive items from SPANE: Scale of Positive and Negative Experience ($\alpha=0.94$).²⁵

Appendix 4: Means for depression, anxiety and stress with overall means weighted to mid-2019 UK population distribution

Table S17: Means for depression, anxiety and stress scores with overall means weighted to UK mid-2019 population distribution

	Number	Depression (PHQ-9) score	Anxiety (GAD-7) score	Stress (PSS-4) score
		Participants	Participants	Participants
		Mean	Mean	Mean
Males				
Age group				
18-19	9	8.11	4.67	5.11
20-24	68	9.88	7.49	7.06
25-29	42	8.12	6.24	6.55
30-34	34	7.94	6.82	6.53
35-39	42	6.40	5.88	5.74
40-44	51	7.04	5.59	5.90
45-49	37	7.14	6.30	6.46
50-54	43	6.51	4.56	6.07
55-59	42	5.64	5.17	6.00
60-64	29	5.07	4.03	5.21
65-69	40	2.03	1.83	4.05
70-74	24	2.46	2.08	4.63
75-79	7	1.71	1.57	3.71
80+	8	3.25	1.90	3.55
Overall¹	476	6.08	4.91	5.68
Females				
Age group				
18-19	35	9.29	8.37	7.57
20-24	252	11.99	9.68	8.60
25-29	215	9.13	7.84	7.01
30-34	237	8.62	8.03	7.00
35-39	266	9.05	8.12	7.20
40-44	277	7.95	6.94	6.47
45-49	299	7.91	6.58	6.38
50-54	311	6.90	6.23	5.92
55-59	298	6.80	5.98	6.20
60-64	201	6.01	4.88	5.63
65-69	127	4.68	3.98	5.59
70-74	66	3.77	3.41	4.83
75-79	24	4.75	3.42	5.42
80+	9	4.00	2.07	6.15
Overall¹	2617	7.32	6.18	6.36
Overall: Males and females¹		6.71	5.56	6.03

¹ Overall means weighted to mid-year population distribution of UK for 2019