

**Motivated Helplessness in the Context of the COVID-19 Pandemic: Evidence for a
Curvilinear Relationship between Perceived Ability to Avoid the Virus and Anxiety**

Supplementary File

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Appendix 1: Helplessness to avoid being infected with COVID-19

Directions: Please indicate the degree to which you agree or disagree with the following statements regarding what your perception of what you can do in order to avoid being infected by the coronavirus (COVID-19). There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1. I can do many things to prevent myself from being infected with the coronavirus.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

2. I can avoid being infected with the coronavirus.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

3. No matter how much I will try to protect myself it is likely that I will be infected with the coronavirus.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

4. Fighting the coronavirus is hopeless since everyone will eventually be exposed to it.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

5. Whether or not I get infected by the coronavirus depends mostly on how careful I am

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

6. There is no point trying to avoid getting infected by the coronavirus because eventually we will all be exposed to it.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

7. There is not much I can personally do to protect myself from being infected with the coronavirus.

1	2	3	4	5	6	7
<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Neither Agree nor Disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>

Appendix 3: Reliability Analyses Within Countries with $N > 160$

Table S1				
<i>Alpha Cronbach Coefficients for the Main Study Variables: Helplessness to Avoid being Infected with COVID-19, State-Anxiety, and Fear of COVID-19, Across Participants from Countries with $N > 160$.</i>				
Country	<i>N</i>	<i>Helplessness to Avoid being Infected</i>	<i>State-Anxiety</i>	<i>Fear of COVID-19</i>
Argentina	219	.71	.87	.91
Estonia	172	.72	.86	.92
Germany	186	.72	.86	.93
Netherlands	541	.74	.89	.92
Poland	320	.76	.87	.93
UK	803	.70	.91	.94
USA	549	.73	.91	.94

Appendix 4: Additional questions about COVID-19

1. Has anyone close to you (family, friends, coworkers) been infected with the coronavirus?

Yes / No

2. Have you been infected with the coronavirus?

Yes / No / Maybe*

3. Are you still able to work/study in the current situation?

Yes / No / Yes but differently

4. Do you currently live with any of your parents or grandparents?

Yes / No, but I see them often / No, and I do not see them often/ No, they have passed away

* The option “maybe” was added as the study was ongoing, so it was only available to some participants. Participants who marked “yes” on this question were excluded from the analyses.

Appendix 5: Analyses with Gender

We examined the effect of dichotomous gender (male vs. female) in additional analyses. First, we included gender as a covariate in the first step of the hierarchical regression testing for the curvilinear relationship between helplessness (its linear, quadratic and cubic terms) and fear of being infected with COVID-19 as well as state-anxiety (a separate analysis was conducted for each depended variable). As in the main analyses, the first step of the regressions, we entered the covariates neuroticism, self-esteem and age for the analysis predicting fear of COVID-19, and only the covariate neuroticism in the analysis predicting state-anxiety. In the second step, we entered the mean centered measure of perceived helplessness to avoid COVID-19, representing the linear term, and in the third step, we entered the quadratic term of the helplessness measure to test for the curvilinear relationship. We again added another step in which we added the cubic term to the regression.

As shown in Table S2, the analysis for fear of COVID-19 indicated that the first step of the regression containing participants' gender as well as neuroticism, self-esteem, and age, was statistically significant, $F(4, 3572) = 153.45, p < .001, R^2_{Adj} = .146$. The second step was also statistically significant, $\Delta F(1, 3571) = 61.13, \Delta p < .001, \Delta R^2 = .014, R^2_{Adj} = .160$, as there was a positive association between perceived helplessness and fear of COVID-19, $b = 0.34, \beta = .12, t(3571) = 7.82, p < .001$. More importantly, the third step was also statistically significant, $\Delta F(1, 3570) = 58.04, \Delta p < .001, \Delta R^2 = .013, R^2_{Adj} = .173$, as the quadratic term for perceived was negatively related to fear of COVID-19, $b = -0.33, \beta = -.12, t(3570) = 7.62, p < .001$. The fourth step of the regression containing the cubic term for perceived helplessness was not statistically significant $F(1, 3569) = 0.77, p = .381$.

The analysis for state-anxiety revealed that the first step of the regression containing gender and neuroticism was statistically significant, $F(2, 3580) = 588.33, p < .001, R^2_{Adj} = .247$ (see Table S3). The second step was also statistically significant, $\Delta F(1, 3579) = 113.01, \Delta p < .001, \Delta R^2 = .023, R^2_{Adj} = .270$, as there was a positive linear association between perceived helplessness and state-anxiety, $b = 0.11, \beta = .15, t(3579) = 10.63, p < .001$. More importantly, the third step was also statistically significant, $\Delta F(1, 3578) = 29.38, \Delta p < .001, \Delta R^2 = .007, R^2_{Adj} = .276$, as the quadratic term for perceived helplessness was negatively associated with state-anxiety, $b = -0.06, \beta = -.08, t(3578) = 5.42, p < .001$. The fourth step containing the cubic term for perceived helplessness was not statistically significant $F(1, 3577) = 0.00, p = .984$ (Table S3).

Additional test separately for each gender, indicated that the curvilinear relationship between helplessness and fear of being infected was statistically significant among males, $\Delta F(1, 2109) = 34.72, p < .001, \Delta R^2 = .014$ (linear term, $t = 7.26, b = 0.42, \beta = .16, p < .001$; quadratic term; $t = 5.89, b = -0.32, \beta = -.13, p < .001$); among females, $\Delta F(1, 1456) = 24.41, p < .001, \Delta R^2 = .014$ (linear term, $t = 7.08, b = 0.54, \beta = .15, p < .001$; quadratic term; $t = 4.94, b = -0.34, \beta = -.13, p < .001$); and among participants who reported “other” as gender, $\Delta F(1, 43) = 5.91, p = .019, \Delta R^2 = .106$ (linear term, $t = 1.12, b = 0.50, \beta = .17, p = .237$; quadratic term; $t = 2.43, b = -0.95, \beta = -.34, p = .019$).

Similarly, results were the same across genders when predicting state-anxiety: the regression step containing the quadratic term was statistically significant among males, $\Delta F(1, 2115) = 23.07, p < .001, \Delta R^2 = .008$ (linear term, $t = 8.59, b = 0.12, \beta = .17, p < .001$; quadratic term; $t = 4.91, b = -0.07, \beta = -.10, p < .001$); among females, $\Delta F(1, 1460) = 7.41, p = .007, \Delta R^2 = .007$ (linear term, $t = 8.15, b = 0.16, \beta = .21, p < .001$; quadratic term; $t = 2.72, b = -0.05, \beta = -.07, p = .007$); and among participants who reported “other” as gender, $\Delta F(1, 45) = 7.65, p =$

.008, $\Delta R^2 = .106$ (linear term, $t = 2.03$, $b = 0.21$, $\beta = .24$, $p = .048$; quadratic term; $t = 2.77$, $b = -0.26$, $\beta = -.33$, $p = .008$).

Table S2

Regression Analyses Predicting Fear of COVID-19 as a Function of the Linear, Quadric, and Cubic Terms of Perceived Helplessness to Avoid being Infected Among Participants from all Countries ($N = 3,577$), With the addition of gender (Males = 1, Females = -1) as a covariate.

	<i>b</i> (SE)	<i>t</i>	<i>p</i>	β	ΔF	ΔR^2
<u>Step 1</u>			< .001		153.45	.147
Gender	-0.64 (.07)	9.27	< .001	-.15		
Neuroticism	1.14 (.06)	18.24	< .001	.31		
Self-esteem	0.11 (.02)	6.04	< .001	.11		
Age	0.03 (.00)	7.26	< .001	.12		
<u>Step 2</u>			< .001		61.13	.014
Helplessness linear	0.34 (.04)	7.82	< .001	.12		
<u>Step 3</u>			< .001		58.04	.013
Helplessness linear	0.46 (.05)	9.94	< .001	.16		
Helplessness quad	-0.33 (.04)	7.62	< .001	-.12		
<u>Step 4</u>			.381		0.77	.000
Helplessness cubic	-0.04 (.04)	0.88	.381	-.03		

Notes. Helplessness linear = helplessness mean-centered; Helplessness quad = Helplessness quadratic (squared); Helplessness raised to the power of 3.

Table S3

Regression Analyses Predicting State-Anxiety as a Function of the Linear, Quadric, and Cubic Terms of Helplessness to Avoid being Infected with COVID-19 Among Participants from all Countries (N = 3583).

	<i>b</i> (SE)	<i>t</i>	<i>p</i>	β	ΔF	ΔR^2
<u>Step 1</u>			< .001		588.33	.247
Gender	-0.12	6.82	< .001	-.10		
Neuroticism	0.42 (.01)	30.83	< .001	.46		
<u>Step 2</u>			< .001		113.01	.023
Helplessness linear	0.12 (.01)	10.63	< .001	.15		
<u>Step 3</u>			< .001		29.38	.007
Helplessness linear	0.14 (.01)	11.86	< .001	.18		
Helplessness quad	-0.06 (.01)	5.42	< .001	-.08		
<u>Step 4</u>			.984		0.00	.000
Helplessness cubic	0.00 (.01)	0.24	.984	-.00		

Notes. Helplessness linear = helplessness mean-centered; Helplessness quad = Helplessness quadratic (squared); Helplessness raised to the power of 3.

Appendix 6: Analyses within countries with $N > 160$

We tested the curvilinear relationship between helplessness to avoid COVID-19 and fear of being infected, as well as state-anxiety among participants from each of the countries with adequate power ($N > 160$), using the same two hierarchical regression analyses as in the main analysis (a separate analysis for each depended variable). For each country, we centered the mean helplessness score separately and created the quadratic term accordingly. Neuroticism was again used as a covariate. Age and self-esteem were only statistically significant covariates in the analysis predicting fear of being infected in some of the countries, but not in all other countries, so they were excluded from the within country analyses (adding them to the models did not change the results in any of the analyses). Below and in Tables S3 and S4 we report the analysis predicting fear of being infected with COVID-19 and state-anxiety, for each of the countries with adequate power: the United Kingdom (U.K.) the United States (U.S.), the Netherlands, Poland, Argentina, Germany and Estonia.

Fear of being infected with COVID-19

As shown in Table S4, the analysis for fear of being infected with COVID-19 showed that the first step of the regression containing participants' neuroticism was statistically significant in all the countries, $F_s > 10.94$, $p_s < .001$, $R^2_s > .09$, all $\beta_s > .20$. The second step of the regression that included the linear term was statistically significant in the U.S., the Netherlands, Poland, and Argentina, $\Delta F_s > 4.80$, $p_s < .030$, $\Delta R^2_s > .01$, all $\beta_s > .08$, but not, in the U.K., Germany and Estonia, $F_s < 1$, $p_s > .513$. Importantly, the third step containing the quadratic term was statistically significant, in the U.K., U.S., Netherlands and Poland, $\Delta F_s > 4.36$, $p_s < .050$, $\Delta R^2_s > .01$, all $\beta_s < -.08$. In Estonia, this step was only approaching statistical significance, $\Delta F(1, 167) = 2.89$, $p = .091$, $\Delta R^2 = .015$ (quadratic term $\beta = -.13$). In Argentina and

Germany this step was not significant, $\Delta F_s < 1$, $p_s > .416$ (See Figures S1a-S1g). In Germany however, there was a statistically significant negative cubic relationship, $\Delta F = 5.31$, $p = .022$, $\Delta R^2 = .025$ (cubic term $\beta = -.37$), in which there was a reduction in fear of being infected among participants high in helplessness (see Figure S1f). All other cubic effects were not significant, $\Delta F_s < 1.10$, $p_s > .296$ (see Table S4).

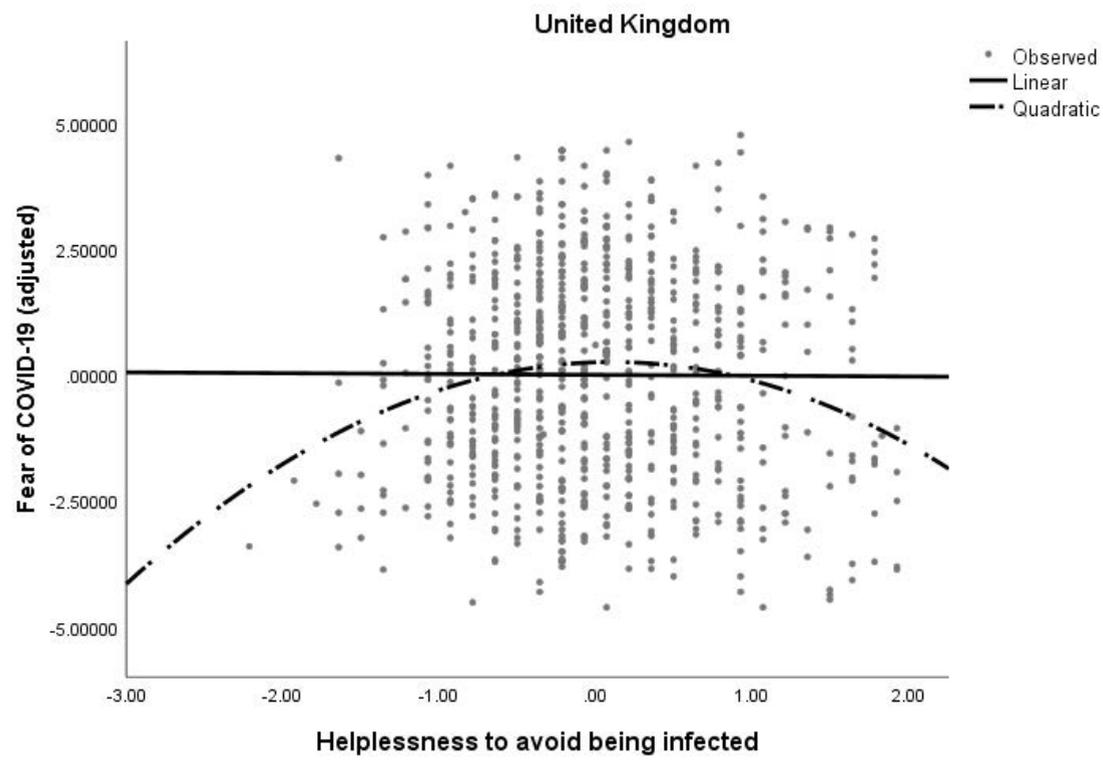
Table S4

Standardized Regression Coefficients from the Analyses Predicting Fear of COVID-19 as a Function of the Linear, Quadric, and Cubic Terms of Perceived Helplessness to Avoid being Infected Among Participants from Countries with $N > 160$.

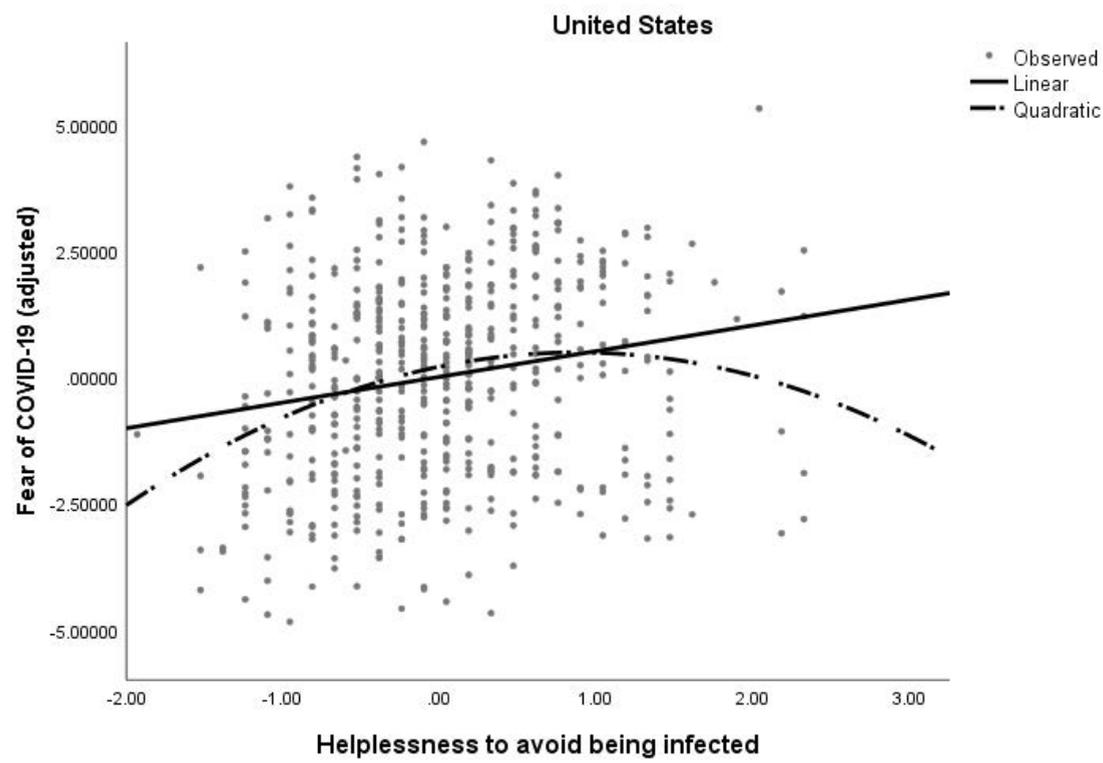
	UK ($N = 803$)	USA ($N = 549$)	Netherlands ($N = 541$)	Poland ($N = 320$)	Argentina ($N = 219$)	Germany ($N = 186$)	Estonia ($N = 172$)
<u>Step 1: $\Delta F, \Delta R^2$</u>	61.65, .07***	67.38, .11***	54.01, .09***	13.53, .04***	22.07, .09***	10.95, .11***	22.78, .12***
Neuroticism β	.27***	.33***	.30***	.20***	.30	.37***	.35***
<u>Step 2: $\Delta F, \Delta R^2$</u>	0.03, .00	16.82, .03***	4.81, .01**	11.61, .03***	8.53, .03**	0.43, .00	.00, .01
Helplessness linear β	-.01	.16***	.09*	.18***	.19**	.05	-.01
<u>Step 3: $\Delta F, \Delta R^2$</u>	20.87, .02***	12.08, .02***	4.36, .01*	12.87, .04***	0.58, .00	0.66, .00	2.89, .02 [†]
Helplessness linear β	.03	.22***	.12**	.29***	.20**	.07	.05
Helplessness quad β	-.16***	-.15***	-.09*	-.22***	-.05	-.06	-.13 [†]
<u>Step 4: $\Delta F, \Delta R^2$</u>	0.15, .00	0.01, .00	0.16, .00	0.22, .00	1.09, .00	5.31, .03*	0.26, .00
Helplessness cubic β	.02	-.00	-.03	-.06	.12	-.37*	.08

Notes. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Helplessness linear = helplessness mean-centered; Helplessness quad = Helplessness quadratic (squared); Helplessness cubic = Helplessness raised to the power of 3.

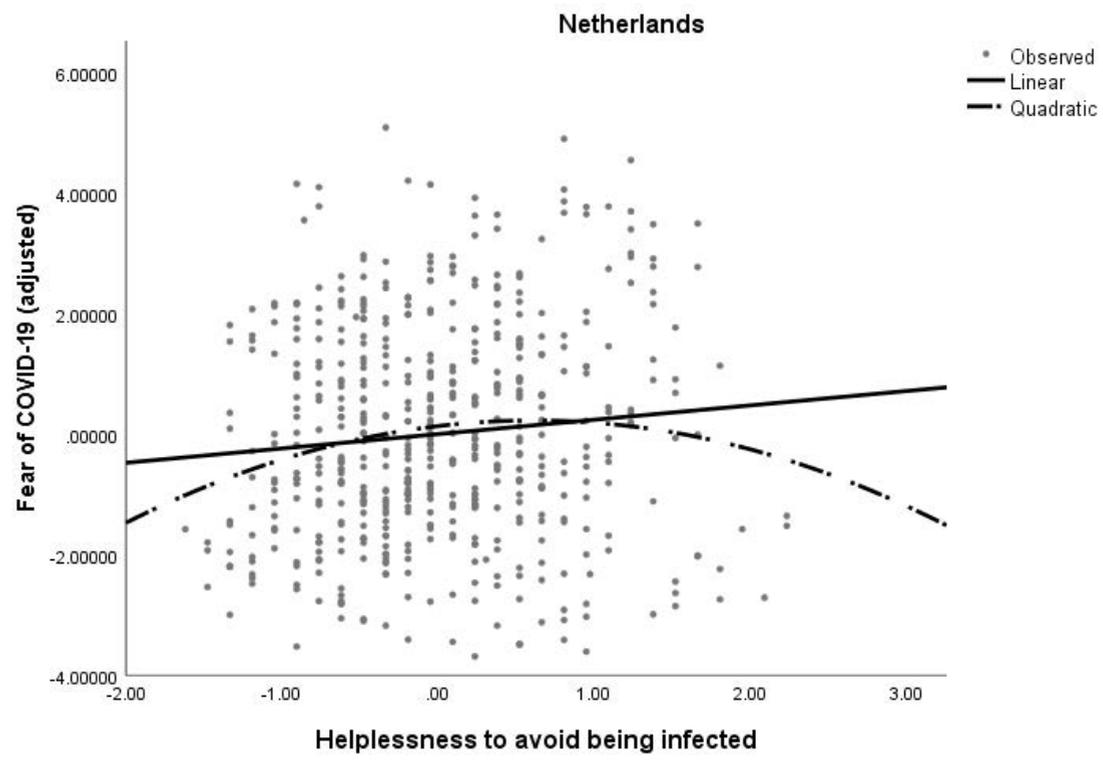
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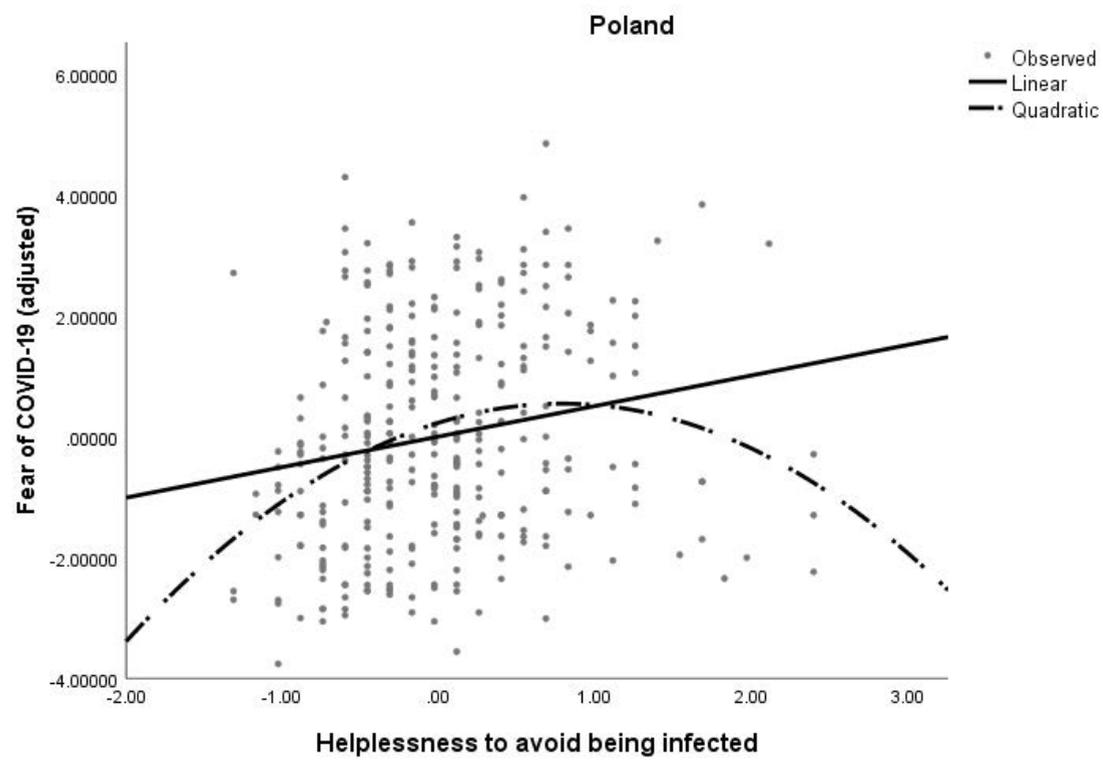
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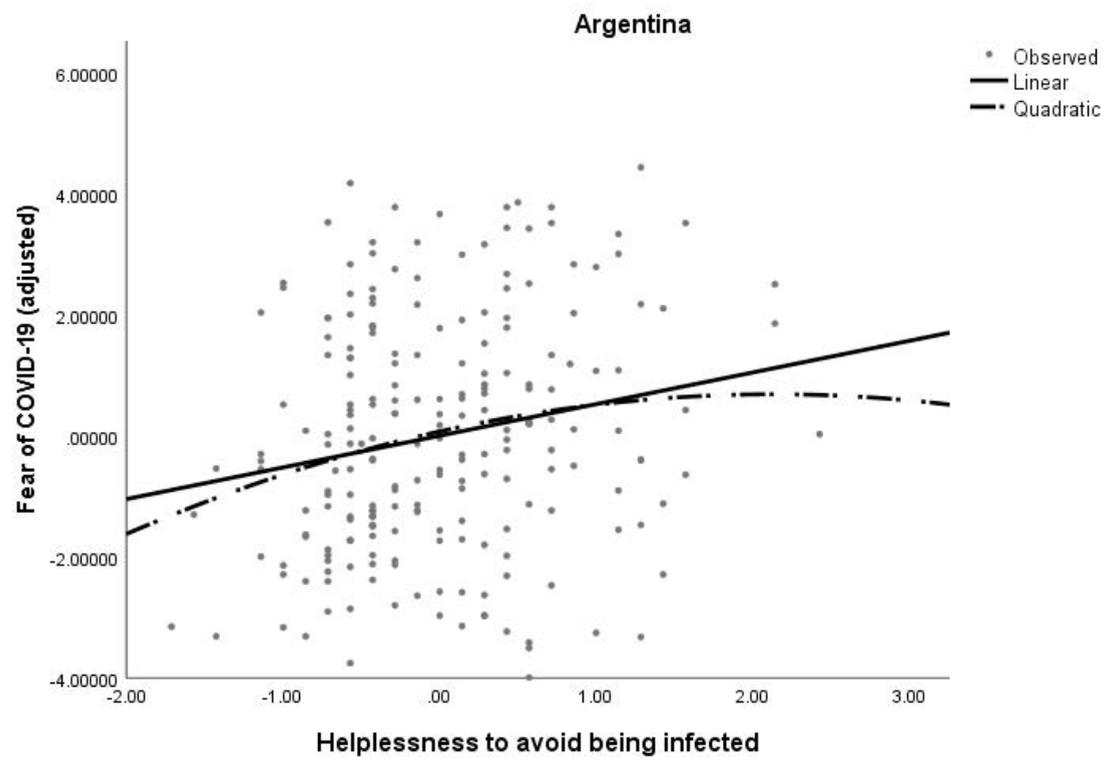
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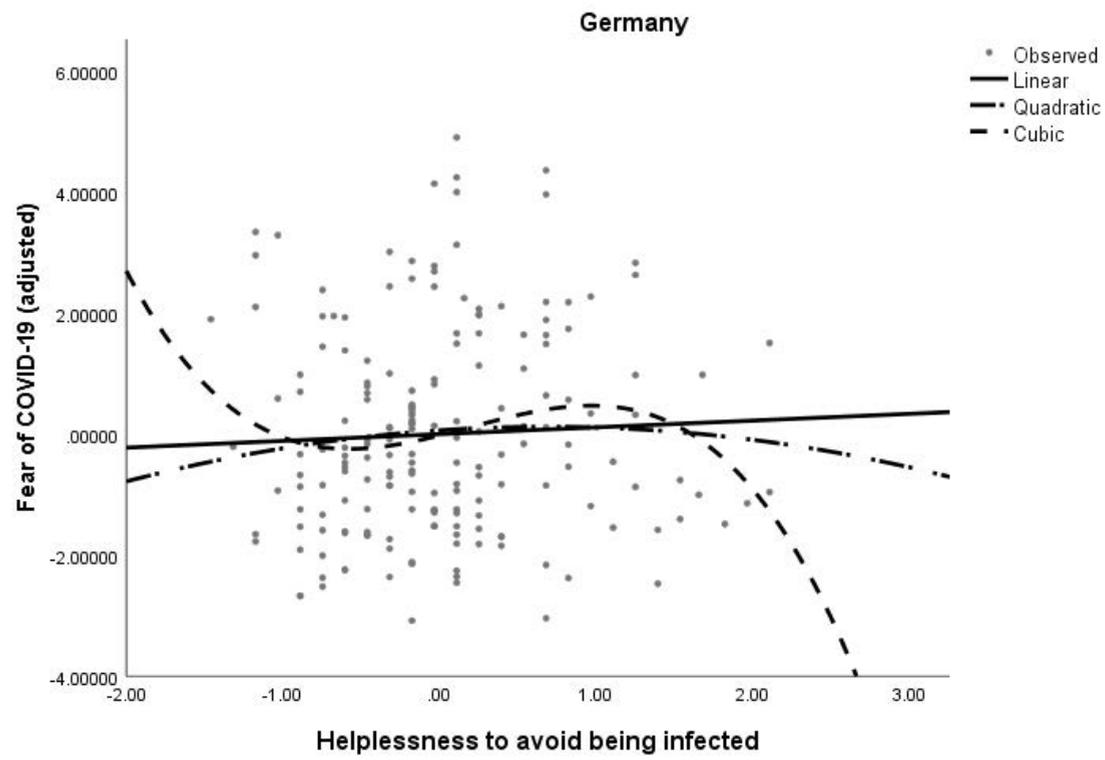
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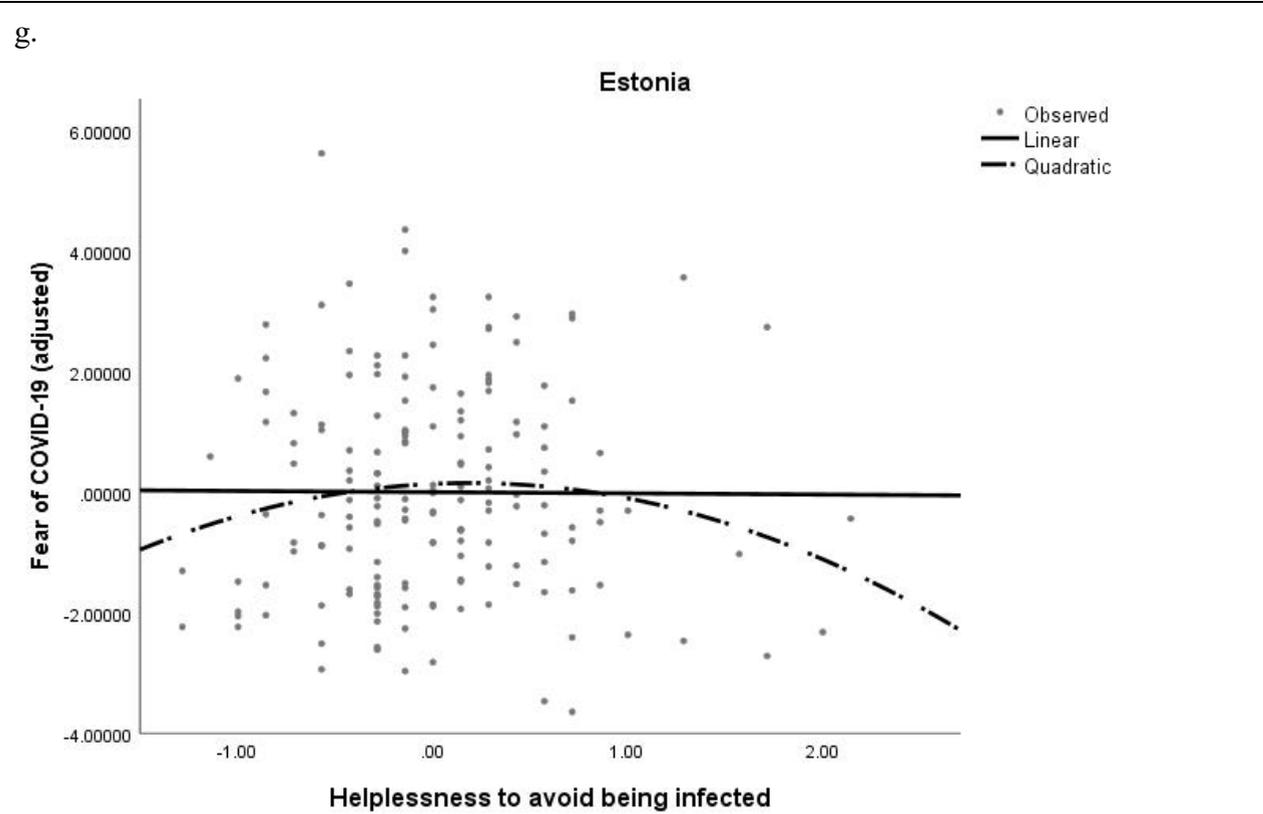


Figure S1 panels a-g. *A Scatter-Plot Graph Depicting the Linear and Curvilinear relationship between Perceived Helplessness to Avoid being Infected with COVID-19 and Fear of COVID-19 Among Participants from the Countries with $N > 160$.*

Notes. Fear of being infected with COVID-19 is adjusted for neuroticism (scores are residuals saved after the first regression step). Only in Germany the cubic term is also superimposed on the graph considering that it was statistically significant.

State-Anxiety

As shown in Table S5, the analysis predicting state-anxiety indicated that the first step of the regression containing participants' neuroticism was statistically significant in all the countries, $F_s > 26.50$, $ps < .001$, $R^2_s > .13$, all $\beta_s > .36$. The second step of the regression that included the linear term was statistically significant in the U.S., the Netherlands, Poland, Argentina and Germany, $\Delta F_s > 4.80$, $ps < .034$, $\Delta R^2_s > .005$, all $\beta_s > .08$, but it was not statistically significant, in the U.K. and Estonia, $\Delta F_s < .2.57$, $ps > .110$, $\Delta R^2_s < .013$. Importantly, the third step containing the quadratic term was statistically significant, in the U.K., U.S., and Poland, $\Delta F_s > 7.58$, $ps < .007$, $\Delta R^2_s > .01$, $\beta_s < -.08$. In the Netherlands and Estonia, this step was marginally statistical significance, $\Delta F_s > 3.34$, $ps < .071$, $\Delta R^2_s > .004$ (quadratic terms $\beta < -.07$) (see Figures S2a-S2g). In Argentina and Germany this step was not significant, $\Delta F_s < 1.15$, $ps > .285$. The fourth regression step containing the cubic effects was not significant in any country, $\Delta F_s < 1.74$, $ps > .188$ (see Table S5).

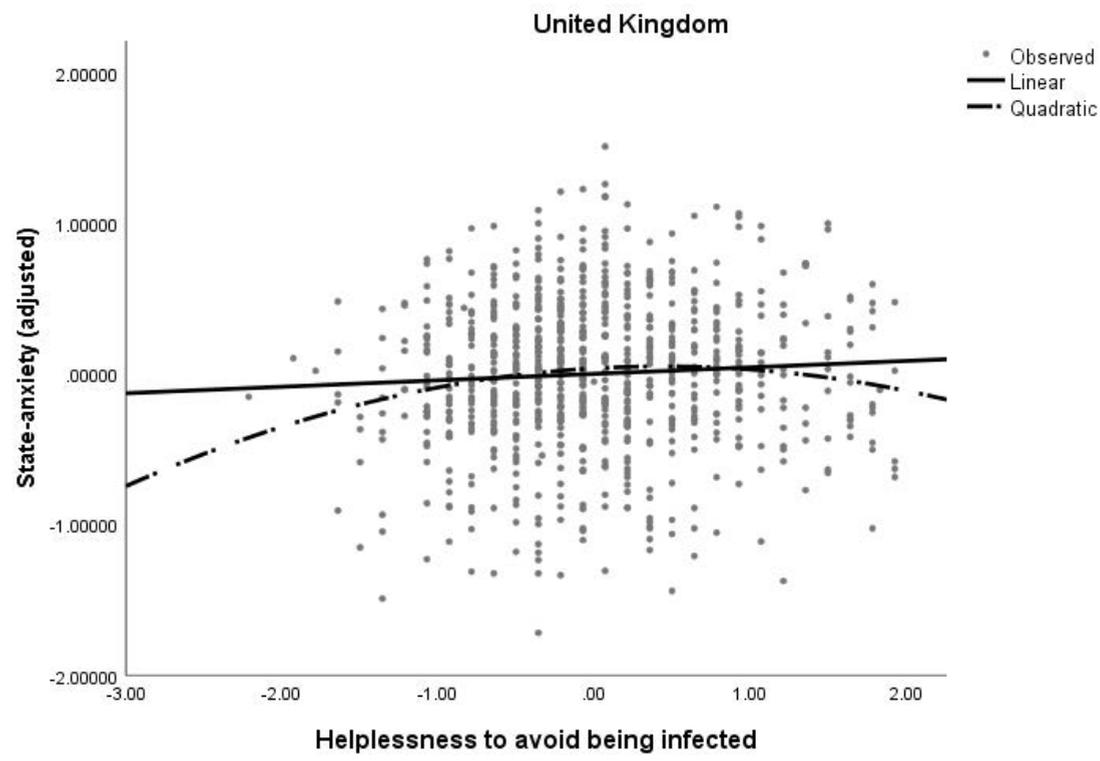
Table S5

Standardized Regression Coefficients from the Analyses Predicting State-Anxiety as a Function of the Linear, Quadric, and Cubic Terms of Helplessness to Avoid being Infected with COVID-19 among Participants from Countries with $N > 160$.

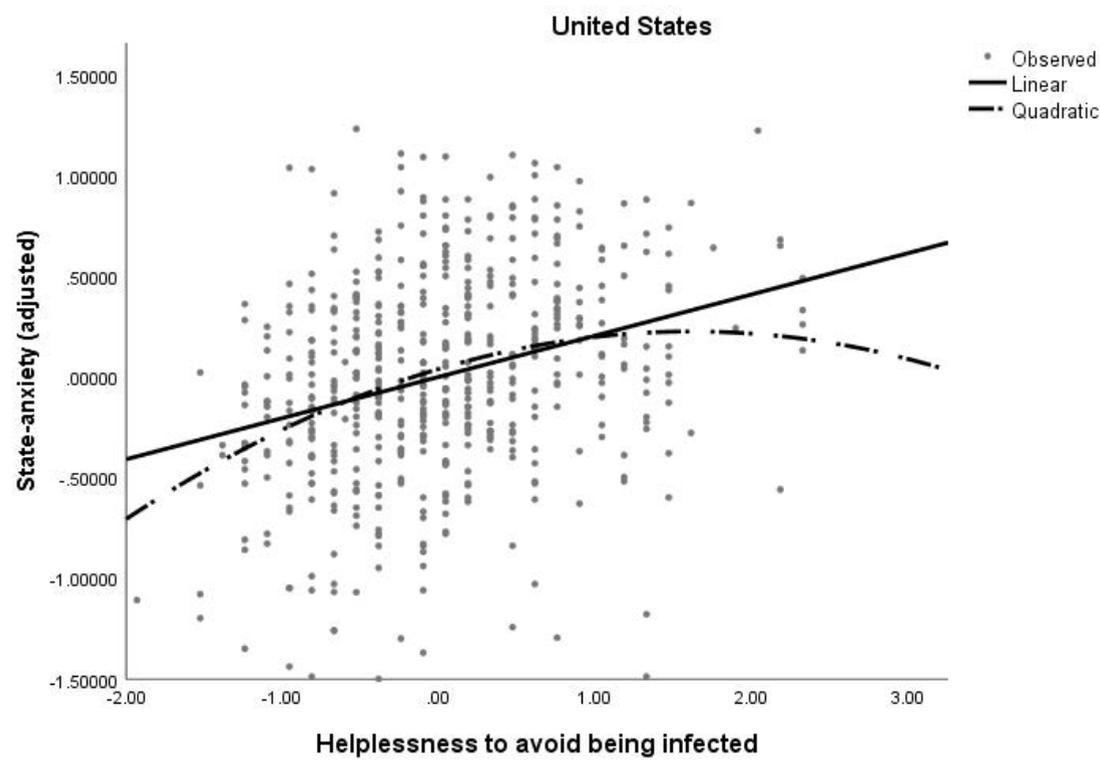
	UK ($N = 803$)	USA ($N = 549$)	Netherlands ($N = 541$)	Poland ($N = 320$)	Argentina ($N = 219$)	Germany ($N = 186$)	Estonia ($N = 172$)
<u>Step 1: $\Delta F, \Delta R^2$</u>	279.54, .26***	136.73, .20***	175.43, .25***	53.95, .15***	86.79, .29***	26.51, .13***	43.13, .20***
Neuroticism β	.51***	.45***	.50***	.38***	.53***	.36***	.45***
<u>Step 2: $\Delta F, \Delta R^2$</u>	3.30, .00	54.92, .07***	5.56, .01*	8.97, .02**	5.75, .02*	8.25, .04**	2.57, .01
Helplessness linear β	.06	.27***	.08*	.15**	.14*	.19**	.11
<u>Step 3: $\Delta F, \Delta R^2$</u>	7.78, .01***	7.58, .01**	3.34, .01 [†]	7.84, .02**	0.38, .00	1.15, .01	3.77, .02 [†]
Helplessness linear β	.08*	.31***	.10*	.24***	.12*	.23**	.17*
Helplessness quad β	-.09**	-.11**	-.07 [†]	-.16**	.04	-.08	-.14 [†]
<u>Step 4: $\Delta F, \Delta R^2$</u>	0.10, .00	1.35, .00	0.04, .00	1.26, .00	0.45, .00	0.07, .00	1.74, .01
Helplessness cubic β	-.02	.082	-.01	-.14	.07	.04	.20

Notes. [†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$. Helplessness linear = helplessness mean-centered; Helplessness quad = Helplessness quadratic (squared); Helplessness cubic = Helplessness raised to the power of 3.

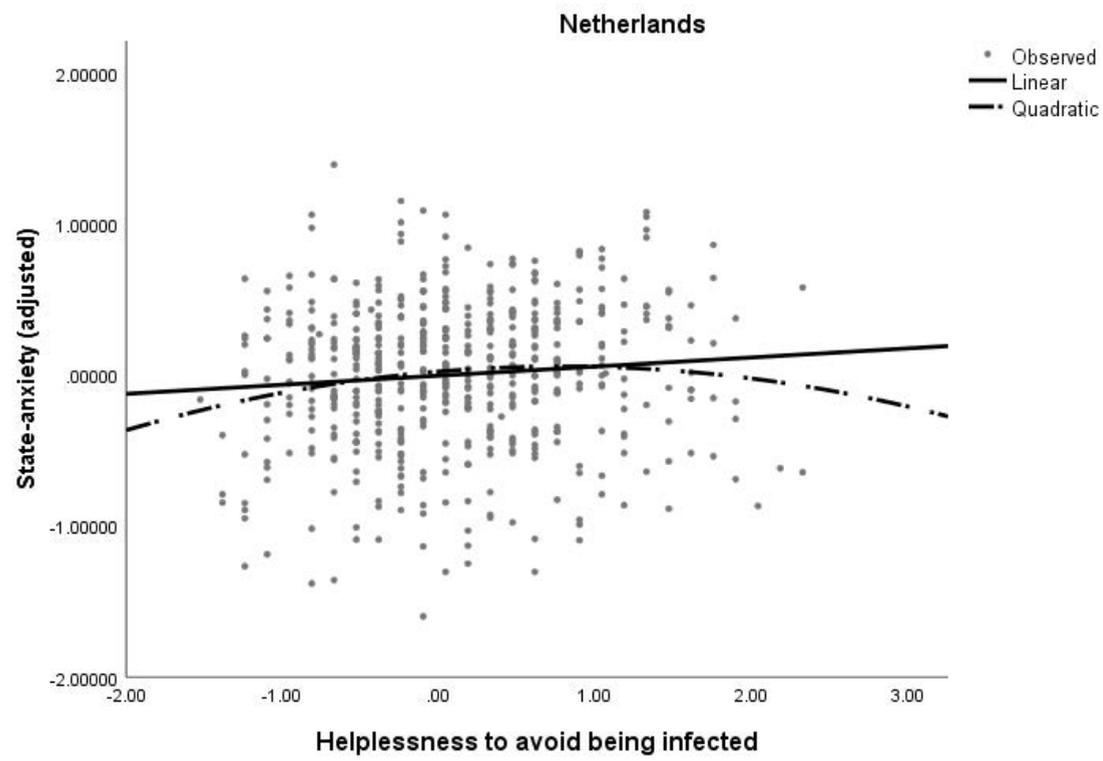
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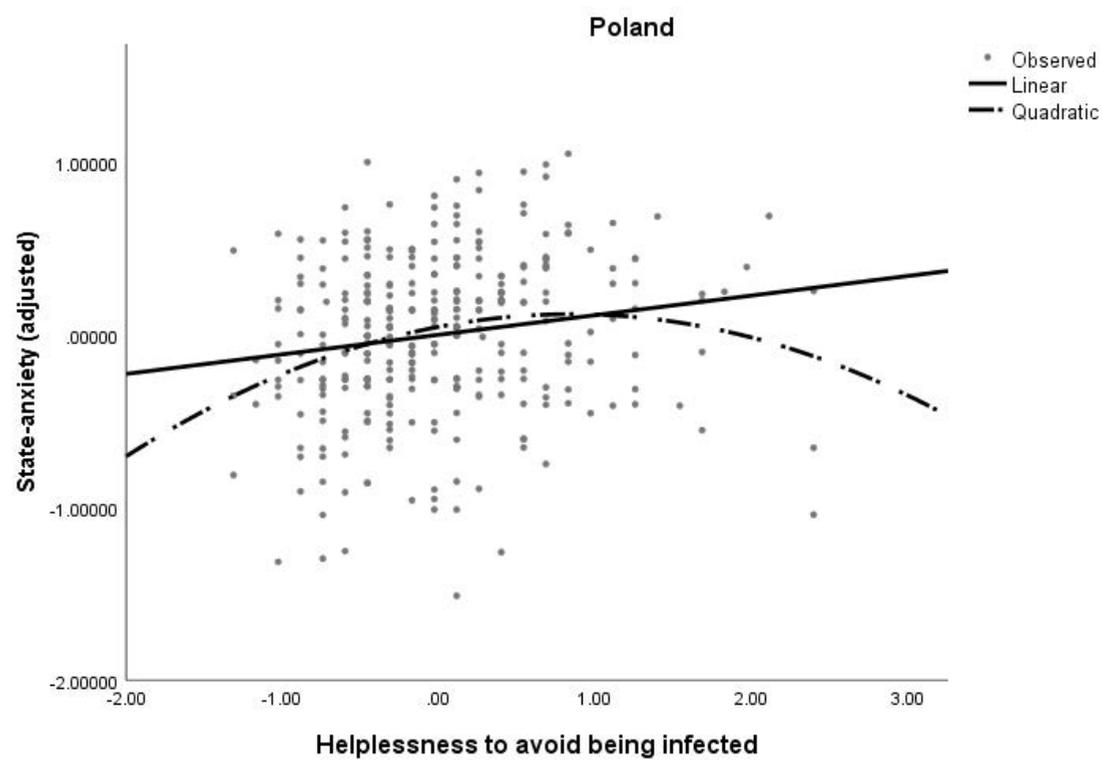
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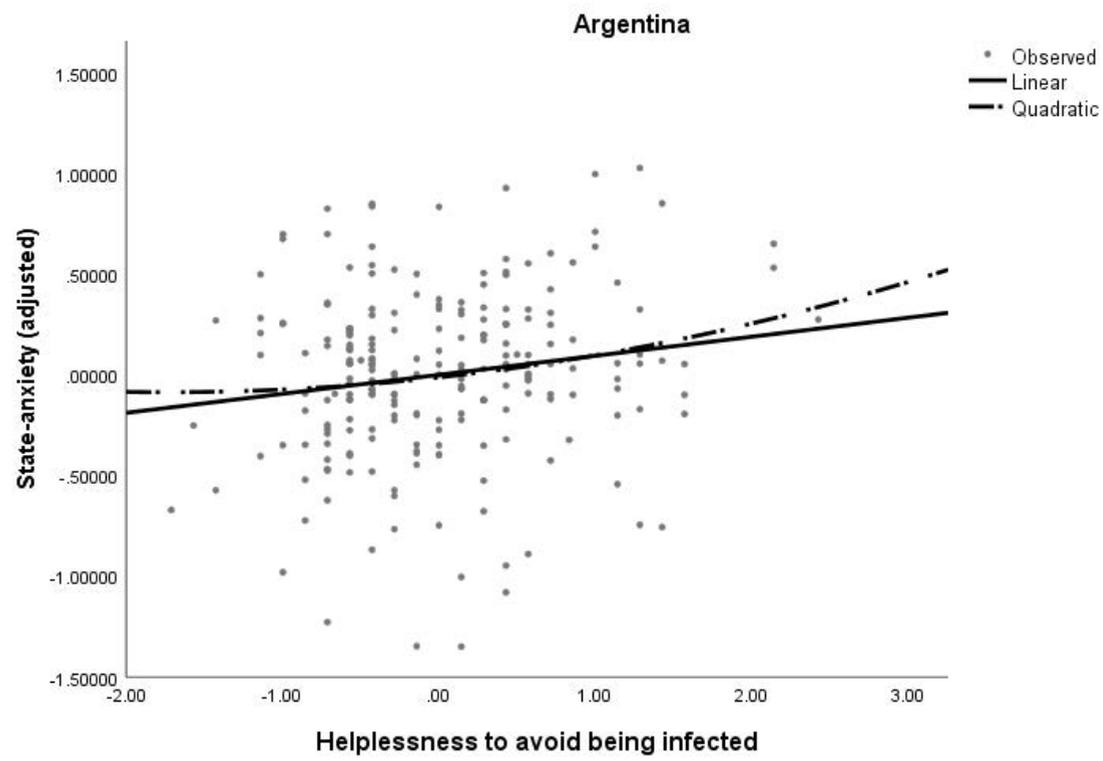
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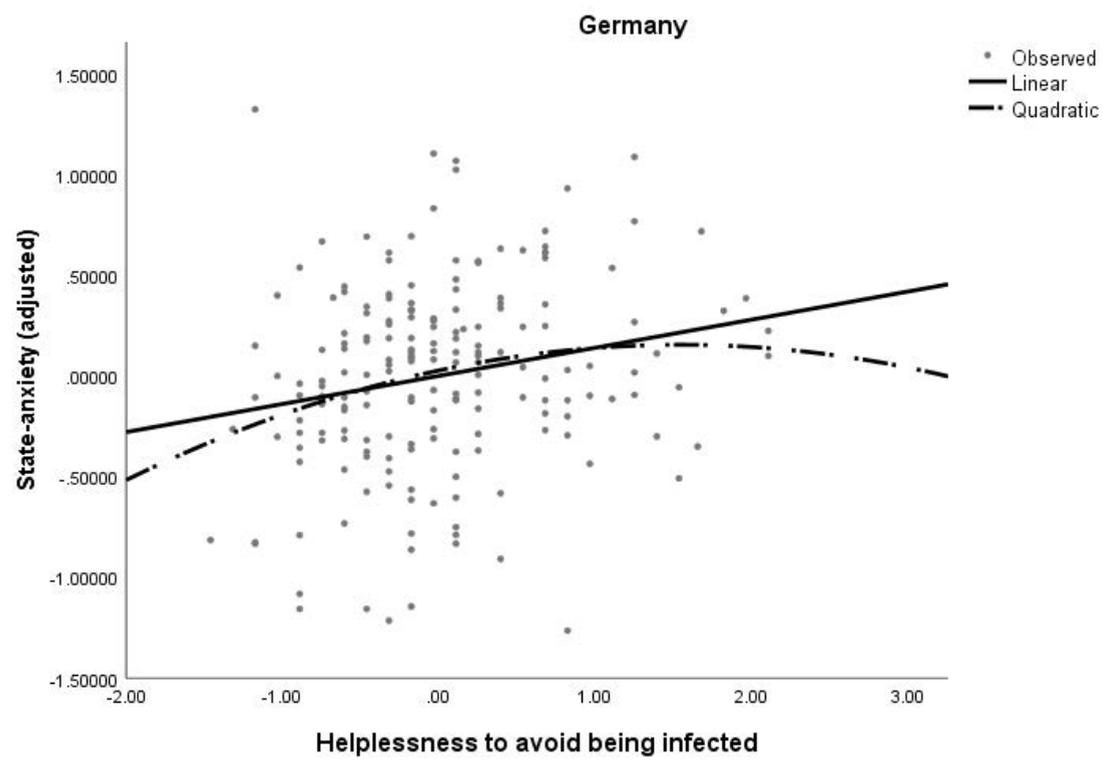
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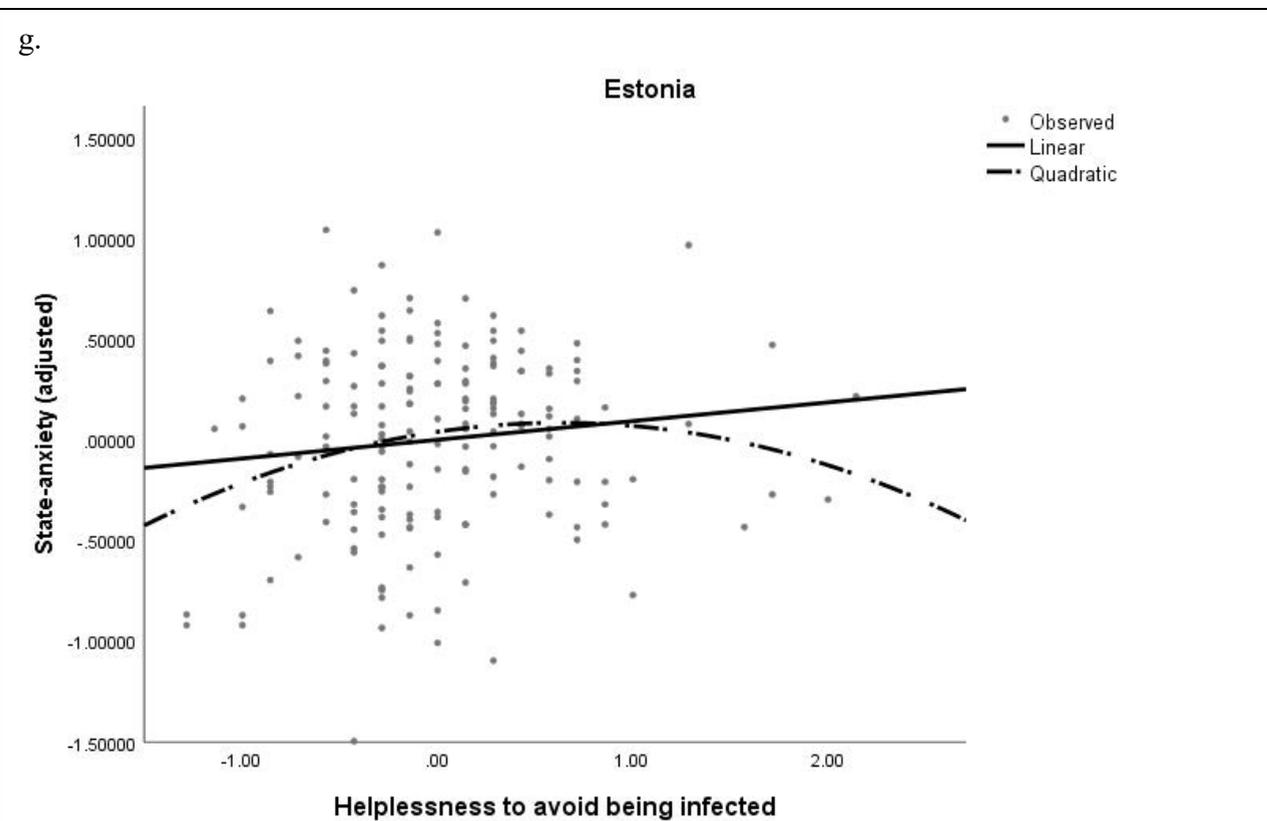


Figure S2. A Scatter-Plot Graph Depicting the Linear and Curvilinear relationship between Perceived Helplessness to Avoid being Infected with COVID-19 and State-Anxiety Among Participants from Countries with $N > 160$.

Notes. State-anxiety is adjusted for neuroticism (scores are residuals saved after the first regression step).