

## Appendix S1: Descriptive Statistics

To study trends in psychosocial factors (H1) and behaviour (H2 and H3), we included all observations (participants in a specific round) with valid information on all sociodemographic characteristics as well as the relevant outcome variable. Table A1 provides the descriptive statistics at the observation-level for these variables.

**Table A1: Descriptive statistics for the trend analyses (H1-H3) (rounds 1-19)**

	N	%	Mean	S.D.	Min	Max
<i>Behaviour</i>						
Distancing when visiting with friends or family	779,686					
Not in situation	144,205	18.5				
Never closer than 1.5m	84,510	10.84				
Infrequently closer than 1.5m	373,635	47.92				
Frequently closer than 1.5m	177,336	22.74				
Distancing when grocery shopping	813,588					
Not in situation	66,493	8.17				
Never closer than 1.5m	23,511	2.89				
Infrequently closer than 1.5m	356,919	43.87				
Frequently closer than 1.5m	366,665	45.07				
Handwashing	849,273		4.63	1.5	1	7
<i>Psychosocial factors (continuous)</i>						
Emotional response	338,387		2.87	0.9	1	5
Affective risk	338,387		3.55	1	1	5
<i>Psychosocial factors (categorical)</i>						
Perceived susceptibility (self)	338,388	14.04				
Perceived susceptibility (others)	338,388	46.30				
Perceived severity (self)	338,388	55.06				
Perceived severity (others)	338,388	89.21				
Self-efficacy - distancing	335,988	63.50				
Self-efficacy - handwashing	334,710	48.84				
Response efficacy - distancing	338,388	69.10				
Response efficacy - handwashing	338,387	80.87				
Descriptive norms - distancing	268,184	44.97				
Descriptive norms - handwashing	309,463	60.51				

To study within-person associations between psychosocial factors and behaviour (H4 and H5), we included participants who reported behaviour at  $t$  as well as psychosocial factors at  $t-1$  at least twice. Table A2 provides descriptive statistics for the within-person analysis of handwashing, while Table A3 provides this information for distancing behaviour. Because distancing behaviour was measured categorically, reported within-variation requires some explanation: the within percentages per category indicate the percentage of rounds participants were in a specific category conditional on

ever being in this category, while the within percentage of the entire variable provides the weighted average of these shares per category, indicating overall levels of stability.

**Table A2: Descriptive statistics of handwashing behaviour for the within-person analyses (H4-H5) (rounds 1-19)**

	N	Mean	S.D.	Min	Max
Handwashing round 2-6					
Overall	53,343	4.71	1.48	1.00	7.00
Within participants	17,756	0.00	0.54	-5.53	4.19
Handwashing round 7-19					
Overall	143,153	4.55	1.51	1.00	7.00
Within participants	22,882	0.00	0.62	-3.90	4.78

**Table A3: Descriptive statistics of distancing behaviour for the within-person analyses (H4-H5) (rounds 1-18)**

	Overall		Within	
	N	%	N	%
Distancing when visiting with friends or family - round 2-6	53,359		17,758	59.44
Not in situation	8,753	16.40		51.59
Never closer than 1.5m	4,859	9.11		44.82
Infrequently closer than 1.5m	25,210	47.25		65.76
Frequently closer than 1.5m	14,537	27.24		61.16
Distancing when visiting with friends or family - round 7-18	125,654		22,670	49.14
Not in situation	24,322	19.36		42.15
Never closer than 1.5m	13,934	11.09		33.93
Infrequently closer than 1.5m	62,815	49.99		61.28
Frequently closer than 1.5m	24,583	19.56		45.31
Distancing when grocery shopping - round 2-6	53,359		17,758	68.30
Not in situation	3,826	7.17		54.15
Never closer than 1.5m	1,101	2.06		40.48
Infrequently closer than 1.5m	21,446	40.19		66.88
Frequently closer than 1.5m	26,986	50.57		74.23
Distancing when grocery shopping - round 7-18	133,534		22,837	56.90
Not in situation	10,936	8.19		38.32
Never closer than 1.5m	4,261	3.19		27.25
Infrequently closer than 1.5m	63,986	47.92		62.66
Frequently closer than 1.5m	54,351	40.70		61.61

Some observations lacked a valid answer to the questions on self-efficacy, response efficacy, descriptive norms, or a cue to action (in total, 28.61% of observations have between 1 and 4 missing values on the psychosocial factors, mostly on descriptive norms). We added a separate missing category for these variables in order to retain these participants for the within-analyses.

## Appendix S2: Reliability of the single-item measures of psychosocial constructs

Most psychosocial factors were measured with single items to limit the length of the survey. A disadvantage of using single-items to measure psychosocial constructs is that the measures may be less reliable than multiple-item measures. We therefore explored the test-retest reliability of all single-items (except for cues to action, as stability herein is not expected). We followed the same method used earlier to investigate the reliability of the behavioural questions, which tested stability in self-reports from round 9 and 10 of the study (winter 2021).<sup>1</sup> This period was chosen because it was relatively stable period in terms of the Covid-19 situation: preventive measures against Covid-19 had been in place for a while and both rounds were conducted during the second lockdown in the Netherlands. For the items measuring perceived susceptibility, perceived severity, self-efficacy and response efficacy, we found that (weighted) kappa > 0.4, indicating sufficient reliability for ordinal self-reported measures.<sup>2</sup> For descriptive social norms on adherence to distancing guidelines, we found kappa = 0.375, which was just below the 0.4 threshold. We expected that this somewhat lower value, compared to the other measures, reflected an actual change in social norms due to the continuation of the lockdown and increased need for social contact, rather than an indication that of non-reliability of the item. ICC, a measure for stability of continuous variables, was not sufficient (< 0.7) for most items, indicating the variables should not be considered continuous.

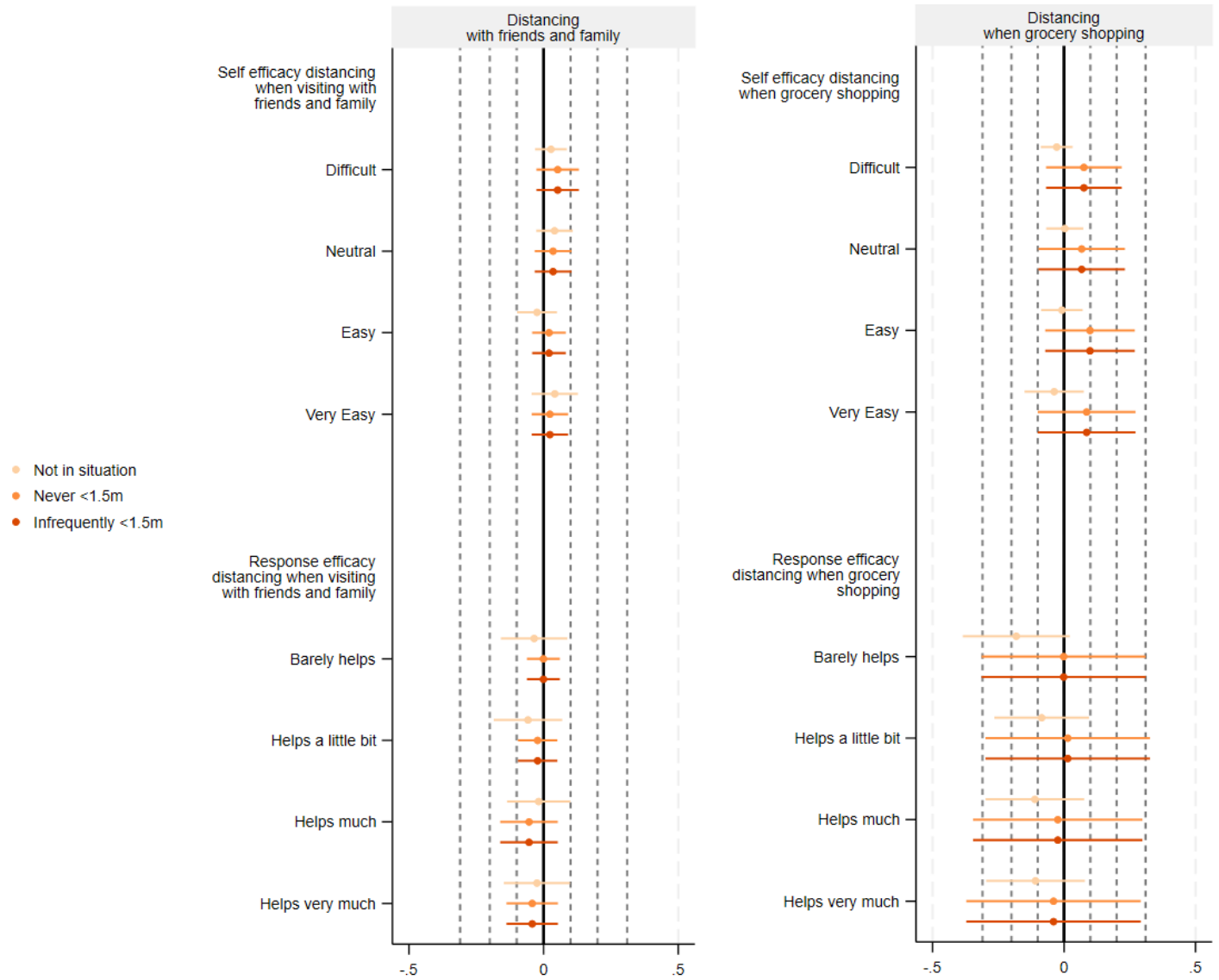
For the six items related to affective response, factor analyses indicated that the items measured two factors. One factor measured emotional response: four questions strongly loaded on this factor (> 0.6) and Cronbach's alpha of this factor was > 0.85. Emotional response scores were therefore calculated by averaging participants' answers on these four questions. The second factor measured affective risk, but factor loadings (> 0.4) and correlations (between 0.43 and 0.6) were lower than for the emotional response factor. Despite these limitations, we averaged participants' answers on the two questions to measure affective risk, since the combination of the two items likely provides a more reliable measure than the individual two items. A robustness test was conducted using the two separate questions, which showed that fixed-effects associations between affective risk and the three behaviours under study were the same for the single and combined measures. Emotional response and affective risk scores were mirrored so higher scores indicated stronger responses.

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<sup>1</sup> Bussemakers, C., van Dijk, M., Dima, A. L., & de Bruin, M. (2022). *How well do surveys on adherence to pandemic policies assess actual behaviour: measurement properties of the Dutch Covid-19 Adherence to Prevention Advice Survey (CAPAS)*. <https://osf.io/rm8qn/>

<sup>2</sup> de Vet, H. C. W., Terwee, C. B., Mokkink, L. B., & Knol, D. L. (2011). *Measurement in Medicine: A Practical Guide*. Cambridge University Press. <https://doi.org/DOI: 10.1017/CBO9780511996214>

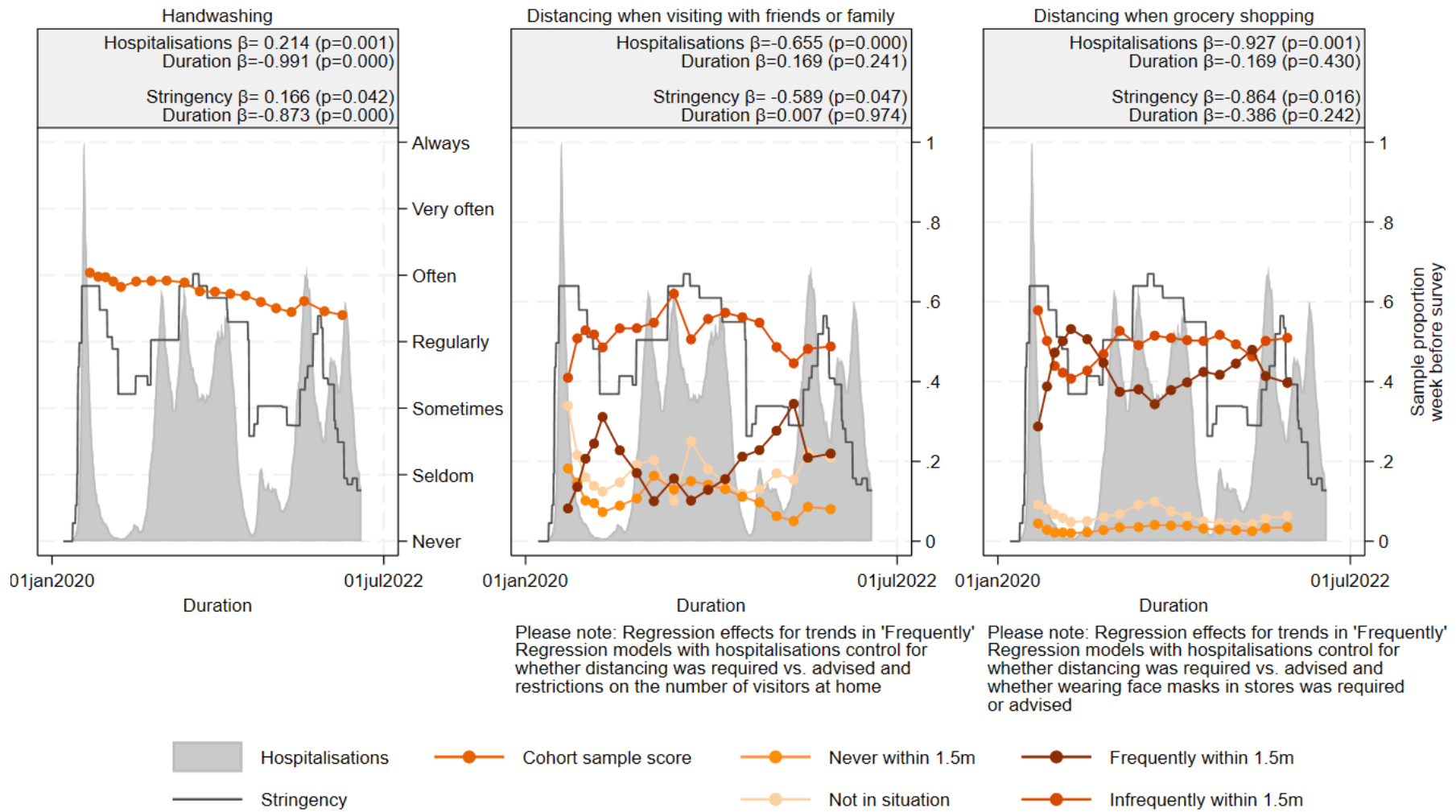
**Appendix S3: FE-associations between situation specific efficacy of distancing and distancing behaviour (based on full models, rounds 5-12 and 15)**



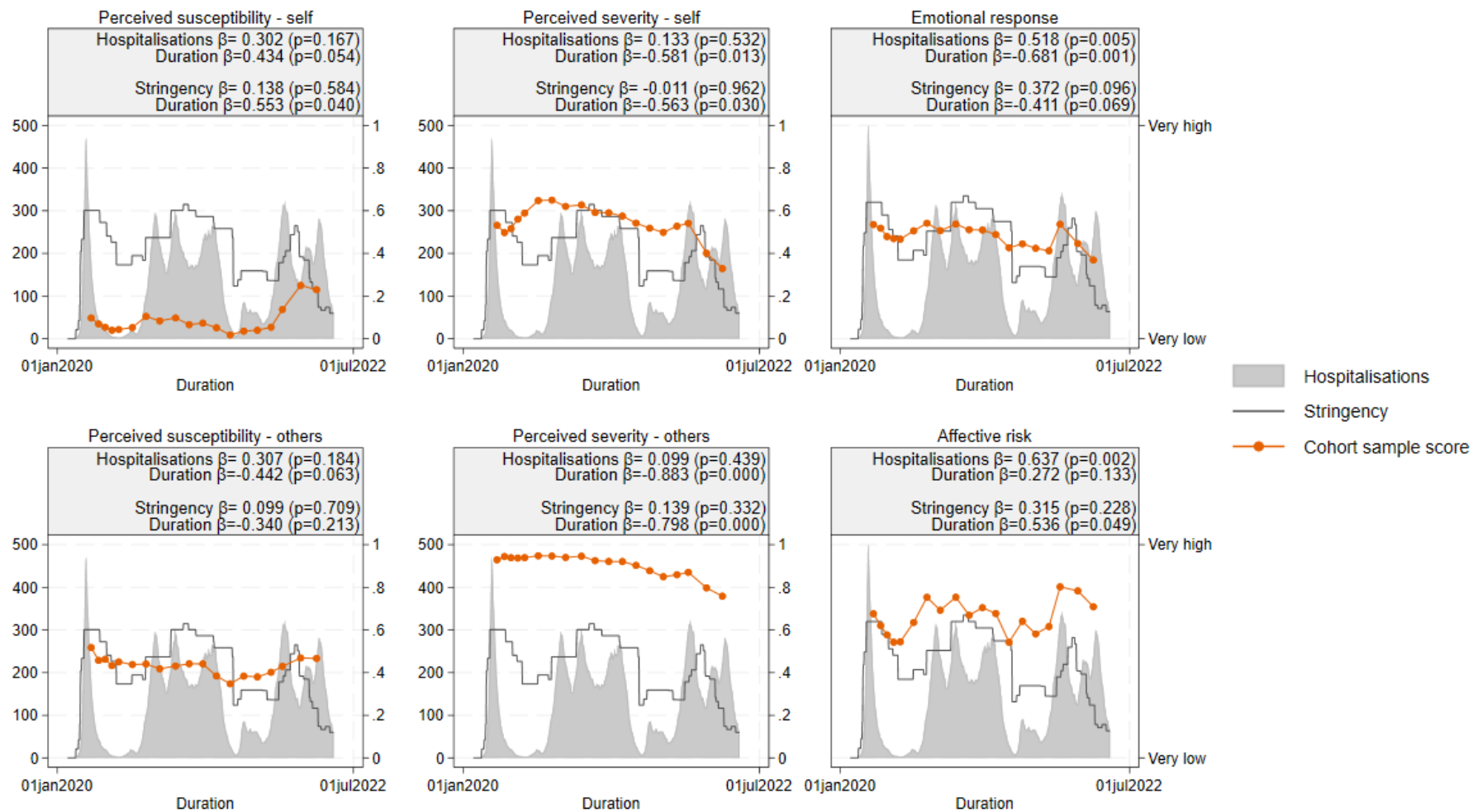
#### **Appendix S4: Trend analyses of behaviour and determinants (H1, H2 and H3) using different operationalisations of pandemic severity**

As a preregistered robustness test, we also operationalized pandemic severity using policy stringency. Results are presented in Appendix S4.1 and S4.2 below.

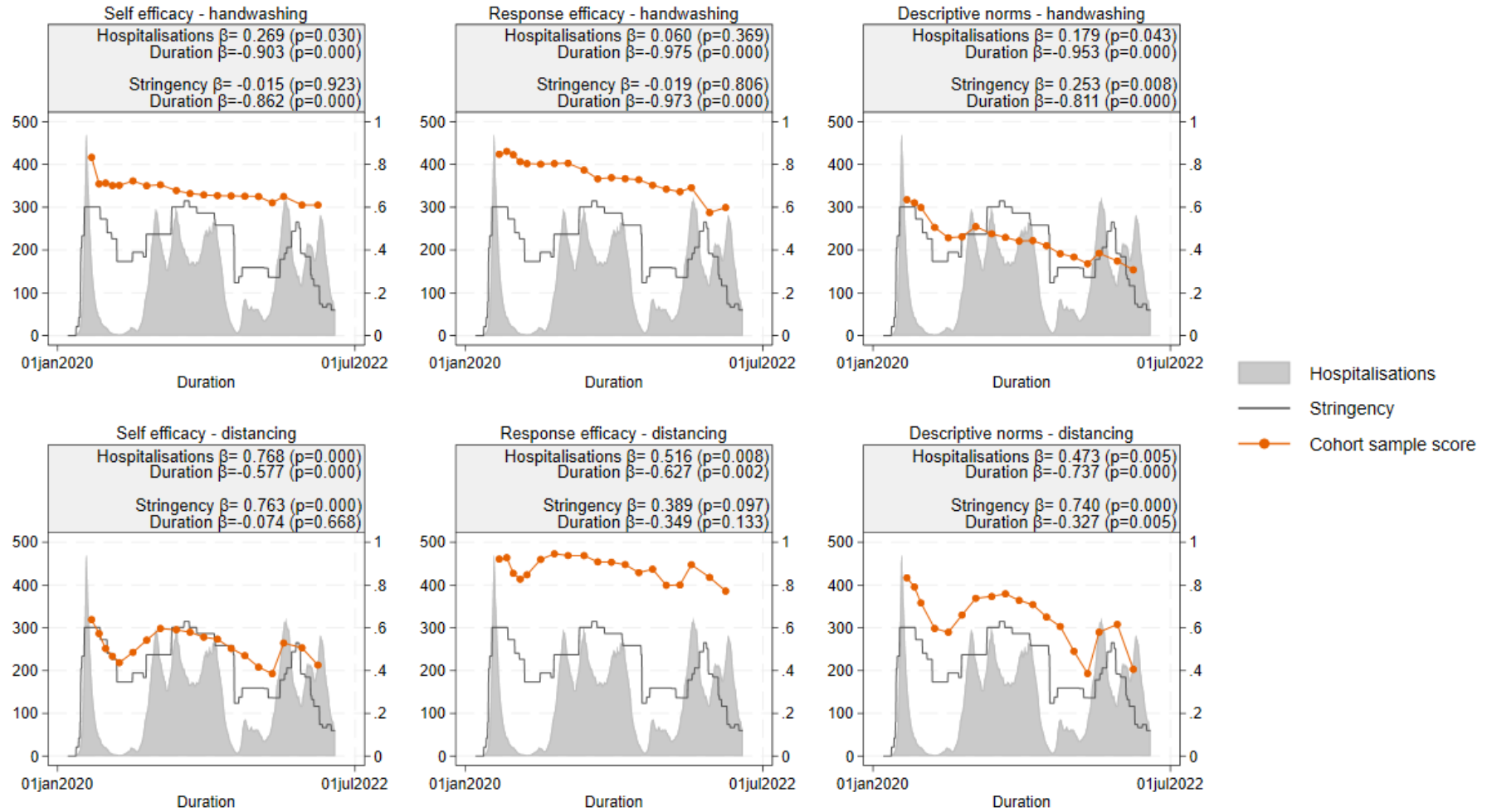
Additionally, we explored whether measures of severity 1-2 weeks after participants' behaviour were associated with their behaviour, because the Dutch pandemic communication was mainly based on the number of infections, which preceded hospital admissions and policy changes. Because behaviour referred to behaviour in the week before the survey, we used measures of severity 1 week after the survey took place (for hospitalisations, this was measured with average admissions 1 and 2 weeks after the survey to encompass the entire relevant week). Results can be found in Appendix S4.3 below and indicate that for hospital admissions, results were similar. For stringency, we found that future stringency tended to be more strongly associated with behaviour and determinants. Since policy changed after changes in infections and hospital admissions, this confirms the earlier found influence of increases in hospital admissions on people's attitudes and behaviour.



**Appendix S4.1: Behaviour (cohort average) with severity (measured with hospitalisations and severity) and duration of the pandemic**



**Appendix S4.2: Determinants (cohort average) with severity (measured with hospitalisations and severity) and duration of the pandemic**



Appendix S4.2: Determinants (cohort average) with severity (measured with hospitalisations and severity) and duration of the pandemic (continued)

**Appendix S4.3: Full regression models of behaviour and determinants (cohort averages) with severity (various operationalisations) and duration of the pandemic**

Appendix S4.3.1: Handwashing

	Handwashing	Handwashing	Handwashing	Handwashing	Handwashing
Duration	-0.991***	-1.081***	-1.082***	-0.873***	-0.810***
Hospital admissions lagged (7 days)	0.214**				
Hospital admissions forwarded (7 days)		0.247**			
Hospital admissions forwarded (14 days)			0.222**		
Stringency lagged (7 days)				0.166*	
Stringency forwarded (7 days)					0.242**
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.2: Distancing when visiting with friends or family

	Not in situation			Never within 1.5m		Infrequently within 1.5m			Frequently within 1.5m			
Duration	-0.288	-0.305	-0.338	-0.363*	-0.470*	-0.445	0.327	0.185	0.204	0.169	0.320	0.321
Duration squared												
Hospital admissions lagged (7 days)	0.494			0.666***		0.002				-0.655***		
Hospital admissions forwarded (7 days)		0.293			0.577*			0.310			-0.666**	
Hospital admissions forwarded (14 days)			0.319			0.459			0.237			-0.586*
Policy: distance	0.191	0.196	0.169	-0.188	-0.257	-0.231	-0.392	-0.521	-0.503	0.184	0.293	0.290
Policy: visitors	0.061	0.159	0.137	0.223	0.264	0.310	0.304	0.151	0.181	-0.352*	-0.345	-0.367
Observations	18	18	18	18	18	18	18	18	18	18	18	18

Standardized beta coefficients

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

Appendix S4.3.3: Distancing when grocery shopping

	Not in situation			Never within 1.5m			Infrequently within 1.5m			Frequently within 1.5m		
Duration	-0.539*	-0.660*	-0.735**	0.245	0.014	-0.068	0.484*	0.211	0.139	-0.169	0.082	0.165
Duration squared												
Hospital admissions lagged (7 days)	0.522*			0.862***			0.970***			-0.927***		
Hospital admissions forwarded (7 days)		0.568			0.641			0.587			-0.664	
Hospital admissions forwarded (14 days)			0.488			0.452			0.329			-0.442
Policy: distance	-0.094	-0.189	-0.161	-0.301	-0.346	-0.276	-0.355	-0.355	-0.259	0.310	0.349	0.267
Policy: face masks	0.268	0.252	0.380	-0.012	0.186	0.391	-0.407	-0.082	0.158	0.175	-0.057	-0.286
Observations	18	18	18	18	18	18	18	18	18	18	18	18

Standardized beta coefficients

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

Appendix S4.3.4: Distancing when visiting with friends or family

	Not in situation			Never within 1.5m			Infrequently within 1.5m			Frequently within 1.5m		
Duration	-0.164	-0.081	-0.196	-0.053			0.326	0.352		0.007		-0.134
Stringency lagged (7 days)	0.496			0.682*			-0.132			-0.589*		
Stringency forwarded (7 days)		0.528			0.900**			0.146				-0.879**
Policy: distance	0.334	0.288	0.005	-0.068	-0.068	-0.396	-0.400	-0.400	-0.003	-0.003	0.066	0.066
Policy: visitors	-0.065	-0.081	0.042	-0.106	-0.106	0.404	0.199	0.199	-0.236	-0.236	-0.034	-0.034
Observations	18	18	18	18	18	18	18	18	18	18	18	18

Standardized beta coefficients

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

Appendix S4.3.5: Distancing when grocery shopping

	Not in situation			Never within 1.5m			Infrequently within 1.5m			Frequently within 1.5m		
Duration	-0.167	0.130		0.352	0.771*		0.594	0.959*		-0.386		-0.779*
Stringency lagged (7 days)	0.889***			0.651*			0.716			-0.864*		
Stringency forwarded (7 days)		1.074***			1.043**			1.024*				-1.177**
Policy: distance	0.195	0.118	0.020	-0.013	-0.013	0.003	-0.045	-0.045	-0.066	-0.066	-0.004	-0.004
Policy: face masks	0.030	-0.137	0.194	-0.124	-0.124	-0.163	-0.419	-0.419	0.074	0.074	0.338	0.338
Observations	18	18	18	18	18	18	18	18	18	18	18	18

Standardized beta coefficients

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

Appendix S4.3.6: Emotional response

	Emotional response	Emotional response	Emotional response	Emotional response	Emotional response
Duration	-0.681***	-0.943***	-0.997***	-0.411	-0.194
Hospital admissions lagged (7 days)	0.518**				
Hospital admissions forwarded (7 days)		0.684***			
Hospital admissions forwarded (14 days)			0.705***		
Stringency lagged (7 days)				0.372	
Stringency forwarded (7 days)					0.668**
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.7: Affective risk

	Affective risk	Affective risk	Affective risk	Affective risk	Affective risk
Duration	0.272	-0.074	-0.182	0.536*	0.693*
Hospital admissions lagged (7 days)	0.637**				
Hospital admissions forwarded (7 days)		0.888***			
Hospital admissions forwarded (14 days)			0.980***		
Stringency lagged (7 days)				0.315	
Stringency forwarded (7 days)					0.520
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.8: Perceived susceptibility - self

	Perceived susceptibility - self	Perceived susceptibility - self	Perceived susceptibility - self	Perceived susceptibility - self	Perceived susceptibility - self
Duration	0.434	0.246	0.156	0.553*	0.484
Hospital admissions lagged (7 days)	0.302				
Hospital admissions forwarded (7 days)		0.466			
Hospital admissions forwarded (14 days)			0.573*		
Stringency lagged (7 days)				0.138	
Stringency forwarded (7 days)					-0.005
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.9: Perceived susceptibility - others

	Perceived susceptibility - others	Perceived susceptibility - others	Perceived susceptibility - others	Perceived susceptibility - others	Perceived susceptibility - others
Duration	-0.442	-0.619*	-0.700*	-0.340	-0.420
Hospital admissions lagged (7 days)	0.307				
Hospital admissions forwarded (7 days)		0.447			
Hospital admissions forwarded (14 days)			0.542*		
Stringency lagged (7 days)				0.099	
Stringency forwarded (7 days)					-0.055
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.10: Perceived severity - self

	Perceived severity - self	Perceived severity - self	Perceived severity - self	Perceived severity - self	Perceived severity - self
Duration	-0.581*	-0.683*	-0.720**	-0.563*	-0.344
Hospital admissions lagged (7 days)	0.133				
Hospital admissions forwarded (7 days)		0.244			
Hospital admissions forwarded (14 days)			0.282		
Stringency lagged (7 days)				-0.011	
Stringency forwarded (7 days)					0.360
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.11: Perceived severity - others

	Perceived severity - others	Perceived severity - others	Perceived severity - others	Perceived severity - others	Perceived severity - others
Duration	-0.883***	-0.941***	-0.943***	-0.798***	-0.665***
Hospital admissions lagged (7 days)	0.099				
Hospital admissions forwarded (7 days)		0.147			
Hospital admissions forwarded (14 days)			0.135		
Stringency lagged (7 days)				0.139	
Stringency forwarded (7 days)					0.337*
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.12: Self efficacy - handwashing

	Self efficacy - handwashing	Self efficacy - handwashing	Self efficacy - handwashing	Self efficacy - handwashing	Self efficacy - handwashing
Duration	-0.903***	-0.919***	-0.893***	-0.862***	-0.833***
Hospital admissions lagged (7 days)	0.269*				
Hospital admissions forwarded (7 days)		0.124			
Hospital admissions forwarded (14 days)			0.065		
Stringency lagged (7 days)				-0.015	
Stringency forwarded (7 days)					0.038
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.13: Self efficacy - distancing

	Self efficacy - distancing	Self efficacy - distancing	Self efficacy - distancing	Self efficacy - distancing	Self efficacy - distancing
Duration	-0.577***	-0.830***	-0.842**	-0.074	0.107
Hospital admissions lagged (7 days)	0.768***				
Hospital admissions forwarded (7 days)		0.752***			
Hospital admissions forwarded (14 days)			0.694**		
Stringency lagged (7 days)				0.763***	
Stringency forwarded (7 days)					0.925***
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.14: Response efficacy - handwashing

	Response efficacy - handwashing	Response efficacy - handwashing	Response efficacy - handwashing	Response efficacy - handwashing	Response efficacy - handwashing
Duration	-0.975***	-1.000***	-0.984***	-0.973***	-0.933***
Hospital admissions lagged (7 days)	0.060				
Hospital admissions forwarded (7 days)		0.070			
Hospital admissions forwarded (14 days)			0.034		
Stringency lagged (7 days)				-0.019	
Stringency forwarded (7 days)					0.052
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.15: Response efficacy - distancing

	Response efficacy - distancing	Response efficacy - distancing	Response efficacy - distancing	Response efficacy - distancing	Response efficacy - distancing
Duration	-0.627**	-0.856***	-0.897***	-0.349	-0.128
Hospital admissions lagged (7 days)	0.516**				
Hospital admissions forwarded (7 days)		0.619**			
Hospital admissions forwarded (14 days)			0.624**		
Stringency lagged (7 days)				0.389	
Stringency forwarded (7 days)					0.688**
Observations	19	19	19	19	19

Standardized beta coefficients

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

Appendix S4.3.16: Descriptive norms - handwashing

	Descriptive norms - handwashing	Descriptive norms - handwashing	Descriptive norms - handwashing	Descriptive norms - handwashing	Descriptive norms - handwashing
Duration	-0.953***	-0.985***	-0.961***	-0.811***	-0.817***
Hospital admissions lagged (7 days)	0.179*				
Hospital admissions forwarded (7 days)		0.107			
Hospital admissions forwarded (14 days)			0.051		
Stringency lagged (7 days)				0.253**	
Stringency forwarded (7 days)					0.191
Observations	18	18	18	18	18

Standardized beta coefficients

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

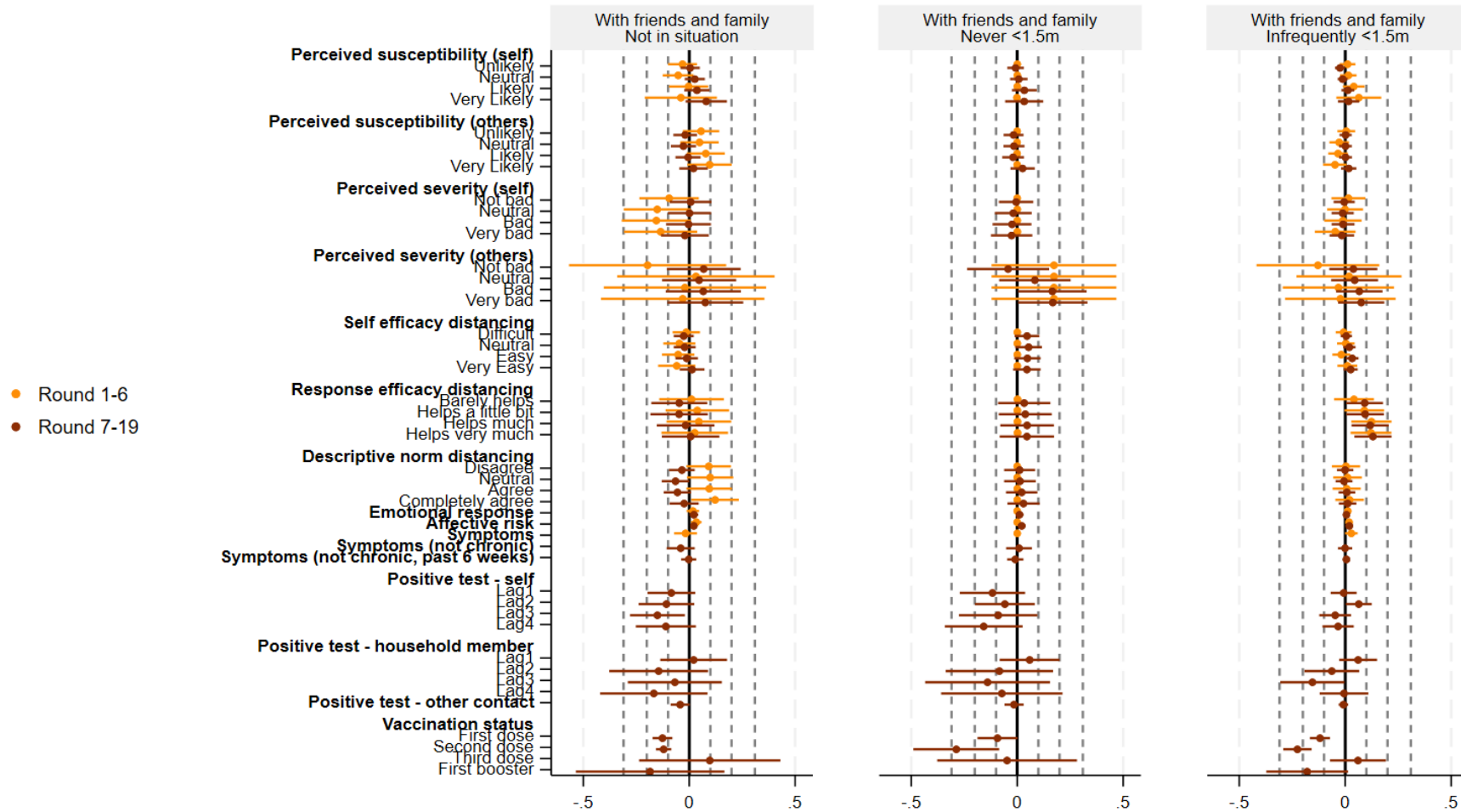
Appendix S4.3.17: Descriptive norms - distancing

	Descriptive norms - distancing	Descriptive norms - distancing	Descriptive norms - distancing	Descriptive norms - distancing	Descriptive norms - distancing
Duration	-0.737***	-0.876***	-0.863***	-0.327**	-0.192
Hospital admissions lagged (7 days)	0.473**				
Hospital admissions forwarded (7 days)		0.399			
Hospital admissions forwarded (14 days)			0.327		
Stringency lagged (7 days)				0.740***	
Stringency forwarded (7 days)					0.812***
Observations	18	18	18	18	18

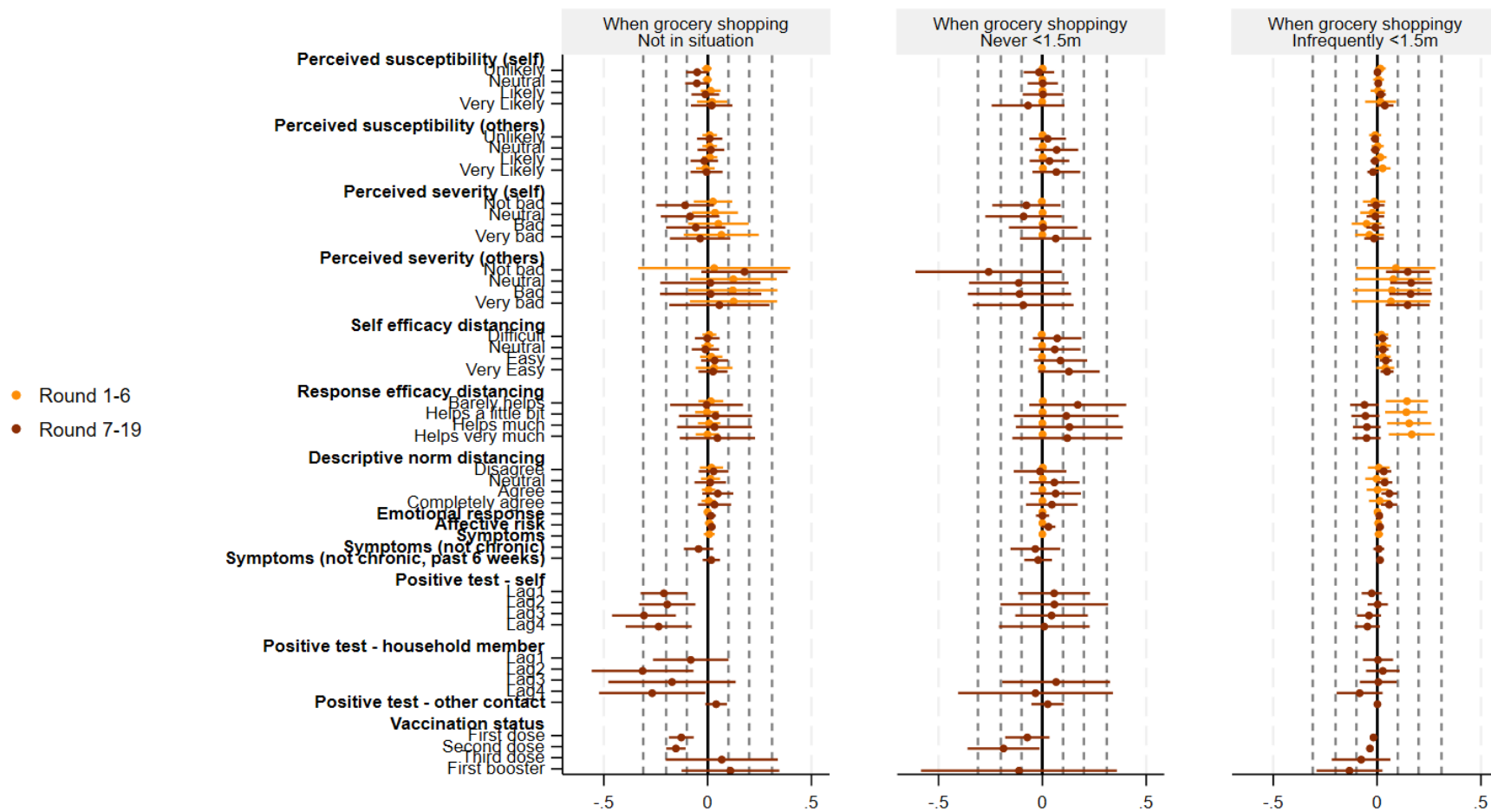
Standardized beta coefficients

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

Appendix S5: FE-associations between psychosocial determinants and distancing (marginal effects, relative to 'frequently <1.5m from others')

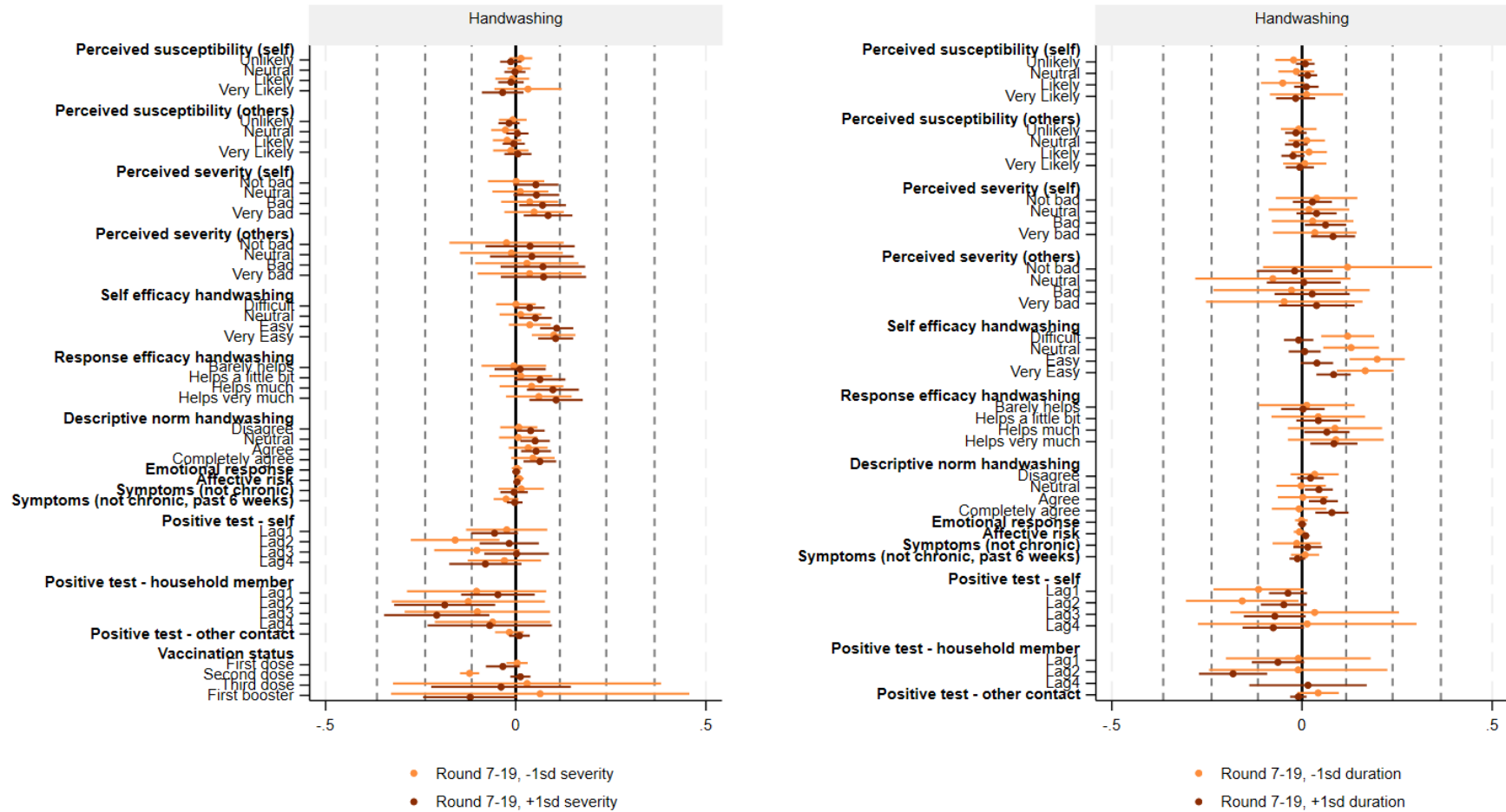


Vaccination: booster omitted from 'Never' because its CI extended the plot area. Effect was not statistically significant.

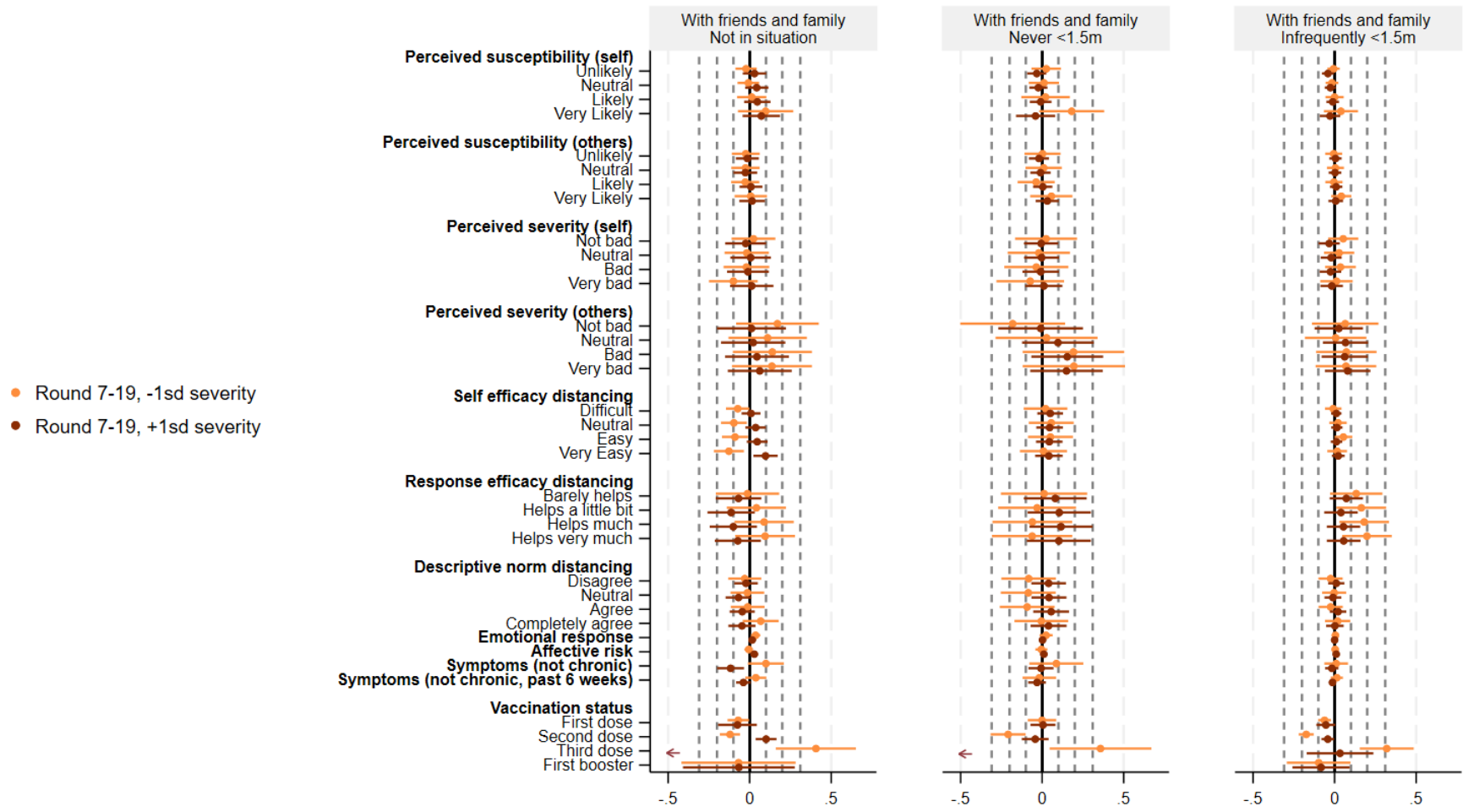


**Vaccination: Third dose effect on 'Never' too large for graph (-.801, CI: -1.101/-501)**  
 Perceived severity (others) and Positive test - Household member Lag1 and Lag2 omitted from 'Never' because the CIs extended the plot area. These effects were not statistically significant.

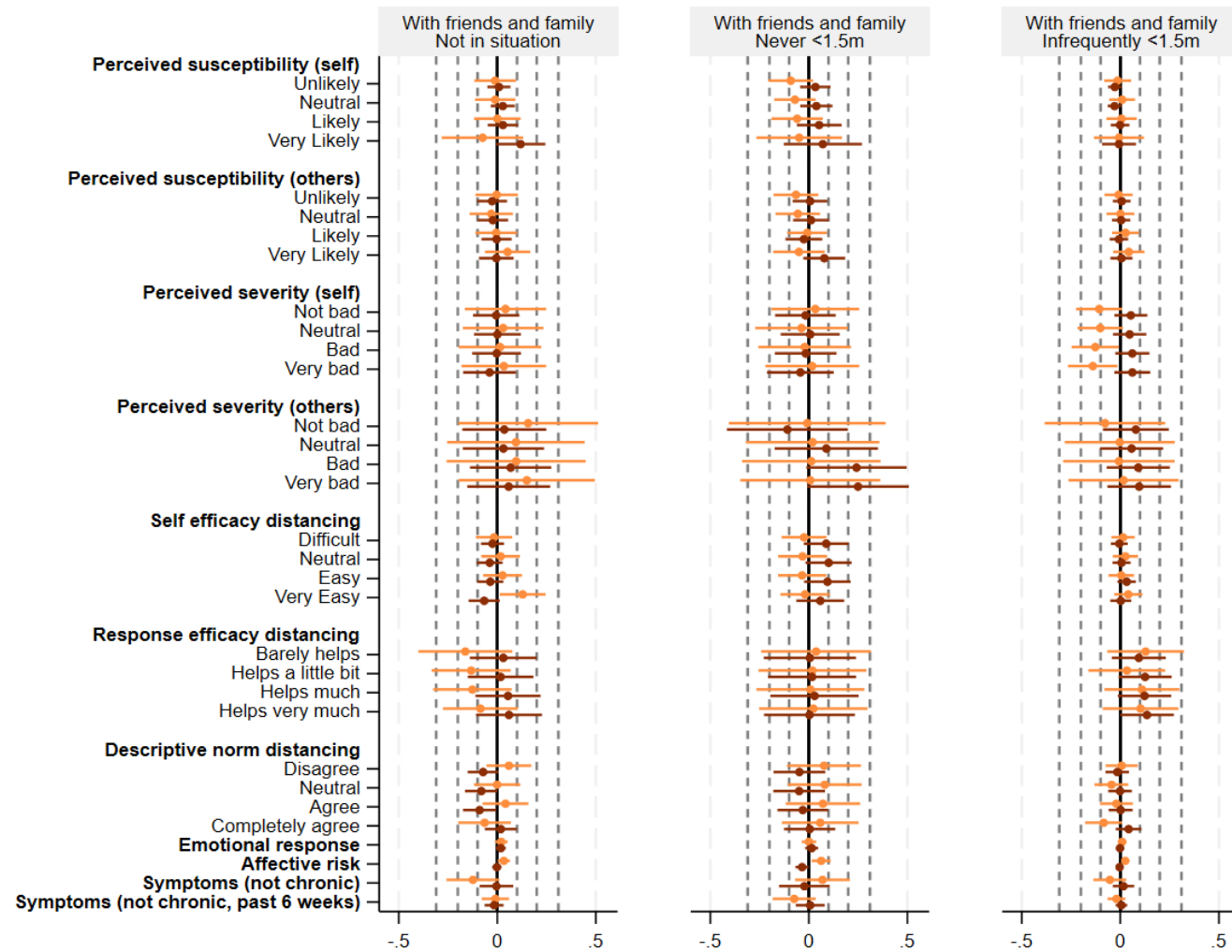
Appendix S6: FE-associations between psychosocial determinants and behaviour moderated by severity and duration of the pandemic



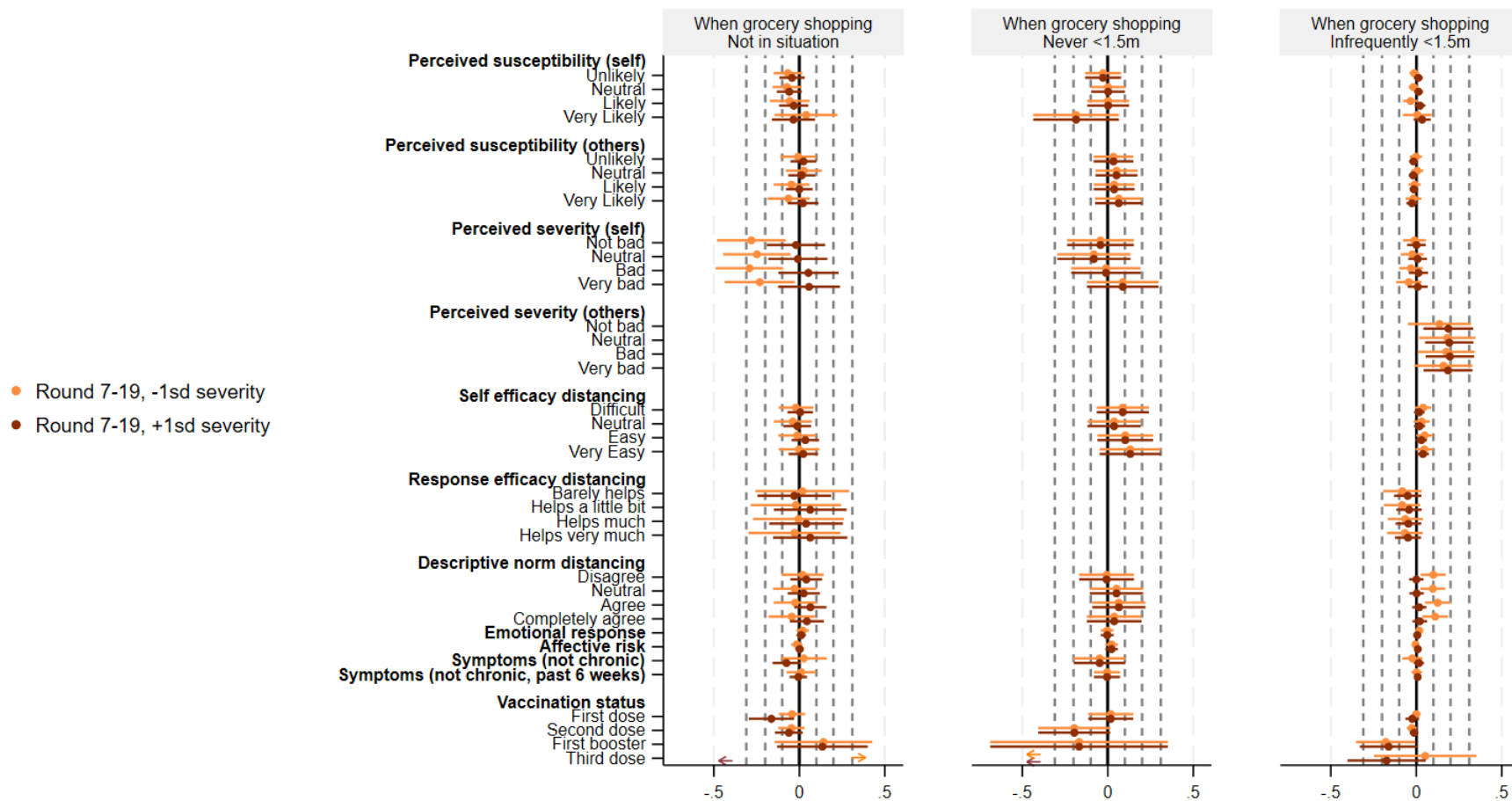
Positive test - household member Lag2 and Lag4 at -1sd duration omitted because their CIs extended the plot area. These effects were not statistically significant.



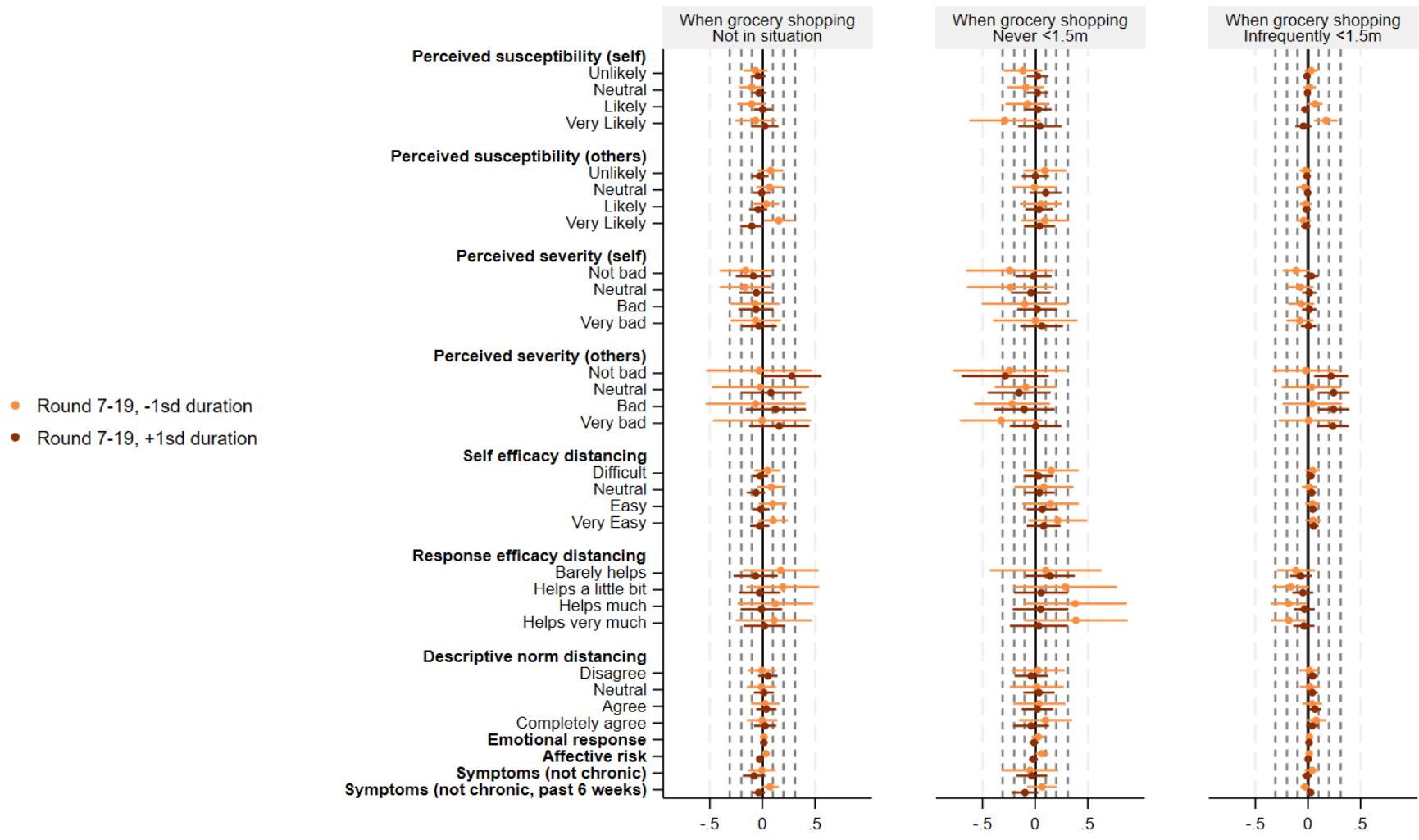
**Vaccination: Third dose at +1sd severity on 'Not in situation' and 'Never' too large for graph (-.625, CI: -1.061/-1.189 & -.827, CI: -1.564/-0.91)**  
 Vaccination: First booster omitted from 'Never' because the CIs extended the plot area. These effects were not statistically significant.



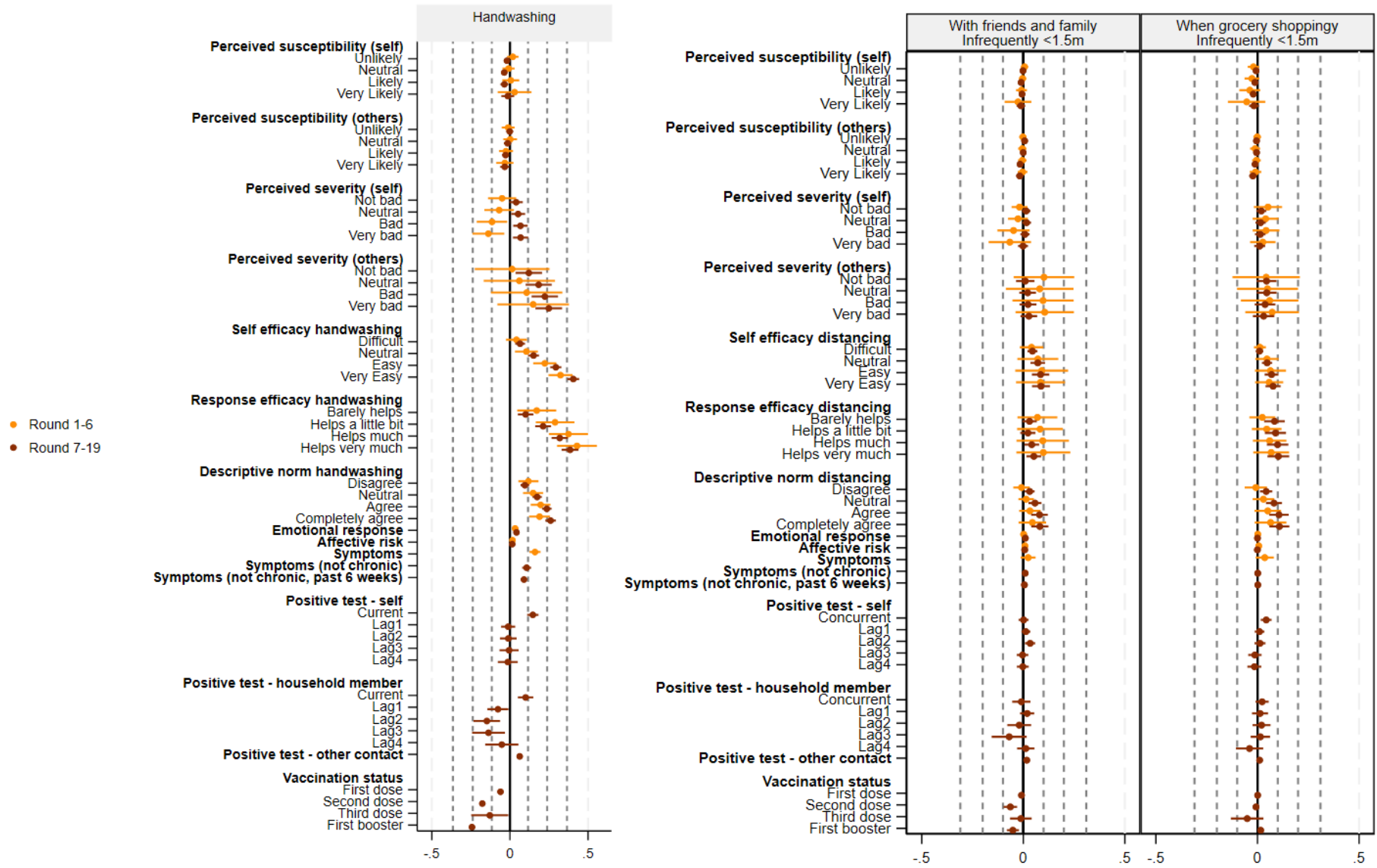
- Round 7-19, -1sd duration
- Round 7-19, +1sd duration



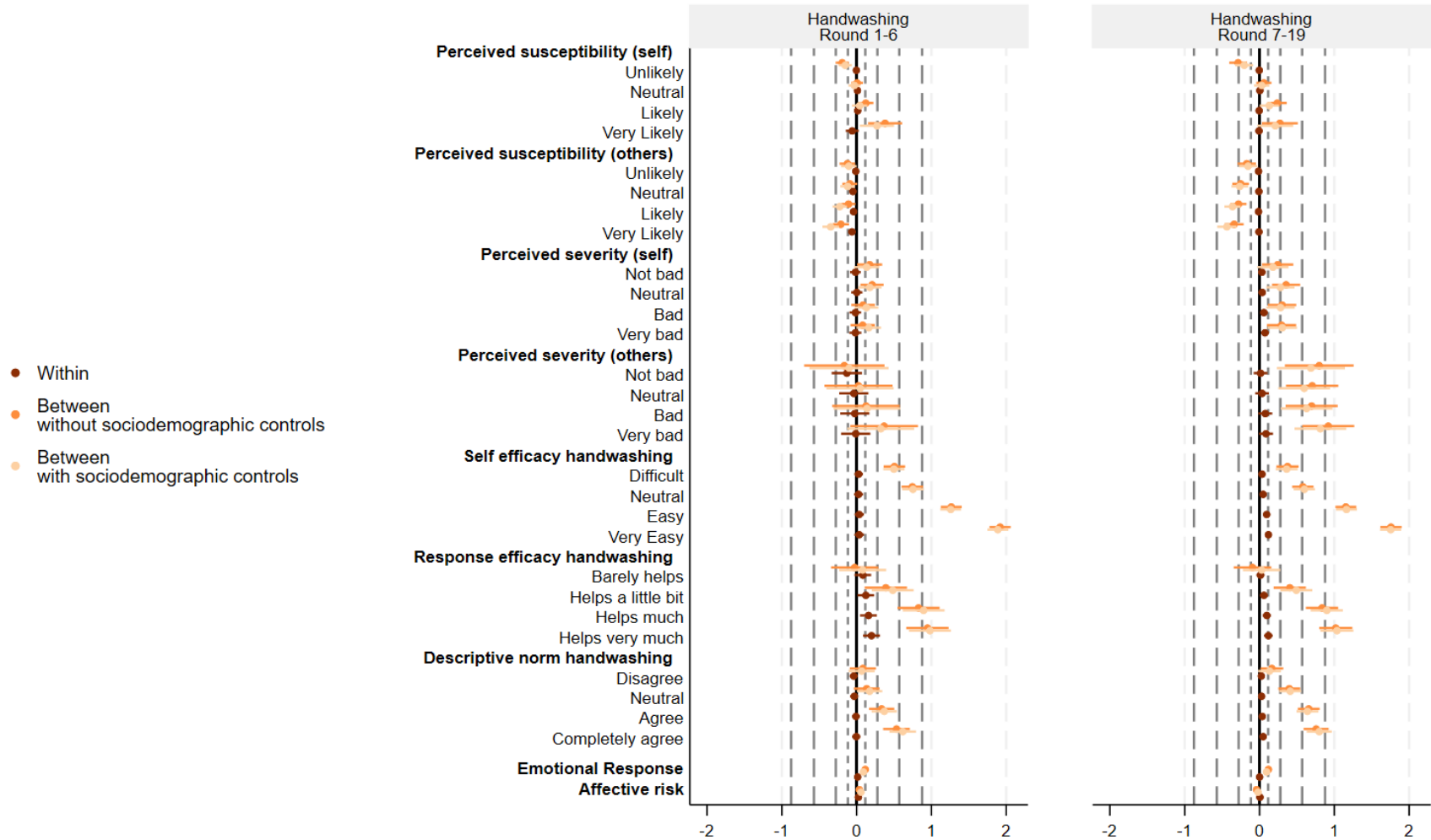
**Vaccination: Third dose on 'Not in situation' too large for graph (-1sd: .498, CI: .162/.833 & +1sd: -.561, CI: -.888/-.234)**  
 Vaccination: Third dose on 'Not in situation' too large for graph (-1sd: -.690, CI: -1.105/-.275 & +1sd: -.783, CI: -1.114/-.453)  
 Perceived severity (others) omitted from 'Not in situation' and 'Never' because the CIs extended the plot area. These effects were not statistically significant.  
 Response efficacy distancing omitted from 'Never' because the CIs extended the plot area. These effects were not statistically significant.



Appendix S7: FE-associations between psychosocial determinants and behaviour – measured concurrently



**Appendix S8: Between-within model for associations between psychosocial determinants and handwashing<sup>3</sup>**



<sup>3</sup> Models with and without sociodemographic factors illustrate the relevance of unobserved confounding factors: even with controls, between-effects differ substantially from the within-effects. Moreover, although cues to action were included in the model to ensure sufficient control, these effects are not presented as they are inherently time-specific so there is no meaningful interpretation of between-effects.

Appendix S9: FE-associations between psychosocial determinants and behaviour – determinants included separately

