

Electronic Supplementary Material 1 for

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Youth Depression Symptoms During COVID-19: A Longitudinal Twin Study on Resilience Factors

Supplement

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Document Description

This is the supplementary material for the paper “Youth Depression Symptoms During COVID-19: A Longitudinal Twin Study on Resilience Factors”. The study was pre-registered on 15 June 2022 (<https://osf.io/wurx2>).

The final study had three **deviations from the pre-registration**: (1) Survey weights, accounting for selective response patterns based on the first pre-pandemic survey (Krell et al., 2022), were not mentioned in the preregistration. (2) As the pandemic depression measure, three items of the PHQ-9 were proposed in the preregistration. Instead, the validated PHQ-2 (consisting of two of these items) was used. (3) we chose participations from narrower timeframes within the pandemic surveys to capture specific pandemic phases, namely the first pandemic wave, assessed in retrospect (study participations 06–11/2020), the (partial) lockdown during the second wave and subsequent third wave (11/2020–04/2021), and the onset of the fourth wave (09–11/2021). As a cutoff date for pre-pandemic information, we considered data from the third pre-pandemic survey up to 10 March 2020 (the day of the official WHO classification of SARS-CoV-2 as a pandemic). Additional analyses that are denoted as control analyses were not pre-registered as well and were performed post-hoc.

Scripts which were created in the analysis process for statistical software *Stata* (StataCorp, 2015) and *R* (R Core Team, 2022; RStudio Team, 2020; with mainly used packages *psych*, *lavaan*, *semTools*, *abe*, *umx*), can be accessed via <https://osf.io/gu4yk/>. The structure of this supplement follows the script file structure and denomination.

Supplement A: Data Preprocessing, Hypotheses Background, and Descriptives

Our data base is the TwinLife Scientific Use File v6.0.0 (ZA6701; <https://doi.org/10.4232/1.13932>) with information on the third COVID-19 supplementary survey as well as regional and survey date information appended from internal pre-release data (set for publication in the next data releases). Information on seven-day COVID-19 incidence rates for Germany based on federal state and survey date was appended from the Robert Koch Institute (RKI).

Data Preprocessing Procedures

(as in syntax file “SuppA_TL-CovResilience_01-DataPreprocessing.do”)

- Import of internal data (T-Cov3 data, survey date and federal state for all pandemic surveys).
- Variable selection, format of IUF data according to SUF structure, set all missing indicators to NA.
- Pooling of separated variables for analysis (gls* over cohorts, pas* over step-parents, hoe* and emi* variables according to SUF typology, summary of federal state information).
- Constructing family SES composite scores from ISCED, ISEI, EGP, and OECD-equivalence income: applying wave-specific Tukey’s Fences with k-value = 3 to income variable, square-root transformation of income and residualization for parents’ age for all four components.
- Sampling based on participation in either T-Cov1, T-Cov2, or T-Cov3 ($N = 3,025$).
- Appending RKI seven-day incidence rate based on state and date.
- Summary of COVID-19 infection and/or quarantine measure in the household as a dichotomous index over T-Cov1,2,3 (to generate a control variable that is valid across time).
- Appending TwinLife panel weights based on participation rates in the first survey wave.
- Generating positive/negative life events index (simple additive indices computed from positive and negative life event evaluations – taken from T-Pre3, information from T-Pre2 summed up on top to generate a control variable that is valid across time).
- Wide format & analysis preparation (reverse coding of inverted item variables).

Information on R packages

All further data analyses apart from data preprocessing were performed with *R*. For functions that are not covered by base *R*, we used the following packages.

- sjlabelled (version 1.2.0; Lüdtke, 2022): read_stata() function for the importing of Stata *.dta files.
- psych (version 2.2.5; Revelle, 2022): omega() and fa() functions for internal consistency checks and exploratory factor analyses.
- semTools (version 0.5.6; Jorgensen et al., 2022): measEq.syntax() function for measurement invariance tests over time.
- lavaan (version 0.6.11; Rosseel, 2012): cfa(), lavTestScore(), lavPredict(), growth(), and lavInspect() functions for convergent validity checks, measurement invariance tests across cohorts, confirmatory factor analyses, factor score extraction, and latent growth curve model analyses.
- abe (version 3.0.1; Blagus, 2017): abe() function for regression analyses using the augmented backwards elimination algorithm.
- yhat (version 2.0.3; Nimon et al., 2021): yhat() function to compute beta weights, commonality estimates, and structure coefficients.
- dotwhisker package (version 0.7.4; Solt & Hu, 2021): dwplot() function for dot whisker plot.
- umx package (version 4.10.50; Bates et al., 2019): umxACE(), umxReduce(), umxCP(), umxModify(), and umxCompare() functions for twin analyses.

Information on figures:

Twin model figures and the pie chart were generated using LibreOffice (version 7.3.1.3 (x64)) and Inkscape (version 1.1.1 (3bf5ae0d25, 2021-09-20)).

Dot whisker plots were generated using R::dotwhisker() (version 0.7.4; Solt & Hu, 2021).

Table E1. Overview of Hypotheses' Background

No.	Hypothesis	Background
H1	The level of and change in youth pandemic DS significantly varies between individuals.	Resilience theory, salutogenesis theory, transactional theory
H2	Individual characteristics affect the level of and change in pandemic DS.	Transactional theory, core self-evaluation, self-efficacy theory,
H2a	Neuroticism positively affects the level of pandemic DS.	theory of self-determination,
H2b	Externalizing and internalizing behavior positively affect the level of pandemic DS.	salutogenesis theory,
H2c	Emotion-oriented coping positively affects the level of pandemic DS.	transactional theory,
H2d	Task-oriented coping negatively affects the level of pandemic DS.	stress inoculation theory,
H2e	Self-efficacy and self-esteem negatively affect the level of pandemic DS.	challenge model of resilience theory, empirical findings (e.g., Oshio et al., 2018)
H2f	Life satisfaction negatively affects the level of pandemic DS.	
H2g	Optimism negatively affects the level of pandemic DS.	
H2h	Negative life experiences have a U-shaped association with the level of pandemic DS.	
H3	Family characteristics affect the level of and change in pandemic DS.	Socio-ecological framework, transactional theory,
H3a	Parental emotional support negatively affects the level of pandemic DS.	compensatory model of resilience theory
H3b	Family socioeconomic status negatively affects the level of pandemic DS.	
H3c	A chaotic home environment positively affects the level of pandemic DS.	
H4	Unfolding genetic factors and accumulating environmental factors affect the change in youth pandemic DS.	Three laws of behavior genetics (Turkheimer, 2000), empirical findings (e.g., Clark et al., 1994;
H5	The effect of individual characteristics on the level of pandemic DS is primarily attributable to genetic factors.	Gillespie et al., 2015; Kandler & Ostendorf, 2016)

Table E2. Study Constructs and Measures

Construct	Measures	References	McDonald's ω
Depression symptoms			
Pre-pandemic	Seven-item adaptation of the Beck Depression Inventory-Fast Screen	Beck et al., 2000	.83
Pandemic	Two-item Patient Health Questionnaire (PHQ-2)	Löwe et al., 2005	.63–.76
Big Five personality traits	G-SOEP adaptation of the Big Five Inventory	Gerlitz & Schupp, 2005	.55–.81
Self-Efficacy	Self-Efficacy Scale (Short Form)	Beierlein et al., 2012	.70–.78
Self-Esteem	Rosenberg Self-Esteem Scale (adaptation)	Reim et al., 2022	.80–.83
Optimism	Life Orientation Test	Glaesmer et al., 2008	.75
Life satisfaction	Satisfaction with Life Scale (adaptation)	Gadermann et al., 2010	.85–.86
Coping styles			
Adolescents	German Coping Questionnaire for Children and Adolescents	Hampel et al., 1997	.51–.70
Young adults	Coping Inventory for Stressful Situations	Endler & Parker, 1999	.57–.66
Internalizing and externalizing problem behavior	Strengths and Difficulties Questionnaire	Goodman et al., 1998	.59–.72
Family socio-economic status	Composite of parents' educational attainment, household income, and occupational status	Gottschling et al., 2019	.70–.71
Educational attainment	International Standard Classification of Education (ISCED-97)	Schneider, 2008	
Household income	OECD-modified scale	https://bit.ly/3POXSEB	
Occupational status	International Socio-Economic Index and Erikson-Goldthorpe-Portocarero classes, based on the current job as classified by ISCO-08	Jann, 2019	
Parental emotional support	three twin-report items, adapted from the German family panel pairfam	Reim et al., 2022	.86
Home environment	Adaptation of the Confusion, Hubbub and Order Scale	Matheny et al., 1995	.66

Note. ISCO-08 = International Standard Classification of Occupations. We merged items of nearly identical, age-appropriate scale versions for adolescents and young adults into single variables (life satisfaction, home environment). To compute family socio-economic status (SES) scores, Tukey's fences with $k = 3$ were applied to the upper end of the household income data, before square root-transforming the income data. Data following the International Standard Classification of Education and Erikson-Goldthorpe-Portocarero classes were set to a [0:100] range in accordance with the International Socio-Economic Index. For all four family SES components, we considered the highest level in the family. All family SES indicators were residualized for the mean age of the parents.

Table E3. Descriptives: Socio-Demographics and COVID-19 Indicators

Variable (cont.)	Cohort	Min	M	Max	SD	Variance	Skewness	Kurtosis
Educational level	2003–04	1	8.61	11	1.96	3.85	-1.38	4.35
(highest family	1997–98	2	8.44	11	2.01	4.04	-1.05	3.25
ISCED-97)	1990–93	3	8.93	11	1.45	2.09	-1.57	5.15
Occupational	2003–04	0	61.90	89	18.83	354.49	-.84	3.13
status/job prestige	1997–98	0	60.96	89	18.21	331.64	-.63	2.91
(ISEI from ISCO-08)	1990–93	15	65.41	89	14.14	199.94	-.66	2.98
Occupational	2003–04	0	70.51	100	27.11	734.80	-1.09	2.91
status/job prestige	1997–98	0	57.97	100	28.06	787.61	-.42	1.93
(EGP from ISCO-08)	1990–93	0	54.41	100	28.35	803.49	-.34	1.72
Household income	2003–04	211	1928.20	6630	822.09	675837.7	1.39	6.60
(OECD-modified	1997–98	144	1950.86	6640	870.87	758417.6	1.36	6.06
scale)	1990–93	394	2353.45	5160	825.92	682146.4	0.72	3.77
Variable (dichot.)	Cohort	T-Cov1	T-Cov2	T-Cov3	Total			
COVID-19 infection	2003–04	0.97	7.79	11.55	10.30			
in the household	1997–98	2.59	7.81	11.34	9.73			
	1990–93	0.81	7.05	9.52	8.21			
Quarantine measure	2003–04	7.46	24.67	30.86	31.91			
in the household	1997–98	6.84	17.68	15.12	20.08			
	1990–93	6.49	13.67	15.65	16.95			

Note. cont. = continuous; dichot. = dichotomous. All values are based on mean scores, reported for sample description purposes only to ease interpretation within the range of the original scales. Values for dichotomous variables show proportion in percent. All items refer to the highest value within families. EGP computed on a reverse-coded scale on a range of [0:100] in preparation of latent socio-economic status composite.

Table E4. Descriptives: Mean Scores

Variable	Cohort	Min	Mean	Max	SD	Variance	Skewness	Kurtosis
Pandemic DS, T-Cov1	2003–04	1	1.77	4	0.61	0.38	0.94	4.33
	1997–98	1	1.84	4	0.61	0.37	0.72	3.90
	1990–93	1	1.69	4	0.67	0.44	1.27	4.96
Pandemic DS, T-Cov2	2003–04	1	1.83	4	0.65	0.42	0.80	3.72
	1997–98	1	1.89	4	0.64	0.41	0.86	4.13
	1990–93	1	1.72	4	0.61	0.37	0.96	4.27
Pandemic DS, T-Cov3	2003–04	1	1.83	4	0.69	0.48	0.98	4.03
	1997–98	1	1.80	4	0.64	0.41	1.11	4.83
	1990–93	1	1.72	4	0.60	0.36	0.80	3.79
Pre-pandemic DS	2003–04	1	1.58	4	0.42	0.18	1.55	7.41
	1997–98	1	1.64	3.71	0.47	0.22	1.09	4.25
	1990–93	1	1.62	3.43	0.46	0.21	1.05	4.25
Openness	2003–04	1.67	4.92	7	1.00	1.00	-0.34	2.71
	1997–98	1.33	4.88	7	1.07	1.15	-0.21	2.55
	1990–93	2	4.73	7	1.11	1.23	-0.13	2.42
Conscientiousness	2003–04	1.83	4.93	7	0.92	0.84	-0.12	2.63
	1997–98	2	5.14	7	0.96	0.91	-0.34	2.79
	1990–93	2	5.51	7	0.87	0.75	-0.51	3.21
Extraversion	2003–04	1.33	4.88	7	1.00	1.00	-0.29	2.81
	1997–98	1.33	4.72	7	1.28	1.63	-0.23	2.44
	1990–93	1	4.79	7	1.30	1.68	-0.35	2.49
Agreeableness	2003–04	2.67	5.46	7	0.77	0.59	-0.43	3.01
	1997–98	1.67	5.53	7	0.84	0.70	-0.80	4.05
	1990–93	2.67	5.63	7	0.81	0.65	-0.69	3.24

Variable	Cohort	Min	Mean	Max	SD	Variance	Skewness	Kurtosis
Neuroticism	2003–04	1	3.80	6.83	0.99	0.99	0.17	2.86
	1997–98	1.67	4.22	7	1.15	1.33	-0.07	2.60
	1990–93	1	4.11	7	1.20	1.43	0.04	2.54
Life Satisfaction	2003–04	1.6	4.12	5	0.62	0.38	-0.88	3.57
	1997–98	1.67	3.89	5	0.68	0.46	-0.66	3.11
	1990–93	1.13	3.88	5	0.70	0.49	-0.72	3.23
Self-Efficacy	2003–04	1.67	3.84	5	0.47	0.22	-0.54	4.33
	1997–98	1.33	3.93	5	0.44	0.20	-0.63	4.87
	1990–93	1.2	4.01	5	0.50	0.25	-1.17	7.34
Self-Esteem	2003–04	2	3.53	5	0.37	0.13	-0.87	4.31
	1997–98	1	3.45	4.2	0.36	0.13	-1.10	5.57
	1990–93	2	3.5	5	0.35	0.12	-0.96	5.91
Optimism	2003–04	1	3.88	5	0.70	0.49	-0.68	3.91
	1997–98	1	3.70	5	0.75	0.57	-0.53	3.48
	1990–93	1	3.79	5	0.77	0.59	-0.73	3.86
Internalizing: Emotional Problems	2003–04	1	1.53	3	0.36	0.13	0.74	3.34
	1997–98	1	1.62	2.9	0.43	0.19	0.57	2.61
	1990–93	1	1.58	3	0.43	0.18	0.69	2.88
Internalizing: Peer Problems	2003–04	1	1.42	3	0.32	0.10	0.92	4.19
	1997–98	1	1.42	2.67	0.35	0.12	0.87	3.81
	1990–93	1	1.37	2.83	0.36	0.13	1.11	3.99
Externalizing: Hyperactivity	2003–04	1	1.67	3	0.38	0.15	0.27	2.80
	1997–98	1	1.60	3	0.41	0.17	0.34	2.63
	1990–93	1	1.50	3	0.41	0.16	0.48	2.82
Externalizing: Misconduct	2003–04	1	1.25	3	0.25	0.63	1.54	6.94
	1997–98	1	1.16	2.5	0.21	0.44	2.08	9.73
	1990–93	1	1.13	2	0.17	0.03	1.62	5.90
Home Environment	2003–04	1	2.63	5	0.61	0.37	0.44	3.78
	1997–98	1.25	2.60	4.25	0.54	0.29	0.60	2.97
	1990–93	1	2.52	4.5	0.55	0.30	0.70	3.88
Parental Emotional Support	2003–04	1	4.38	5	0.62	0.39	-1.32	5.46
	1997–98	1	3.74	5	0.77	0.59	-0.48	2.94
	1990–93	1	3.83	5	0.76	0.58	-0.59	3.21

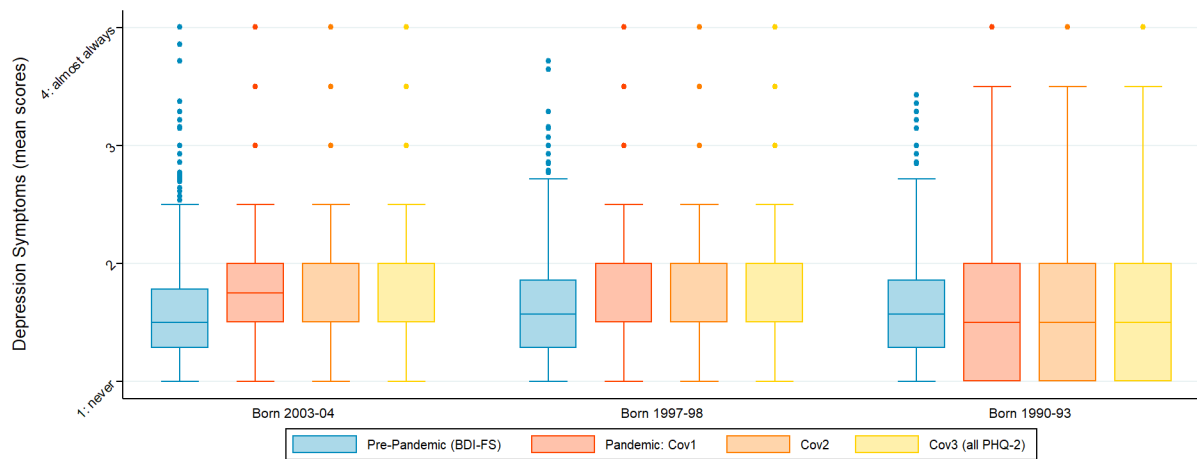
Note. All values refer to mean scores, reported for sample description purposes only to ease interpretation within the range of the original scales. For all further analyses, regression scores from factor analysis are used.

Table E5. Rank-Order Stability of Depression Symptoms

Variable	T-Pre2	T-Pre3	T-Cov1	T-Cov2	T-Cov3
T-Pre2	1.0				
T-Pre3	.54 (.51)	1.0			
T-Cov1	.32 (.24)	.40 (.30)	1.0		
T-Cov2	.32 (.24)	.38 (.29)	.42 (.43)	1.0	
T-Cov3	.37 (.27)	.46 (.34)	.42 (.41)	.45 (.44)	1.0

Note. Values compare mean scores with autoregressive coefficients, indicating the predictive carryover effect (Haehner et al., 2021). Values in parentheses represent Pearson’s *r* correlation coefficients of mean scores.

Figure E1. Distribution of Pre-Pandemic and Pandemic Depression Symptoms



Note. Boxes represent the neighboring quartiles from the median, represented by the middle line. Whiskers represent upper and lower adjacent values (1.5x interquartile ranges from the inner quartile boxes). Dots represent outliers.

Supplement B: Internal Consistency Estimates and Exploratory Factor Analyses**Table E6.** McDonald's ω for Scales, Separately for Each Wave

Construct	T-Pre1	T-Pre2	T-Pre3	T-Cov1	T-Cov2	T-Cov3
Depression Symptoms						
<i>BDI-Fast Screen</i>		.83	.83			
<i>PHQ-2</i>				.71	.63	.76
Big Five						
<i>Openness</i>	.59		.57			
<i>Conscientiousness</i>	.64		.70			
<i>Extraversion</i>	.71		.81			
<i>Agreeableness</i>	.55		.58			
<i>Neuroticism</i>	.59		.70			
Life Satisfaction	.86	.85	.86			
Self-Efficacy	.70	.76	.78			
Self-Esteem		.80	.83			
Optimism		.75				
C2: Coping Styles (SVF-KJ)						
<i>Self-Control</i>		.70				
<i>Thoughts/Resignation</i>		.56				
<i>Distraction</i>		.51				
C3+4: Coping Styles (CISS)						
<i>Task Orientation</i>		.57				
<i>Emotional</i>		.59				
<i>Distraction</i>		.66				
Internalizing Problem Behavior						
<i>Emotional Problems</i>	.69		.76			
<i>Peer Problems</i>	.47		.48			
Externalizing Problem Behavior						
<i>Hyperactivity</i>	.70		.55			
<i>Misconduct</i>	.45		.40			
Family Socio-Economic Status	.70	.70	.70			
Home Environment	.66					
Parental Emotional Support	.86					

Note. C2 = cohort 2, born 2003–04; C3+4 = cohorts 3 and 4, born 1997–98 and 1990–93, respectively; T-Pre1/2/3 = pre-pandemic survey 1/2/3; T-Cov1/2/3 = pandemic survey 1/2/3.

Table E9. Result of the Exploratory Factor Analyses of Home Environment Items

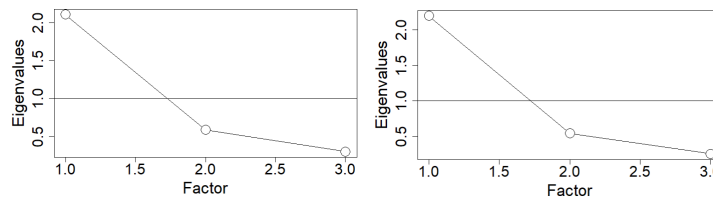
Item name (item description)	Factor Loading			Scree-Plot
	Factor 1 (all items)	Factor 1 (hoe0100r omitted)	Factor 1 (hoe0100r + hoe0500 omitted)	
hoe0100r_1 ([used to have] regular bedtime routine)	.223			
hoe0200_1 (cannot think clearly at home)	.639	.639	.629	
hoe0300_1 (at home everything is chaotic)	.783	.793	.785	
hoe0400r_1 (at home everything is under control)	.634	.635	.652	
hoe0500_1 (at home TV almost always on)	.283	.272		
hoe0600r_1 (the atmosphere at home is quiet)	.677	.671	.672	
Explained variance	.335	.393	.472	

Note. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using a varimax rotation. Hierarchical comparison of three different factor structures. Items with insufficient factor loading in greyscale. Final model taken forward into analysis bold-faced.

Table E10. Result of the Exploratory Factor Analyses of Self-Esteem Items

Item name (item description)	Factor Loading	
	T-Pre2	T-Pre3
ses0100r (feeling of worthlessness)	.636	.661
ses0101 (liking oneself the way one is)	.881	.892
ses0102 (being satisfied with oneself)	.881	.925
Explained variance	.652	.696

Scree-Plot



Note. T-Pre2/3 = pre-pandemic survey 2/3. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using a varimax rotation.

Table E11. Result of the Exploratory Factor Analyses of Life Satisfaction Items

Item name (item description)	Factor Loading		
	T-Pre1	T-Pre2	T-Pre3
gls1 (life almost ideal)	.838	.834	.820
gls2 (excellent life conditions)	.767	.741	.772
gls3 (satisfied with life)	.883	.881	.910
gls4 (most important wishes in life fulfilled)	.700	.688	.715
gls5 (would change almost nothing in life)	.765	.742	.753
Explained variance	.629	.609	.635

Item name (item description)	T-Pre1		T-Pre3	
	Factor 1	Factor 2	Factor 1	Factor 2
int0100_1 (I have frequent headaches/ stomach aches)	.466		.535	-.108
int0101_1 (I'm often worried)	.783	-.121	.867	
int0102_1 (I'm often unhappy or depressed)	.667	.141	.762	
int0103_1 (I'm nervous in new situations)	.568	.112	.643	.110
int0104_1 (I have a lot of fears)	.690		.767	
int0105_1 (I'm usually on my own)	.108	.432	.137	.363
int0106r_1 (I have one or more good friends)		.782		.703
int0107r_1 (Other people generally like me)		.546		.714
Explained variance	.262	.143	.330	.147

Note. T-Pre1/2/3 = pre-pandemic survey 1/2/3. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using a varimax rotation.

Table E12. Result of the Exploratory Factor Analyses of Internalizing Problem Behavior Items

Item name (item description)	Factor Loading			
	T-Pre1		T-Pre3	
	Factor 1	Factor 2	Factor 1	Factor 2
int0100_1 (I have frequent headaches/ stomach aches)	.466		.535	-.108
int0101_1 (I'm often worried)	.783	-.121	.867	
int0102_1 (I'm often unhappy or depressed)	.667	.141	.762	
int0103_1 (I'm nervous in new situations)	.568	.112	.643	.110
int0104_1 (I have a lot of fears)	.690		.767	
int0105_1 (I'm usually on my own)	.108	.432	.137	.363
int0106r_1 (I have one or more good friends)		.782		.703
int0107r_1 (Other people generally like me)		.546		.714
Explained variance	.262	.143	.330	.147

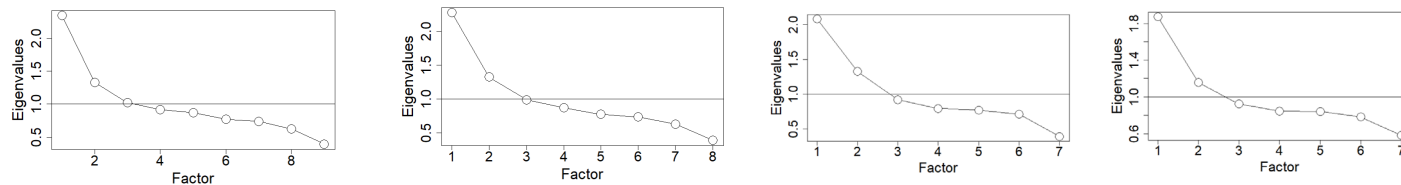
Item name (item description)	T-Pre1		T-Pre3	
	Factor 1	Factor 2	Factor 1	Factor 2
int0100_1 (I have frequent headaches/ stomach aches)	.466		.535	-.108
int0101_1 (I'm often worried)	.783	-.121	.867	
int0102_1 (I'm often unhappy or depressed)	.667	.141	.762	
int0103_1 (I'm nervous in new situations)	.568	.112	.643	.110
int0104_1 (I have a lot of fears)	.690		.767	
int0105_1 (I'm usually on my own)	.108	.432	.137	.363
int0106r_1 (I have one or more good friends)		.782		.703
int0107r_1 (Other people generally like me)		.546		.714
Explained variance	.262	.143	.330	.147

Note. T-Pre1/3 = pre-pandemic survey 1/3. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using an oblimin rotation. Factor allocation bold-faced.

Table E13. Result of the Exploratory Factor Analyses of Externalizing Problem Behavior Items

Item name (item description)	Factor Loading								
	T-Pre1 (all items)			T-Pre1 (excl. ext0106)		T-Pre1 (excl. ext0106 + ext0100)		T-Pre2 (excl. ext0106 + ext0100)	
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
ext0100 (I'm often restless)	.584			.243	.355			<i>(omitted)</i>	
ext0102 (I'm easily distracted and unfocused)	.716			.412	.312	.384	.278	.565	.136
ext0103r (I think before acting)			.846	.754	.	.718		.374	.178
ext0104r (I finish what I start and am able to concentrate)			.840	.909	.	.980		.804	
ext0105 (I get mad easily)	.246	.337		.117	.459	.120	.445		.567
ext0106r (I normally do what people tell me to do)		.194	.253	<i>(omitted)</i>		<i>(omitted)</i>			
ext0107 (I attack others physically)		.749		.	.704		.720	-.124	.682
ext0108 (People claim that I lie)		.557		.	.637		.636	.105	.461
ext0109 (I take things that don't belong to me)		.546		.	.530		.542	.171	.563
Explained variance	.105	.149	.166	.206	.203	.235	.214	.166	.195

Scree-Plot



Note. T-Pre1/3 = pre-pandemic survey 1/3. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using an oblimin rotation. Two items were excluded during analysis: In the first observation time point, ext0106 (“I normally do what people tell me to do”) and ext0100 (“I’m often restless”) showed insufficient and theoretically unsound factor loadings and were therefore excluded (loadings displayed in greyscale). Factor allocation and final item configuration bold-faced.

Table E14. Result of the Exploratory Factor Analysis of Coping Styles Items as Measured for Adolescents

Item name (item description)	Factor Loading			Scree-Plot
	Factor 1	Factor 2	Factor 3	
svk0100_3 (S-C: I make a plan)	.629			
svk0103_3 (S-C: find out the problem)	.763			
svk0106_3 (S-C: consider what I can do)	.729			
svk0101_3 (T/R: think about the situation)	.473	.462		
svk0104_3 (T/R: everything pointless)		.676		
svk0107_3 (T/R: rather avoid it)	-.107	.627		
svk0102_3 (Dis: read something)	.280		.348	
svk0105_3 (Dis: play something)			.657	
svk0108_3 (Dis: get comfy)			.623	
Explained variance	.203	.119	.106	

Note. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using an oblimin rotation. Variables that were omitted due to ambiguous factor loading displayed in greyscale. Factor allocation bold-faced. Abbreviations in parentheses indicate: S-C = Self-Control; T/R = Thoughts/Resignation; Dis = Distraction.

Table E15. Result of the Exploratory Factor Analysis of the Coping Styles Items as Measured for Young Adults

Item name (item description)	Factor Loading			Scree-Plot
	Factor 1	Factor 2	Factor 3	
cis0100_3 (T-O: learn from mistakes)	.569			
cis0103_3 (T-O: take corrective action)	.726			
cis0106_3 (T-O: control over situation)	.506			
cis0101_3 (Emo: worry about what to do)	.276	.443		
cis0104_3 (Emo: blame myself)		.674		
cis0107_3 (Emo: anxious of not being able to cope)		.715		
cis0102_3 (Dis: visit a friend)	.154		.336	
cis0105_3 (Dis: buy myself something)			.825	
cis0108_3 (Dis: go out for a snack or meal)			.790	
Explained variance	.135	.130	.159	

Note. Number of factors derived from Kaiser-Guttman criterion (Eigenvalues ≥ 1). Based on the principal axis method using an oblimin rotation. Factor allocation bold-faced. Abbreviations in parentheses indicate: T-O = Task-Orientation; Emo = Emotional; Dis = Distraction.

**Supplement C: Measurement Invariance Tests, Convergent Validity Test,
and Factor Score Extraction**

Table E16. Results of the Modeling Comparison of Depression Symptoms Instruments

Factor Model	RMSEA	CFI	SRMR	AIC	df	χ^2	p
Model with one latent trait	.038 [.036, .041]	.952	.044	77877.746	156	834.92	< .001
Model with separate latent traits	.035 [.032, .037]	.961	.032	77757.349	154	710.53	< .001

Note. Missing data handled with full information maximum likelihood estimation. We allowed residual covariances of the same item between time points. The model comparison shows a comparably better fit of the two-factor model, leading to the conclusion that BDI-FS and PHQ-2 measure related ($r = .628$) but different depression symptom constructs across time and/or depending on a pandemic situation. This is despite some face valid comparability of PHQ-2 and BDI-FS items (“little interest or pleasure in your activities” and “I find it difficult to enjoy anything”, as well as “dejection, melancholy or hopelessness” and “I am pessimistic about my future”). In other words, although previous research used versions of these instruments to test convergent validity (e.g., Kliem et al., 2014), we cannot rule out that these depression symptom measures meaningfully differ. Therefore, the depression symptom measurement based on the BDI-FS was used as a precedent independent variable, and the depression symptoms measurement based on the PHQ-2 was as the dependent variable.

Table E17. Results of the Measurement Invariance Tests Over Time

Latent construct and MI level	RMSEA	CFI	SRMR	AIC	df	χ^2	p
Pre-Pandemic Depression Symptoms							
(T-Pre2/3)							
configural	.050	.958	.031	57720.127	69	550.84	< .001
metric	.048	.957	.032	57718.334	75	561.05	< .001
scalar	.048	.955	.033	57738.463	81	593.18	< .001
strict	.047	.953	.035	57753.157	88	621.87	< .001
Socio-Economic Status (T-Pre1/2/3)							
configural	.046	.984	.031	260258.157	39	291.39	< .001
metric	.046	.982	.034	260284.475	45	329.71	< .001
scalar	.049	.976	.035	260361.857	51	419.09	< .001
strict	.052	.968	.037	260473.232	59	546.46	< .001
Life Satisfaction (T-Pre1/2/3)							
configural	.032	.988	.027	90771.681	72	293.36	< .001
metric	.031	.988	.028	90769.587	80	307.27	< .001
scalar	.031	.986	.029	90794.862	88	348.54	< .001
strict	.031	.985	.030	90806.331	98	380.01	< .001
Self-Esteem (T-Pre2/3)							
configural	.032	.998	.018	32650.606	5	19.03	.002
metric	.026	.998	.018	32647.397	7	19.82	.006
scalar	.044	.992	.024	32680.556	9	56.98	< .001
partial scalar (intercept of ses0102 freed)	.037	.995	.021	32664.795	8	39.22	< .001
strict (intercept of ses0102 freed)	.039	.992	.022	32677.666	11	58.09	< .001
Self-Efficacy (T-Pre1/2/3)							
configural	.009	.999	.011	42794.350	15	19.08	.210
metric	.009	.999	.012	42790.939	19	23.67	.209
scalar	.024	.994	.016	42820.717	23	61.45	< .001
strict	.074	.925	.041	43253.193	29	505.92	< .001
Internalizing Behavior (T-Pre1/3)							
<u>baseline</u>	.147						
configural	.032	.965	.028	69913.860	90	360.55	< .001
metric	.031	.965	.028	69911.399	96	370.08	< .001
scalar	.035	.951	.031	70010.221	102	480.91	< .001
strict	.039	.936	.037	70124.279	110	610.96	< .001
Externalizing Behavior (T-Pre1/3)							
<u>baseline</u>	.126						
configural	.039	.931	.037	43864.064	64	364.56	< .001
metric	.044	.905	.044	43970.652	69	481.15	< .001
scalar	.043	.904	.044	43971.953	74	492.45	< .001
strict	.054	.836	.055	44260.973	81	795.47	< .001
Big Five (T-Pre1/3)							
<u>baseline</u>	.123						
configural	.050	.868	.057	269447.029	345	2957.87	< .001
metric	.050	.865	.058	269501.796	355	3032.63	< .001
scalar	.052	.848	.060	269827.501	365	3378.34	< .001
strict	.054	.830	.062	270172.891	380	3753.73	< .001

Note. T-Pre1/2/3 = pre-pandemic survey 1/2/3; MI = measurement invariance. Missing data handled with full information maximum likelihood estimation. We allowed residual covariances of the same item between time points. Highest level of found measurement invariance and relevant measures for interpretation are bold-faced. Baseline RMSEA only reported when CFI was low (CFI not interpreted and in grayscale when baseline RMSEA < .158). Measurement invariance for the two-item pandemic depression measure was not tested.

Table E18. Results of Measurement Invariance Tests Across Cohorts

Latent construct and MI level	RMSEA	CFI	SRMR	AIC	df	χ^2	p
Pre-Pandemic Depression Symptoms							
configural	.052	.955	.036	57251.089	207	728.90	< .001
metric	.052	.951	.047	57275.750	231	801.56	< .001
scalar	.056	.937	.051	57419.954	255	989.77	< .001
...							
partial scalar (intercepts of bdi0103_3 and bdi0105_3 freed)	.052	.945	.049	57326.307	251	892.12	< .001
invariance of factor variances (intercepts freed as above)	.053	.943	.060	57339.638	255	913.45	< .001
invariance of factor covariances (intercepts freed as above)	.053	.942	.066	57350.004	257	927.82	< .001
strict (intercepts freed as above)	.056	.929	.058	57480.639	279	1102.45	< .001
Socio-Economic Status							
configural	.049	.982	.034	258129.556	117	405.29	< .001
metric	.051	.978	.051	258179.229	135	490.96	< .001
scalar	.074	.948	.067	258694.577	153	1002.31	< .001
...							
partial scalar (intercepts of inc0411s_resid_5 and _1, emp0508r_resid_1 and _5 freed)	.060	.968	.056	258338.646	145	670.38	< .001
invariance of factor variances (intercepts freed as above)	.064	.962	.105	258427.497	151	771.23	< .001
invariance of factor covariances (intercepts freed as above)	.074	.946	.112	258678.243	157	1033.97	< .001
...							
partial invariance of factor covariances (intercepts freed as above and covariances of SES_01 with SES_03 and _05 freed)	.067	.957	.109	258507.587	153	855.32	< .001
strict (intercepts and covariances freed as above)	.073	.942	.128	258732.336	177	1128.07	< .001
Life Satisfaction							
<u>baseline</u>	.249						
configural	.035	.987	.028	89097.210	216	479.61	< .001
metric	.045	.976	.054	89289.808	240	720.21	< .001
partial metric (loading of gls2_1 freed)	.042	.978	.049	89236.915	238	663.32	< .001
scalar (loading of gls2_1 freed)	.066	.941	.063	89941.713	262	1416.11	< .001
...							
partial scalar (loading of gls2_1 and intercepts of gls1_1, _3 and _5, gls2_3 and _5 freed)	.045	.974	.051	89312.266	252	766.67	< .001
invariance of factor variances (loading and intercepts freed as above)	.045	.973	.054	89312.518	258	778.92	< .001
invariance of factor covariances (loading and intercepts freed as above)	.050	.966	.079	89454.832	264	933.23	< .001
strict (loadings/intercepts freed as above)	.064	.938	.078	89976.571	294	1514.97	< .001
Parental Emotional Support							
configural	.020	.999	.011	38509.850	15	21.22	.130
metric	.023	.998	.018	38507.283	23	34.65	.056
scalar	.055	.987	.031	38581.278	31	124.64	< .001
partial scalar (intercept of pas0101f_1 freed)	.032	.996	.023	38519.973	29	59.34	.001
invariance of factor variances (intercept of pas0101f_1 freed)	.063	.982	.122	38614.582	33	161.95	< .001
invariance of factor covariances (intercept of pas0101f_1 and factor variances freed)	.038	.994	.053	38532.072	31	75.44	< .001
strict (intercept of pas0101f_1 and factor variances freed)	.070	.971	.079	38688.296	43	255.66	< .001

Latent construct and MI level	RMSEA	CFI	SRMR	AIC	df	χ^2	p
Home Environment							
configural	.061	.989	.017	32280.009	6	28.65	< .001
metric	.044	.989	.022	32274.426	12	35.07	< .001
scalar	.050	.979	.030	32289.734	18	62.38	< .001
invariance of factor variances	.051	.976	.044	32294.907	20	71.55	< .001
strict	.082	.912	.060	32422.038	28	214.68	< .001
Optimism							
configural	.086	.989	.021	17582.840	3	21.59	< .001
metric	.063	.990	.022	17579.093	5	21.84	.001
scalar	.050	.989	.028	17577.091	9	27.84	.001
invariance of factor variances	.064	.977	.071	17594.799	11	49.55	< .001
strict (factor variances freed)	.052	.979	.031	17586.669	15	49.42	< .001
Self-Esteem							
configural	.051	.994	.026	32454.562	15	51.60	< .001
metric	.050	.991	.034	32462.608	23	75.64	< .001
scalar	.050	.988	.035	32474.214	31	103.25	< .001
invariance of factor variances	.050	.986	.054	32480.282	35	117.32	< .001
invariance of factor covariances	.057	.981	.053	32508.533	37	149.57	< .001
strict	.060	.972	.065	32548.456	49	213.49	< .001
Self-Efficacy							
configural	.017	.998	.017	42198.790	45	57.45	.101
metric	.016	.998	.021	42189.919	57	72.58	.080
scalar	.024	.994	.024	42201.327	69	107.98	.002
invariance of factor variances	.027	.992	.041	42210.362	75	129.02	< .001
invariance of factor covariances	.028	.990	.044	42214.245	81	144.90	< .001
strict	.074	.916	.074	42681.763	99	648.42	< .001
Internalizing Behavior							
<u>baseline</u>	.150						
configural	.034	.961	.034	69271.577	270	588.36	< .001
metric	.033	.961	.036	69246.637	294	611.42	< .001
scalar	.043	.926	.043	69509.609	318	922.39	< .001
invariance of factor variances	.044	.923	.051	69523.087	326	951.87	< .001
invariance of factor covariances	.045	.917	.057	69561.415	338	1014.20	< .001
strict	.047	.901	.063	69663.049	370	1179.83	< .001
Externalizing Behavior							
<u>baseline</u>	.124						
configural	.042	.919	.044	42053.727	192	535.95	< .001
metric	.042	.911	.047	42066.775	212	589.00	< .001
scalar	.044	.892	.050	42125.412	232	687.64	< .001
invariance of factor variances	.048	.867	.058	42225.064	240	803.29	< .001
invariance of factor covariances	.048	.862	.059	42233.316	252	835.54	< .001
strict	.081	.560	.139	43480.909	280	2139.13	< .001
Big Five							
<u>baseline</u>	.126						
configural	.050	.874	.062	267014.845	1035	3679.31	< .001
metric	.051	.864	.065	267169.940	1075	3914.40	< .001
scalar	.054	.845	.067	267534.797	1115	4359.26	< .001
invariance of factor variances	.054	.838	.073	267650.514	1135	4514.98	< .001
invariance of factor covariances	.055	.823	.079	267890.977	1225	4935.44	< .001
strict	.058	.792	.082	268477.057	1285	5641.52	< .001

Note. T-Pre1/2/3 = pre-pandemic survey 1/2/3; MI = measurement invariance. Missing data handled with full information maximum likelihood estimation. Highest level of found measurement invariance and relevant measures for interpretation are bold-faced. Baseline RMSEA only reported when CFI was low (CFI not interpreted and in grayscale when baseline RMSEA < .158). Measurement invariance for the two-item pandemic depression measure was not tested.

Table E19. Results of Confirmatory Factor Analyses for the Validated Instruments and Depression Symptoms Used for the Factor Score Extraction

Latent Construct	RMSEA [CI]	SRMR	CFI (nullRMSEA)	AIC	df	χ^2 (<i>p</i>)	Standardized Factor Loading			
							Item	T-Pre1	T-Pre2	T-Pre3
Optimism	.060 [.030, .096]	.020	.995	17618.086	1	10.07 (.002)	lot0100		.733	
							lot0101		.754	
							lot0102		.627	
Self-Efficacy	.018 [.008, .027]	.021	.997	42804.577	17	33.30 (.010)	sef0100	.646	.680	.705
							sef0101	.692	.737	.776
							sef0102	.643	.721	.747
							HOF loading	.685	.762	.715
Socio-Economic Status	.046 [.041, .051]	.031	.983	260264.851	41	302.08 (<i><</i> .001)	eca0108	.636	.612	.617
							emp0505	.913	.928	.847
							emp0508	.483	.435	.482
							inc0411	.330	.420	.458
							HOF loading	.896	.962	.910
Big Five	.049 [.048, .051]	.058	.868 (.123)	269449.638	355	2980.48 (<i><</i> .001)	O: per0113	.516		.476
							O: per0103	.712		.759
							O: per0108	.431		.397
							C: per0100	.731		.753
							C: per0110	.703		.678
							C: per0106r	.362		.524
							E: per0101	.789		.825
							E: per0107	.724		.829
							E: per0111r	.476		.631
							A: per0112	.911		1.013
							A: per0105	.343		.251
							A: per0102r	.329		.421
							N: per0114r	.448		.573
							N: per0109	.719		.778
							N: per0104	.528		.612
							HOF loading			
							O	.748		.823
C	.741		.764							
E	.861		.780							
A	.717		.687							
N	.894		.742							

Latent Construct	RMSEA [CI]	SRMR	CFI (nullRMSEA)	AIC	df	χ^2 (<i>p</i>)	Standardized Factor Loading			
							Item	T-Pre1	T-Pre2	T-Pre3
Pre-Pandemic Depression Symptoms	.050 [.046, .054]	.031	.958	57720.127	69	550.84 (<i><</i> .001)	bdi0100		.598	.580
							bdi0101		.584	.600
							bdi0102		.775	.779
							bdi0103		.539	.505
							bdi0104		.775	.793
							bdi0105		.707	.711
							bdi0106		.447	.482
			HOF loading		.741	.782				
Pandemic Depression Symptoms	.007 [.000, .027]	.015	1.000	20411.258	15	5.62 (.345)		T-Cov1	T-Cov2	T-Cov3
							emi0110	.753	.658	.824
							emi0111	.751	.704	.748
							HOF loading	.744	.799	.707

Note. nullRMSEA = baseline RMSEA; T-Pre1/2/3 = pre-pandemic survey 1/2/3. T-Cov1/2/3 = pandemic survey 1/2/3; HOF = higher-order factor; O = openness; C = conscientiousness; E = extraversion; A = agreeableness; N = neuroticism. Missing data handled with full information maximum likelihood estimation. We allowed residual covariances of the same item between time points. Standardized factor loadings with first item of latent group set as reference. Baseline RMSEA only reported when CFI was low (CFI not interpreted and in grayscale when baseline RMSEA < .158).

Table E20. Confirmatory Factor Analyses for Constructs with Previous Exploratory Factor Analysis Used for the Factor Score Extraction

Latent Construct	RMSEA [CI]	SRMR	CFI (nullRMSEA)	AIC	df	χ^2 (p)	Standardized Factor Loading			
							Item	T-Pre1	T-Pre2	T-Pre3
Parental Emotional Support	.017 [.000, .033]	.007	1.000	39442.045	15	9.08 (.106)	pas0100m	.775		
							pas0101m	.730		
							pas0102m	.704		
							pas0100f	.860		
							pas0101f	.840		
							pas0102f	.822		
Home Environment	.052 [.032, .075]	.014	.992	32431.139	2	18.46 (< .001)	hoe0200	.511		
							hoe0300	.729		
							hoe0400	.575		
							hoe0600	.633		
Self-Esteem	.032 [.017, .047]	.018	.998	32650.606	5	19.03 (.002)	ses0100r		.570	.603
							ses0101		.831	.841
							ses0102		.841	.881
							HOF loading		.754	.723
Life Satisfaction	.033 [.030, .037]	.036	.987	90795.826	74	321.50 (< .001)	gls1	.798	.781	.796
							gls2	.731	.695	.737
							gls3	.826	.820	.850
							gls4	.662	.636	.666
							gls5	.713	.670	.691
							HOF loading	.731	.755	.711
Internalizing Problem Behavior	.039 [.036, .042]	.039	.945 (.147)	70240.706	93	522.94 (< .001)	F1: int0100	.357		.372
							F1: int0101	.620		.698
							F1: int0102	.600		.654
							F1: int0103	.549		.633
							F1: int0104	.601		.695
							F1: int0105	.449		.425
							F2: int0106r	.464		.435
							F2: int0107r	.476		.553
							HOF loading			

Latent Construct	RMSEA [CI]	SRMR	CFI (nullRMSEA)	AIC	df	χ^2 (p)	Standardized Factor Loading			
							Item	T-Pre1	T-Pre2	T-Pre3
Externalizing Problem Behavior	.045 [.041, .048]	.044	.908 (.126)	43961.892	67	468.39 (< .001)	F1: ext0102	.397		.469
							F1: ext0103r	.722		.405
							F1: ext0104r	.813		.639
							F2: ext0105	.402		.496
							F2: ext0107	.459		.343
							F2: ext0108	.480		.317
							F2: ext0109	.340		.379
							HOF loading			
							F1	.658		.612
F2	.701		.619							
Coping Styles (SVF-KJ)	.053 [.040, .066]	.045	.946 (.177)	23558.791	17	68.48 (< .001)	S-C: svk0100		.556	
							S-C: svk0103		.745	
							S-C: svk0106		.695	
							T/R: svk0104		.345	
							T/R: svk0107		1.083	
							Dis: svk0102		.323	
							Dis: svk0105		.660	
							Dis: svk0108		.534	
							Coping Styles (CISS)	.057 [.048, .066]	.044	.929 (.174)
T-O: cis0103		.656								
T-O: cis0106		.500								
Emo: cis0101		.337								
Emo: cis0104		.602								
Emo: cis0107		.738								
Dis: cis0102		.290								
Dis: cis0105		.762								
Dis: cis0108		.771								

Note. nullRMSEA = baseline RMSEA; T-Pre1/2/3 = pre-pandemic survey 1/2/3; HOF = higher-order factor; S-C = Self-Control; T/R = Thoughts/Resignation; Dis = Distraction; T-O = Task-Orientation; Emo = Emotional. Missing data handled with full information maximum likelihood estimation. We allowed residual covariances of the same item between time points. Standardized factor loadings with first item of latent group set as reference. Baseline RMSEA only reported when CFI was low (CFI not interpreted and in grayscale when baseline RMSEA < .158).

Supplement D: Augmented Backward Elimination and Control Analyses**Table E21.** Results of the Regression Analyses Based on Twin 1

Model Characteristic	Applied on Twin 1						Applied on Twin 2					
	β	SE_{β}	r_s^2	unique	common	p	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.367	.093				< .001	-.327	.098				< .001
Regression Variables												
Independent Variables												
Pre-Pandemic DS	.212	.036	.854	.024	.117	< .001	.178	.037	.798	.021	.086	< .001
Life Satisfaction	-.066	.035	-.599	.002	.068	.031	-.107	.035	-.600	.006	.049	.001
Optimism	-.063	.030	-.532	.004	.053	.020	-.038	.032	-.475	.001	.033	.110
Internalizing Behavior	.108	.034	.746	.006	.097	.001	.103	.035	.724	.006	.077	.002
Openness	.063	.027	.085	.005	-.003	.021	.058	.028	.056	.005	-.003	.037
Conscientiousness	-.076	.031	-.253	.005	.009	.017	-.001	.032	-.218	.000	.008	.970
Agreeableness	.102	.029	.090	.008	-.007	< .001	-.005	.030	-.119	.000	.001	.865
Control Variables												
Age	-.055	.029	-.119	.001	.000	.057	-.154	.029	-.259	.018	.009	< .001
Sex	.107	.057	.422	.009	.022	< .001	.111	.059	.388	.011	.014	< .001
COVID-19 infection (household)	.029	.088	.045	.000	-.000	.264	-.005	.087	.011	.000	-.000	.860
COVID-19 quarantine (household)	.026	.062	.096	.000	.001	.320	-.060	.063	-.111	.000	-.002	.027
Model statistics												
n	1,229						1,205					
F	23.88						20.26					
df	1217						1193					
p	< .001						< .001					
Adjusted R^2	.170						.150					

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); unique = proportion of criterion variance uniquely explained by the predictor; common = proportion of criterion variance explained by the predictor as well as (an)other predictor(s); DS = depression symptoms. Dependent variable stable trait component of pandemic depression symptoms (DS). Variable selection using Augmented Backwards Elimination (ABE) following Dunkler et al. (2014): Full model with independent variables pre-pandemic DS, family socio-economic status, home environment, parental emotional support, self-efficacy, self-esteem, optimism, life satisfaction, internalizing and externalizing problem behavior, Big Five personality traits, positive life events, and the linear and quadratic term of negative life events. Variables were dropped from the model subsequently by combining the selection by significance ($\alpha = .10$) and change-in-estimate criterion ($\tau = .05$), quasi-cross-validated across twins. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Missing values handled via list-wise deletion, separately for ABE variable selection (on all variables) and on the final model computation. Significant beta coefficients ($p < .05$) are bold-faced.

Table E22. Results of the Regression Analyses Based on Twin 2

Model Characteristic	Applied on Twin 1						Applied on Twin 2					
	β	SE_{β}	r_s^2	unique	common	p	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.453	.093				< .001	-.372	.096				< .001
Regression Variables												
Independent Variables												
Pre-Pandemic DS	.218	.036	.875	.023	.1066	< .001	.167	.036	.763	.019	.079	< .001
Self-efficacy	.029	.029	-.470	.001	.035	.825	.057	.029	-.346	.004	.013	.977
Self-esteem	-.053	.036	-.732	.003	.094	.078	-.070	.037	-.675	.003	.073	.028
Life Satisfaction	-.098	.033	-.647	.004	.067	.002	-.109	.035	-.579	.005	.046	.001
Neuroticism	.073	.028	.541	.003	.041	.005	.109	.029	.533	.007	.033	< .001
Positive Life Experiences	.013	.014	.008	.000	-.000	.617	.036	.013	.016	.001	-.001	.156
Negative Life Experiences	.070	.020	.299	.001	.015	.176	.089	.018	.242	.003	.007	.072
Negative Life Experiences (Squared)	-.030	.002	.215	.000	.009	.552	-.069	.001	.142	.002	.001	.159
Control Variables												
Age	-.090	.027	-.124	.004	-.003	< .001	-.194	.027	-.289	.031	-.019	< .001
Sex	.116	.054	.453	.010	.020	< .001	.095	.054	.371	.009	.013	< .001
COVID-19 infection (household)	.027	.083	.060	.000	-.000	.282	.002	.082	.037	.000	.000	.921
COVID-19 quarantine (household)	.013	.059	.069	.000	.000	.603	-.066	.060	-.112	.003	-.002	.011
Model statistics												
n	1,356						1,325					
F	21.18						19.83					
df	1343						1312					
p	< .001						< .001					
Adjusted R^2	.152						.146					

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); unique = proportion of criterion variance uniquely explained by the predictor; common = proportion of criterion variance explained by the predictor as well as (an)other predictor(s); DS = depression symptoms. Dependent variable stable trait component of pandemic DS. Variable selection via multiple regression using Augmented Backwards Elimination following Dunkler et al. (2014): Full model with independent variables pre-pandemic DS, family socio-economic status, home environment, parental emotional support, self-efficacy, self-esteem, optimism, life satisfaction, internalizing and externalizing problem behavior, Big Five personality traits, positive life events, and the linear and quadratic term of negative life events. Variables were dropped from the model subsequently by combining the selection by significance ($\alpha = .10$) and change-in-estimate criterion ($\tau = .05$), quasi-cross-validated across twins. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Missing values handled via list-wise deletion, separately for ABE variable selection (on all variables) and on the final model computation. Significant beta coefficients ($p < .05$) are bold-faced.

Table E23. Result of the Final Regression Model (Full Sample)

Model Characteristic	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.349	.068				< .001
Regression Variables						
Independent Variables						
Pre-Pandemic DS	.191	.026	.841	.022	.101	< .001
Life Satisfaction	-.091	.024	-.611	.004	.059	< .001
†Optimism	-.050	.022	-.515	.002	.043	.011
Internalizing Problems	.105	.025	.749	.006	.087	< .001
Openness	.061	.019	.073	.005	-.003	.002
†Conscientiousness	-.039	.022	-.242	.002	.009	.084
†Agreeableness	.047	.021	-.010	.002	-.002	.023
Control Variables						
Age	-.107	.021	-.192	.007	-.003	< .001
Sex	.111	.041	.415	.010	.018	< .001
COVID-19 infection (household)	.008	.062	.029	.000	.000	.649
COVID-19 quarantine (household)	-.019	.044	-.004	.000	.000	.314
Model statistics						
<i>n</i>	2,434					
<i>F</i>	42.33					
<i>df</i>	2422					
<i>p</i>	< .001					
Adjusted R^2	.157					

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); unique = proportion of criterion variance uniquely explained by the predictor; common = proportion of criterion variance explained by the predictor as well as (an)other predictor(s); DS = depression symptoms. Dependent variable stable trait component of pandemic DS. Missing values handled via list-wise deletion. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Model with higher explanatory power across both twins chosen for full sample analysis. Effects in the final model were considered meaningful if statistically significant ($p < .05$) across both twins. Significant beta coefficients ($p < .05$) are bold-faced. Variables marked with † were not significant across both twins and were not taken forward into genetically informative analyses.

Table E24. Results of the Control Analyses: Final Regression Model with Pre-Pandemic DS Omitted (Full Sample)

Model Characteristic	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.376	.068				< .001
Regression Variables						
Independent Variables						
Life Satisfaction	-.152	.023	-.653	.015	.048	< .001
†Optimism	-.077	.022	-.544	.005	.039	< .001
Internalizing Problems	.174	.023	.799	.021	.072	< .001
Openness	.084	.019	.081	.009	-.007	< .001
†Conscientiousness	-.060	.022	-.259	.004	.007	.009
†Agreeableness	.042	.021	-.016	.002	-.002	.043
Control Variables						
Age	-.102	.021	-.196	.007	-.003	< .001
Sex	.119	.041	.444	.012	.016	< .001
COVID-19 infection (household)	.006	.062	.032	.000	.000	.742
COVID-19 quarantine (household)	-.016	.045	-.003	.000	-.000	.399
Model statistics						
n		2,437				
F		40.13				
df		2426				
p		< .001				
Adjusted R^2		.138				

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); unique = proportion of criterion variance uniquely explained by the predictor; common = proportion of criterion variance explained by the predictor as well as (an)other predictor(s); DS = depression symptoms. Dependent variable stable trait component of pandemic DS. Missing values handled via list-wise deletion. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Significant beta coefficients ($p < .05$) are bold-faced. Control analysis performed to check for possible interference from pre-pandemic DS (none to be found).

Table E25. Results of the Control Analyses: Pre-Pandemic Depression Symptoms as Criterion

Model Characteristic	Twin 1 ABE Model				Twin 2 ABE Model				Final Model			
	β	SE_{β}	r_s^2	p	β	SE_{β}	r_s^2	p	β	SE_{β}	r_s^2	p
<i>Intercept</i>	.006	.069		.933	.004			.956	-.028			.566
Regression Variables												
Independent Variables												
Life Satisfaction	-.151	.026	-.758	<.001	-.138	.095	-.734	<.001	-.145	.019	-.747	<.001
Optimism	-.066	.022	-.567	.001	-.087	.027	-.562	.001	-.075	.016	-.566	<.001
Internalizing Behavior	.283	.024	.777	<.001	.280	.023	.772	<.001	.285	.018	.777	<.001
Self-Efficacy	-.083	.024	-.593	<.001	-.079	.025	-.495	<.001	-.080	.017	-.548	<.001
Self-Esteem	-.374	.024	-.873	<.001	-.374	.024	-.876	<.001	-.372	.018	-.875	<.001
Negative Life Events	.053	.007	.255	.004	.039	.007	.235	.049	.047	.005	.231	<.001
Openness	.104	.020	-.043	<.001	.095	.024	-.046	<.001	.104	.017	-.041	<.001
Conscientiousness	-.080	.021	-.306	.001	-.062	.022	-.222	.007	-.073	.016	-.268	<.001
Extraversion					.048	.026	-.232	.072	.019	.018	-.234	.295
Parental Support					.069	.020	-.151	.996	.038	.015	-.193	.995
Parental Support					.067			.001	.039			.011
Control Variables												
Age	.007	.004	.014	.712	.057	.004	.110	.009	.033	.003	.060	.117
Sex	-.023	.041	.180	.258	-.003	.042	.193	.876	-.013	.030	.188	.514
Model statistics	↑ Coefficients as Applied on Twin 1				↑ Coefficients as Applied on Twin 2				Applied on Full Sample			
<i>n</i>	1,269		1,250		1,255		1,235		2,490			
<i>F</i>	185.30		147.00		151.30		123.60		273.30			
<i>df</i>	1258		1239		1242		1222		2477			
<i>p</i>	<.001		<.001		<.001		<.001		<.001			
Adjusted R^2	.592		.539		.588		.544		.567			

Note. ABE = augmented backward elimination; r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2). Dependent variable stable trait component of pandemic DS. Variable selection from separate Augmented Backward Elimination (applied on the full model with pre-pandemic depression symptoms as criterion) following Dunkler et al. (2014): Independent variables pre-pandemic DS, family socio-economic status, home environment, parental emotional support, self-efficacy, self-esteem, optimism, life satisfaction, internalizing and externalizing problem behavior, Big Five personality traits, positive life events, and the linear and quadratic term of negative life events. Variables were dropped from the model subsequently by combining the selection by significance ($\alpha = .10$) and change-in-estimate criterion ($\tau = .05$), quasi-cross-validated across twins. Model shows a major increase in explanatory power when compared to pandemic DS and includes more relevant predictors compared to the ABE on pandemic DS (cf. Tables E21, E22, E23). $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Results quasi-cross-validated across twins (co-twin coefficients omitted). Beta coefficients bold-faced when significant ($p < .05$) across both twins.

Table E26. Results of the Control Analyses: Separate Surveys

Model Characteristic	T-Cov1 (06–11/2020)				T-Cov2 (11/2020–04/2021)				T-Cov3 (09–11/2021)			
	β	SE_{β}	r_s^2	p	β	SE_{β}	r_s^2	p	β	SE_{β}	r_s^2	p
Intercept	.141	.263		.592	-.209	.083		.012	-.126	.627		.840
Regression Variables												
Independent Variables (from twin 1 ABE)												
Pre-Pandemic DS	.150	.040	.827	< .001	.177	.027	.793	< .001	.173	.039	.841	< .001
Life Satisfaction	-.059	.037	-.611	.057	-.094	.026	-.562	< .001	-.114	.038	-.664	.001
Optimism	-.081	.035	-.598	.010	-.023	.023	-.446	.165	-.039	.033	-.483	.108
Internalizing Behavior	.121	.038	.766	< .001	.068	.026	.685	.005	.144	.036	.794	< .001
Openness	.079	.030	.102	.010	.043	.021	.076	.040	.051	.029	.048	.084
Conscientiousness	-.041	.034	-.250	.234	-.031	.024	-.212	.195	-.007	.035	-.274	.845
Agreeableness	.078	.033	.129	.014	.063	.022	.054	.004	-.039	.031	-.187	.219
Control Variables												
Age	-.068	.031	-.155	.030	-.118	.022	-.230	< .001	-.086	.032	-.196	.006
Sex	.043	.062	.293	.165	.115	.043	.447	< .001	.096	.062	.342	.002
COVID-19 infection (household)	-.038	.095	-.122	.181	.022	.065	.075	.267	.046	.084	.051	.088
COVID-19 quarantine (household)	-.003	.066	.068	.931	-.022	.047	-.029	.274	-.009	.063	.043	.765
Seven-day Incidence Rate	.023	.003	.030	.552	-.041	.000	-.204	.062	.022	.000	.013	.527
Survey Month	-.041	.033	-.039	.291	-.054	.005	-.178	.016	-.011	.064	-.045	.747
Model statistics												
n	1,096				2,239				1,089			
F	12.12				25.75				17.85			
df	1082				2225				1075			
p	< .001				< .001				< .001			
Adjusted R^2	.117				.126				.168			

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); DS = depression symptoms. Dependent variable stable trait component of pandemic DS during each considered pandemic wave (T-Cov1, 2, 3). Independent variables are trait regression scores as in the main analyses. Variable selection from pandemic DS model ABE on twin 1. A separate variable selection has not been performed to ensure comparability. Separate list-wise missing deletion by survey. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Control variables for seven-day incidence rate and survey month added. Beta coefficients bold-faced when significant ($p < .05$) across both twins.

Table E27. Results of the Control Analyses: Augmented Backward Elimination With the State Scores of the Third Pre-Pandemic Survey

Model Characteristic	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.351	.069				< .001
Regression Variables						
Independent Variables						
Pre-pandemic DS	.141	.084	.815	.010	.112	< .001
Self-esteem	-.056	.047	-.713	.003	.094	.018
Life satisfaction	-.079	.035	-.634	.003	.070	.001
Optimism	-.077	.020	-.507	.005	.040	< .001
Internalizing Behavior	.092	.155	.772	.005	.101	< .001
Openness	.053	.035	-.016	.004	-.004	.006
Neuroticism	.055	.035	.609	.001	.059	.011
Positive life events	.042	.010	.015	.001	-.001	.023
Control Variables						
Age	-.107	.019	-.190	.008	-.004	< .001
Sex	.096	.040	.405	.008	.020	< .001
COVID-19 infection (household)	.011	.062	.022	.000	-.000	538
COVID-19 quarantine (household)	-.020	.044	-.003	.001	-.001	.288
Model statistics						
n	2,434					
F	40.71					
df	2418					
p	< .001					
Adjusted R^2	.164					

Note. r_s^2 = squared structure coefficient (proportion of R^2 variance explained by the predictor, i. e. r^2/R^2); unique = proportion of criterion variance uniquely explained by the predictor; common = proportion of criterion variance explained by the predictor as well as (an)other predictor(s); DS = depression symptoms. Variable selection from separate Augmented Backward Elimination (applied with wave 3 state scores where available, the pre-pandemic survey closest to the start of the pandemic) following Dunkler et al. (2014): Independent variables pre-pandemic DS, family socio-economic status, home environment, parental emotional support, self-efficacy, self-esteem, optimism, life satisfaction, internalizing and externalizing problem behavior, Big Five personality traits, positive life events, and the linear and quadratic term of negative life events. Variables were dropped from the model subsequently by combining the selection by significance ($\alpha = .10$) and change-in-estimate criterion ($\tau = .05$), quasi-cross-validated across twins. Model shows that even fewer factors remain in the model, yielding similarly low explanatory power compared to the main analysis with time-stable trait scores. Dependent variable stable trait component of pandemic DS. Missing values handled via list-wise deletion. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Significant beta coefficients ($p < .05$) are bold-faced.

Table E28. Results of the Control Analyses: Regression Models From ABE With $\alpha = .20$ and With All Considered Variables Included

Model Characteristic	Full Model (All Variables Included)			ABE With $\alpha = .20$		
	β	SE_{β}	p	β	SE_{β}	p
Intercept	.012	.097	.900	.036	.101	.722
Regression Variables						
Independent Variables						
Pre-Pandemic DS	.171	.028	< .001	.172	.029	< .001
Self-efficacy	.042	.024	.960	.047	.024	.974
Self-esteem	-.061	.027	.013	-.062	.028	.013
Life satisfaction	-.073	.026	.003	-.069	.028	.007
Optimism	-.051	.022	.010	-.050	.022	.012
Internalizing Behavior	.108	.025	< .001	.093	.030	.001
Openness	.049	.020	.016	.040	.024	.102
Conscientiousness	-.052	.024	.029	-.046	.025	.071
Agreeableness	.487	.021	.020	.046	.022	.036
Positive Life Experiences	.033	.010	.078	.033	.010	.087
Negative Life Experiences	.031	.007	.109	.030	.007	.122
Socio-Economic Status				-.005	.019	.388
Home Chaos				-.004	.022	.571
Parental Emot. Support				-.144	.022	.253
Externalizing Behavior				.013	.023	.573
Extraversion				.013	.026	.613
Neuroticism				.028	.025	.131
Control Variables						
Age	-.123	.004	< .001	-.128	.005	< .001
Sex	.107	.042	< .001	.105	.042	< .001
COVID-19 infection (household)	.007	.062	.689	.006	.062	.732
COVID-19 quarantine (household)	-.027	.045	.154	-.028	.045	.145
Model statistics						
n		2,398			2,398	
F		31.90			22.87	
df		2382			2376	
p		< .001			< .001	
Adjusted R^2		.162			.161	

Note. DS = depression symptoms. Dependent variable stable trait component of pandemic DS. Variable selection via multiple regression using Augmented Backwards Elimination following Dunkler et al. (2014): Variables were dropped from the full model subsequently by combining the selection by significance ($\alpha = .20$) and change-in-estimate criterion ($\tau = .05$) across both twins. Missing values handled via list-wise deletion. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Significant beta coefficients ($p < .05$) are bold-faced.

Table E29. Results of the Control Analyses: Regression Model Excluding Participants Ever Infected

Model Characteristic	Final Model (see Table E23)					
	β	SE_{β}	r_s^2	unique	common	p
Intercept	-.043	.099				.662
Regression Variables						
Independent Variables						
Pre-Pandemic DS	.185	.027	.853	.021	.102	< .001
Life Satisfaction	-.085	.026	-.623	.004	.059	< .001
Optimism	-.054	.023	-.527	.002	.042	.010
Internalizing Problems	.117	.026	.767	.008	.088	< .001
Openness	.075	.020	.114	.006	-.004	< .001
Conscientiousness	-.042	.023	-.233	.002	.008	.077
Agreeableness	.036	.022	-.020	.001	-.001	.096
Control Variables						
Age	-.079	.004	-.135	.004	-.002	< .001
Sex	.941	.043	.396	.008	.018	< .001
COVID-19 quarantine (household)	-.009	.046	.014	.000	-.000	.658
Model statistics						
n		2,193				
F		40.86				
df		2182				
p		< .001				
Adjusted R^2		.154				

Note. DS = depression symptoms. Dependent variable stable trait component of pandemic DS. Variable selection via multiple regression using Augmented Backwards Elimination following Dunkler et al. (2014): Independent variables pre-pandemic DS, family socio-economic status, home environment, parental emotional support, self-efficacy, self-esteem, optimism, life satisfaction, internalizing and externalizing problem behavior, Big Five personality traits, positive life events, and the linear and quadratic term of negative life events. Variables were dropped from the model subsequently by combining the selection by significance ($\alpha = .10$) and change-in-estimate criterion ($\tau = .05$), quasi-cross-validated across twins. Missing values handled via list-wise deletion. $p/2$ for estimates in direction from hypotheses, $1-p/2$ for estimates in reverse direction of hypotheses. Significant beta coefficients ($p < .05$) are bold-faced.

Supplement E: Latent Growth Curve Model and Twin Analyses

Table E30. Results of the Latent Growth Curve Models

Model Characteristic	Level-Only Model				Linear Change Model			
	Est.	SE	<i>p</i>	Std. Est.	Est.	SE	<i>p</i>	Std. Est.
Model parameters								
<i>Intercepts</i>								
Level	1.811	0.011	< .001	4.204	1.805	0.014	< .001	4.178
Slope					0.012	0.019	.532	0.063
Level-slope covariance					-0.009	0.024	.720	-0.105
<i>Variances</i>								
T-Cov1	0.222	0.013	< .001	0.545	0.215	0.020	< .001	0.536
T-Cov2	0.222	0.011	< .001	0.544	0.223	0.011	< .001	0.544
T-Cov3	0.249	0.014	< .001	0.573	0.224	0.031	< .001	0.512
Level	0.186	0.010	< .001	1	0.187	0.020	< .001	1
Slope					0.036	0.047	.438	1
Model fit statistics								
χ^2	4.653				3.392			
<i>df</i>	4				1			
<i>p</i>	.325				.066			
AIC	9432.091				9436.829			
CFI	.999				.995			
RMSEA [90% CI]	.008 [.000, .030]				.029 [.000, .065]			

Note. T-Cov1,2,3 = pandemic measurements; Est. = estimates; Std. Est. = standardized estimates. Results are based on unweighted data.

Table E31. Result of the Cholesky Decomposition Model Comparison

Model	EP	-2LL	Δ -2LL	Δ <i>df</i>	<i>p</i>	AIC	Δ AIC	wAIC
ACE	21	7967056.159				7967098		.00
ADE	21	7966698.201	-357.959	0		7966740	-358	> .99
DE	15	7971037.687	3981.528	6	< .001	7971068	3970	.00
AE	15	7968844.147	1787.988	6	< .001	7968874	1776	.00
E	9	8113806.712	146750.553	12	< .001	8113825	146727	

Note. EP = estimated parameters; wAIC = rounded Akaike weights. Models compared against the ACE model. The chosen model is bold-faced.

Table E32. Parameter Estimates of the Cholesky ADE Model

T	A ₁	A ₂	A ₃	D ₁	D ₂	D ₃	E ₁	E ₂	E ₃
T-Cov1	0.292 [0.285, 0.298] .472			0.164 [0.153, 0.175] .265			0.519 [0.518, 0.521] .841		
T-Cov2	0.139 [0.130, 0.148] .223	0.276 [0.271, 0.281] .442		0.233 [0.224, 0.242] .373	0.001 [-0.021, 0.023] .000		0.153 [0.152, 0.155] .246	0.465 [0.464, 0.466] .745	
T-Cov3	0.167 [0.157, 0.176] .258	0.138 [0.129, 0.147] .214	0.000 [-0.020, 0.020] .000	0.206 [0.191, 0.220] .318	0.026 [-0.469, 0.520] -.400	0.258 [0.211, 0.306] .041	0.136 [0.134, 0.139] .211	0.075 [0.073, 0.077] .116	0.486 [0.485, 0.488] .753

Note. T = measurement point; T-Cov1,2,3 = pandemic measurements; A_{1,2,3} = additive genetic factors at Cov1,2,3; E_{1,2,3} = unique environmental factors at T1,2,3. Standardized estimates are bold-faced. Likelihood-based confidence intervals are shown in brackets.

Table E33. Result of the Comparison of the Cholesky and Common Factor Model

Model	EP	-2LL	Δ-2LL	Δdf	p	AIC	ΔAIC	wAIC
Cholesky model	21	7966698.196				7966740		> .99
Common factor model	15	7970256.695	3558.500	7	< .001	7970287	3547	.00

Note. EP = estimated parameters; wAIC = rounded Akaike weights.

Table E34. Result of the Cholesky Decomposition Model Including Predictors

Parameter	DSprep	Life Satisfaction	Internalizing Behavior	Openness to Experience	DScov1	DScov2	DScov3
<i>A</i> _{DSprep}	.579 [.573, .585] .575	-.556 [-.561, -.551] -.553	.560 [.555, .566] .558	.040 [.032, .048] .040	.310 [.302, .318] .307	.389 [.381, .397] .390	.397 [.388, .407] .395
<i>D</i> _{DSprep}	.330 [.319, .341] .328	.026 [.014, .037] .025	.098 [.084, .112] .097	-.007 [-.022, .008] -.007	-.024 [-.040, -.007] -.024	-.021 [-.039, -.003] -.021	.019 [-.002, .040] .019
<i>E</i> _{DSprep}	.753 [.752, .754] .749	-.345 [-.347, -.344] -.343	.278 [.276, .279] .277	-.068 [-.070, -.066] -.068	.109 [.106, .112] .108	.043 [.041, .045] .043	.120 [.117, .123] .119
<i>A</i> _{Life Satisfaction}		.428 [.422, .434] .425	-.062 [-.069, -.054] -.061	.146 [.137, .156] .146	.209 [.200, .219] .207	.201 [.193, .210] .202	.140 [.131, .149] .139
<i>D</i> _{Life Satisfaction}		.141 [.131, .151] .140	-.087 [-.100, -.074] -.087	.318 [.290, .346] .317	-.130 [-.146, -.114] -.129	-.329 [-.343, -.316] -.330	-.211 [-.242, -.180] -.209
<i>E</i> _{Life Satisfaction}		.616 [.615, .617] .612	-.082 [-.083, -.080] -.082	.060 [.058, .062] .060	-.115 [-.118, -.112] -.114	-.035 [-.037, -.033] -.035	-.108 [-.110, -.105] -.107
<i>A</i> _{Internalizing}			.352 [.347, .356] .350	-.294 [-.303, -.284] -.293	-.090 [-.100, -.081] -.090	-.241 [-.252, -.230] -.241	-.076 [-.086, -.065] -.075
<i>D</i> _{Internalizing}			.107 [.099, .116] .107	.450 [.423, .477] .449	.101 [.085, .117] .100	.042 [.022, .061] .042	-.159 [-.189, -.129] -.158
<i>E</i> _{Internalizing}			.674 [.673, .675] .671	-.056 [-.058, -.054] -.056	.076 [.074, .079] .075	.028 [.027, .030] .029	.063 [.060, .065] .062
<i>A</i> _{Openness}				.085 [.065, .105] .085	.294 [.279, .308] .290	-.139 [-.158, -.120] -.139	.025 [.010, .040] .025
<i>D</i> _{Openness}				.203 [.158, .248] .202	.052 [.034, .070] .051	.019 [-.004, .041] .019	.341 [.321, .360] .338
<i>E</i> _{Openness}				.730 [.728, .731] .728	-.094 [-.097, -.091] -.093	.013 [.011, .015] .013	.053 [.050, .056] .053
<i>A</i> _{DScov1}					.000 [-.072, .072] .000	.000 [-.051, .051] .000	.000 [-.021, .021] .000
<i>D</i> _{DScov1}					.000 [-.025, .025] .000	.000 [-.027, .027] .000	.000 [-.048, .048] .000
<i>E</i> _{DScov1}					.847 [.844, .849] .838	.245 [.242, .247] .245	.193 [.189, .196] .191
<i>A</i> _{DScov2}						.000 [-.030, .030] .000	.000 [-.019, .019] .000
<i>D</i> _{DScov2}						.000 [-.022, .022] .000	.000 [-.049, .049] .000
<i>E</i> _{DScov2}						.743 [.741, .744] .744	.112 [.109, .115] .111

$A_{D_{Scov3}}$.000 [-.019, .019]
$D_{D_{Scov3}}$.000 .000 [-.054, .054]
$E_{D_{Scov3}}$.749 [.747, .751] .744

Note. Standardized estimates are bold-faced. Likelihood-based confidence intervals are shown in brackets.

DS_{prep} = pre-pandemic depression symptoms;

$DS_{cov1,2,3}$ = depression symptoms at pandemic measurements 1,2,3;

A_x = additive genetic component of the subscript variable x ;

D_x = non-additive genetic component of the subscript variable x ;

E_x = unique environmental component of the subscript variable x .

Table E35. Phenotypic Twin Correlations of Pandemic and Pre-Pandemic Depression Symptoms

Variable	Zygoty	n	Raw		Adjusted	
			r [95% CI]	p	r [95% CI]	p
Pandemic Depression Symptoms						
Measured in the first survey (T-Cov1)	MZ	200	.308 [.177, .428]	< .001	.280 [.147, .403]	< .001
	DZ	208	.156 [.021, .286]	.020	.145 [.009, .276]	.037
Measured in the second survey (T-Cov2)	MZ	562	.396 [.324, .463]	< .001	.370 [.296, .439]	< .001
	DZ	628	.188 [.111, .262]	< .001	.165 [.088, .240]	< .001
Measured in the third survey (T-Cov3)	MZ	238	.398 [.286, .500]	< .001	.382 [.267, .485]	< .001
	DZ	233	.087 [-.042, .213]	.200	.071 [-.058, .198]	.278
Stable trait component (across all surveys)	MZ	613	.395 [.326, .460]	< .001	.370 [.299, .436]	< .001
	DZ	700	.187 [.115, .258]	< .001	.158 [.084, .229]	.006
Pre-Pandemic Depression Symptoms						
Measured in the second pre-pandemic survey (T-Pre2)	MZ	459	.405 [.326, .479]	< .001	.391 [.311, .466]	< .001
	DZ	534	.134 [.050, .216]	.002	.117 [.032, .200]	.007
Measured in the third pre-pandemic survey (T-Pre3)	MZ	435	.414 [.333, .489]	< .001	.408 [.327, .484]	< .001
	DZ	491	.169 [.082, .254]	< .001	.149 [.061, .234]	< .001
Stable trait (component across all surveys)	MZ	591	.463 [.397, .524]	< .001	.457 [.390, .518]	< .001
	DZ	674	.225 [.151, .295]	< .001	.199 [.125, .270]	< .001

Note. MZ = monozygotic; DZ = dizygotic; Adjusted = adjusted for significant sex, age (linear and quadratic), and sexage-interaction effects.

Table E36. Control Analyses: Result of the Cholesky Decomposition Model Comparison for Pre-Pandemic Depression Symptoms

Model	EP	-2LL	Δ-2LL	Δdf	p	AIC	ΔAIC	wAIC
ACE	11	4846717.846				4846740		.00
ADE	11	4843727.027	-2990.819	0		4843749	-2991	> .99
DE	8	4847751.092	1033.247	3	< .001	4847767	1027	.00
AE	8	4846717.846	0.000	3	> .999	4846734	-6	.00
E	5	4992358.493	145640.648	6	< .001	4992368	145629	

Note. EP = estimated parameters; wAIC = rounded Akaike weights. Models compared against the ACE model. The chosen model is bold-faced.

Table E37. Control Analysis: Result of the Cholesky Decomposition Model Including Predictors for Pre-Pandemic Depression Symptoms

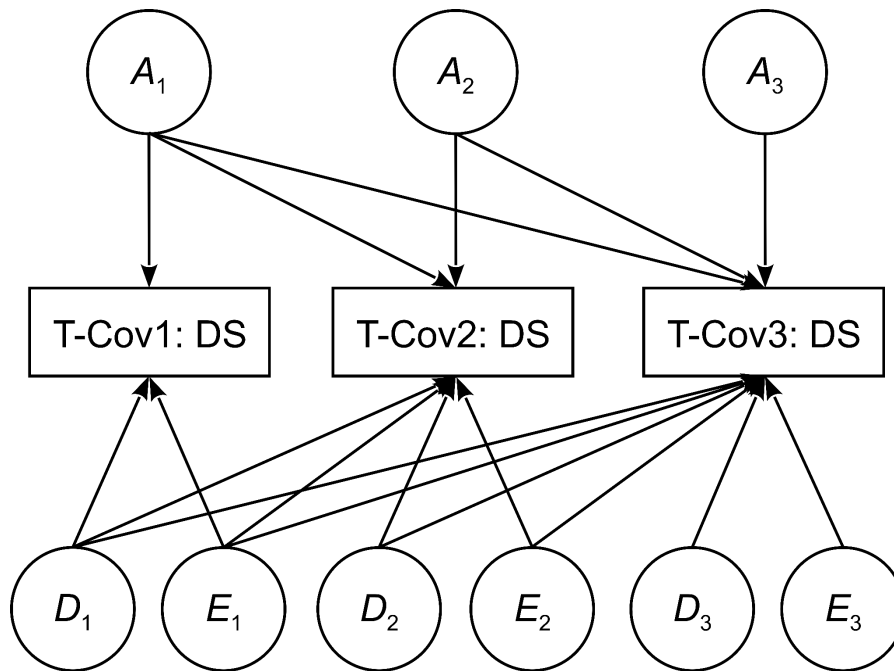
Parameter	Openness	Conscientiousness	Neg. Life Events	Internalizing	Life Satisfaction	Self-Esteem	Self-Efficacy	Optimism	DSpre2	DSpre3
<i>A</i> _{Openness}	0.146 [0.142, 0.149]	0.101 [0.096, 0.106]	-0.170 [-0.202, -0.138]	-0.150 [-0.163, -0.137]	0.034 [0.028, 0.040]	0.075 [0.070, 0.080]	0.309 [0.298, 0.320]	0.035 [0.029, 0.041]	0.017 [0.011, 0.022]	-0.005 [-0.011, 0.001]
	0.346	0.220	-0.066	-0.149	0.072	0.210	0.305	0.060	0.035	-0.011
<i>D</i> _{Openness}	0.246 [0.244, 0.249]	0.012 [0.008, 0.016]	0.471 [0.453, 0.490]	-0.035 [-0.043, -0.026]	0.048 [0.045, 0.052]	-0.014 [-0.017, -0.011]	0.026 [0.018, 0.035]	0.081 [0.077, 0.084]	0.014 [0.011, 0.018]	0.013 [0.009, 0.017]
	0.584	0.026	0.183	-0.034	0.103	-0.040	0.026	0.138	0.030	0.028
<i>E</i> _{Openness}	0.309 [0.309, 0.310]	0.053 [0.053, 0.054]	-0.118 [-0.123, -0.114]	-0.080 [-0.082, -0.079]	0.038 [0.037, 0.039]	0.029 [0.028, 0.029]	0.214 [0.212, 0.215]	0.061 [0.060, 0.062]	-0.033 [-0.033, -0.032]	-0.027 [-0.028, -0.026]
	0.734	0.116	-0.046	-0.080	0.081	0.081	0.211	0.104	-0.069	-0.056
<i>A</i> _{Conscientiousness}		0.122 [0.118, 0.125]	-0.178 [-0.216, -0.140]	-0.066 [-0.082, -0.049]	0.119 [0.112, 0.126]	0.167 [0.163, 0.172]	0.076 [0.063, 0.088]	0.118 [0.112, 0.124]	-0.139 [-0.144, -0.134]	-0.170 [-0.175, -0.164]
		0.265	-0.069	-0.065	0.253	0.471	0.075	0.202	-0.293	-0.356
<i>D</i> _{Conscientiousness}		0.247 [0.244, 0.249]	0.135 [0.117, 0.153]	-0.125 [-0.133, -0.117]	0.097 [0.094, 0.101]	0.001 [-0.001, 0.004]	0.262 [0.255, 0.269]	0.053 [0.049, 0.057]	-0.064 [-0.068, -0.061]	-0.063 [-0.067, -0.059]
		0.536	0.052	-0.125	0.208	0.004	0.259	0.091	-0.136	-0.132
<i>E</i> _{Conscientiousness}		0.350 [0.350, 0.351]	0.043 [0.038, 0.047]	-0.088 [-0.089, -0.086]	0.041 [0.040, 0.042]	0.018 [0.017, 0.019]	0.195 [0.193, 0.197]	0.033 [0.032, 0.035]	-0.027 [-0.028, -0.026]	-0.035 [-0.036, -0.034]
		0.762	0.017	-0.087	0.088	0.051	0.193	0.057	-0.056	-0.073

Parameter	Openness	Conscientiousness	Neg. Life Events	Internalizing	Life Satisfaction	Self-Esteem	Self-Efficacy	Optimism	DSpre2	DSpre3
<i>A</i> _{negativeLifeEvents}			1.387 [1.374, 1.399]	0.144 [0.137, 0.152]	-0.096 [-0.100, -0.092]	-0.016 [-0.02, -0.011]	0.073 [0.065, 0.082]	-0.044 [-0.049, -0.039]	0.046 [0.042, 0.050]	0.059 [0.054, 0.064]
			0.540	0.144	-0.205	-0.044	0.073	-0.075	0.097	0.123
<i>D</i> _{negativeLifeEvents}			0.380 [0.356, 0.405]	-0.171 [-0.190, -0.151]	0.050 [0.045, 0.055]	0.034 [0.029, 0.039]	0.024 [-0.001, 0.048]	0.136 [0.124, 0.146]	0.063 [0.051, 0.075]	-0.046 [-0.057, -0.034]
			0.148	-0.170	0.106	0.096	0.023	0.233	0.133	-0.096
<i>E</i> _{negativeLifeEvents}			2.053 [2.050, 2.056]	0.078 [0.076, 0.079]	-0.013 [-0.013, -0.012]	-0.013 [-0.013, -0.012]	-0.042 [-0.044, -0.041]	-0.054 [-0.055, -0.053]	0.045 [0.044, 0.046]	0.040 [0.040, 0.041]
			0.799	0.077	-0.027	-0.036	-0.042	-0.092	0.095	0.085
<i>A</i> _{Internalizing}				0.522 [0.516, 0.529]	-0.196 [-0.200, -0.192]	-0.121 [-0.126, -0.116]	-0.085 [-0.094, -0.076]	-0.089 [-0.094, -0.076]	0.156 [0.151, 0.161]	0.138 [0.132, 0.144]
				0.520	-0.417	-0.341	-0.084	-0.153	0.328	0.289
<i>D</i> _{Internalizing}				0.338 [0.327, 0.349]	-0.035 [-0.039, -0.030]	-0.044 [-0.047, -0.040]	-0.325 [-0.335, -0.315]	-0.153 [-0.161, -0.145]	0.148 [0.141, 0.155]	0.159 [0.154, 0.164]
				0.337	-0.074	-0.123	-0.321	-0.263	0.311	0.333
<i>E</i> _{Internalizing}				0.712 [0.711, 0.713]	-0.083 [-0.084, -0.083]	-0.070 [-0.071, -0.070]	-0.176 [-0.178, -0.175]	-0.057 [-0.058, -0.056]	0.093 [0.092, 0.094]	0.134 [0.133, 0.135]
				0.709	-0.178	-0.198	-0.174	-0.098	0.196	0.280
<i>A</i> _{LifeSatisfaction}					0.177 [0.173, 0.181]	0.036 [0.031, 0.042]	0.200 [0.190, 0.211]	0.098 [0.093, 0.104]	-0.023 [-0.028, -0.018]	0.032 [0.026, 0.037]
					0.378	0.102	0.198	0.169	-0.049	0.067
<i>D</i> _{LifeSatisfaction}					0.047 [0.044, 0.051]	0.017 [0.013, 0.020]	0.187 [0.176, 0.199]	-0.068 [-0.074, -0.061]	0.100 [0.090, 0.110]	-0.056 [-0.061, -0.051]
					0.101	0.047	0.185	-0.116	0.210	-0.117
<i>E</i> _{LifeSatisfaction}					0.313 [0.313, 0.314]	0.119 [0.118, 0.119]	0.158 [0.157, 0.160]	0.127 [0.126, 0.128]	-0.137 [-0.138, -0.136]	-0.118 [-0.119, -0.117]
					0.667	0.334	0.156	0.218	-0.290	-0.247
<i>A</i> _{Self-Esteem}						0.039 [0.029, 0.049]	0.101 [0.070, 0.131]	0.033 [0.021, 0.044]	-0.007 [-0.015, 0.001]	0.013 [0.002, 0.024]
						0.110	0.099	0.056	-0.015	0.028
<i>D</i> _{Self-Esteem}						0.009 [0.004, 0.014]	-0.028 [-0.055, -0.003]	-0.027 [-0.043, -0.011]	-0.050 [-0.076, -0.025]	-0.027 [-0.042, -0.014]
						0.024	-0.028	-0.047	-0.106	-0.058
<i>E</i> _{Self-Esteem}						0.226 [0.226, 0.227]	0.125 [0.123, 0.126]	0.078 [0.077, 0.079]	-0.094 [-0.095, -0.093]	-0.092 [-0.093, -0.091]
						0.636	0.123	0.134	-0.199	-0.192

Parameter	Openness	Conscientiousness	Neg. Life Events	Internalizing	Life Satisfaction	Self-Esteem	Self-Efficacy	Optimism	DSpre2	DSpre3
$A_{\text{Self-Efficacy}}$							0.000 [-0.043, 0.043]	0.000 [-0.011, 0.011]	0.000 [-0.008, 0.008]	0.000 [-0.014, 0.014]
							0.000	0.000	0.000	0.000
$D_{\text{Self-Efficacy}}$							0.000 [-0.027, 0.028]	0.000 [-0.016, 0.017]	0.000 [-0.025, 0.027]	0.000 [-0.013, 0.014]
							0.001	0.001	0.002	0.001
$E_{\text{Self-Efficacy}}$							0.702 [0.700, 0.703]	0.058 [0.057, 0.060]	-0.055 [-0.056, -0.054]	-0.014 [-0.015, -0.014]
							0.693	0.100	-0.116	-0.030
A_{Optimism}								0.000 [-0.010, 0.010]	0.000 [-0.005, 0.005]	0.000 [-0.012, 0.012]
								0.000	0.000	0.000
D_{Optimism}								0.000 [-0.016, 0.016]	0.000 [-0.021, 0.021]	0.000 [-0.013, 0.013]
								0.000	0.000	0.000
E_{Optimism}								0.459 [0.458, 0.460]	-0.065 [-0.066, -0.064]	0.031 [0.031, 0.032]
								0.788	-0.137	0.066
A_{DSpre2}									0.000 [-0.005, 0.005]	0.000 [-0.008, 0.009]
									0.000	0.000
D_{DSpre2}									0.000 [-0.017, 0.018]	0.000 [-0.009, 0.009]
									0.000	0.000
E_{DSpre2}									0.297 [0.297, 0.298]	0.028 [0.027, 0.029]
									0.627	0.058
A_{DSpre3}										0.000 [-0.008, 0.008]
										0.000
D_{DSpre3}										0.000 [-0.008, 0.008]
										0.000
E_{DSpre3}										0.307 [0.306, 0.307]
										0.643

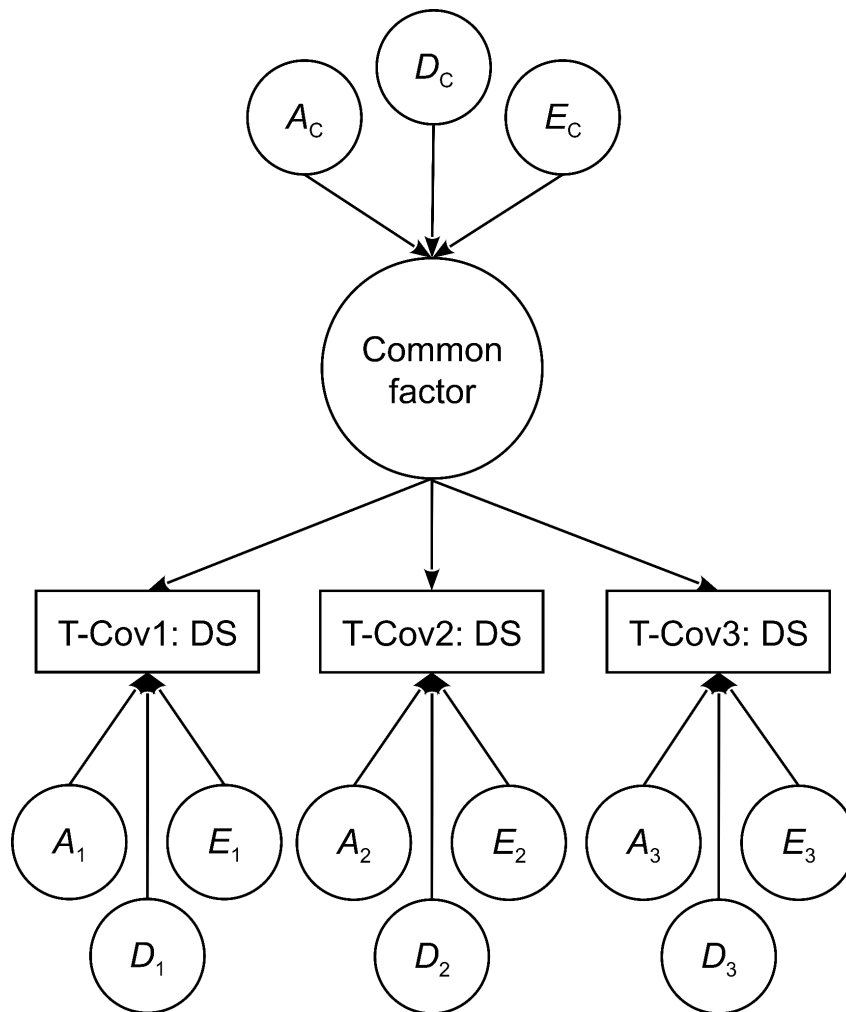
Note. Standardized estimates are bold-faced. Likelihood-based confidence intervals are shown in brackets. DSpre2,3 = depression symptoms at pre-pandemic measurements 2,3; Neg. = negative; Internalizing = internalizing problem behavior; A_x = additive genetic component of the subscript variable x ; D_x = non-additive genetic component of the subscript variable x ; E_x = unique environmental component of the subscript variable x .

Figure E2. Cholesky ADE Decomposition Model



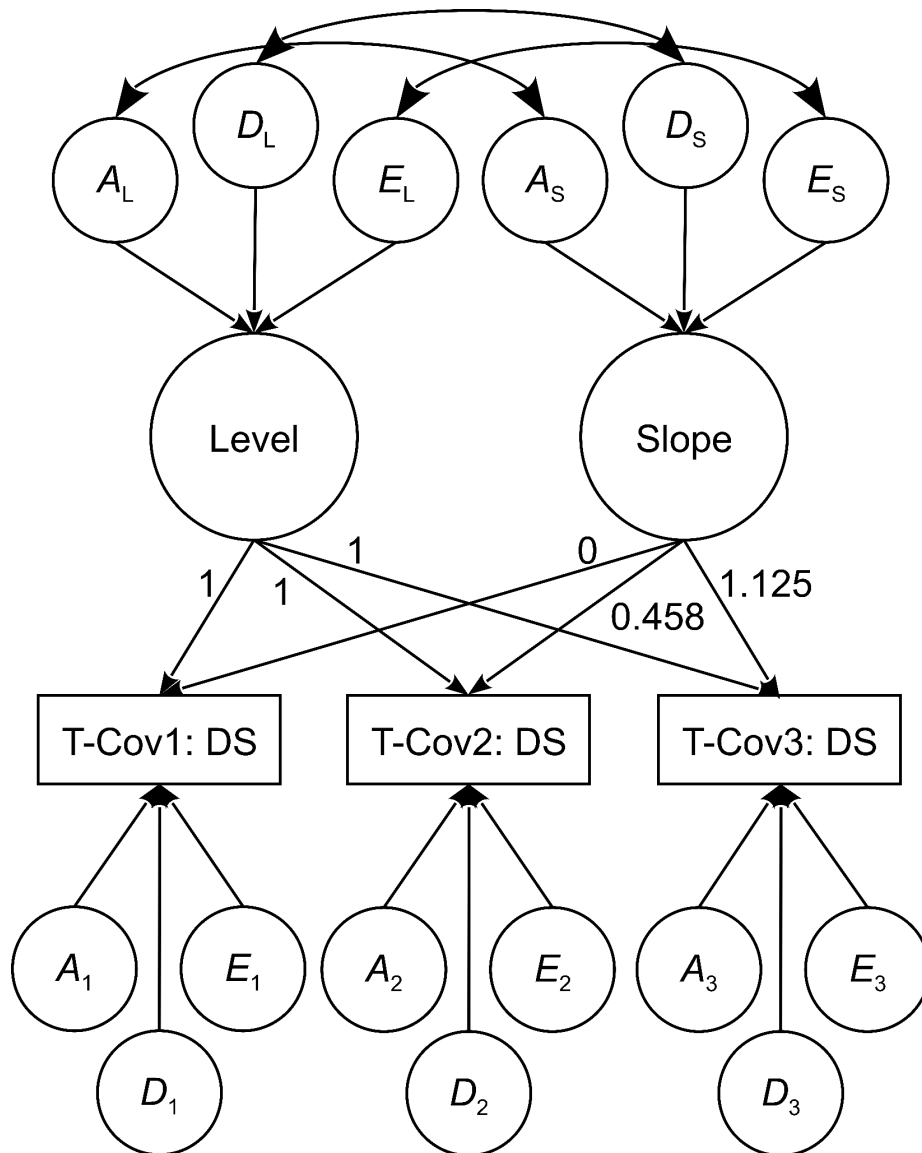
Note. A = additive genetic factor; D = non-additive genetic factor; E = unique environmental factor; T-Cov1/2/3 = pandemic measurement 1/2/3; DS = depression symptoms. Path parameters are omitted for readability.

Figure E3. Common Factor Model



Note. A = additive genetic factor; D = non-additive genetic factor; E = unique environmental factor; T-Cov1/2/3 = pandemic measurement 1/2/3; DS = depression symptoms. Path parameters are omitted for readability.

Figure E4. Genetically Informative Latent Growth Curve Model



Note. A = additive genetic factor; D = non-additive genetic factor; E = unique environmental factor; T-Cov1/2/3 = pandemic measurement 1/2/3; DS = depression symptoms. Fixed path parameters are shown, free path parameters are omitted for readability. Slope path parameters represent the mean amount of months passed after the reference point (5.5 and 13.5 months) divided by 12 (months).

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