6 Appendices

6.1 Software and replication

Code for replication, including instructions on how to import the panel data and run the code, is available at the following URL and on the website of Survey Research Methods. Instructions for accessing the necessary data is detailed in the ReadMe.md file in the replication documents.

https://osf.io/n4y6w/?view_only=18eb6d46900e4c7d84175042072ff1eb

The data used in this study for each panel is referenced in the bibliography and cited as follows: The Socio-Economic Panel (SOEP) (**liebig_socio-economic_2022**), German Internet Panel (GIP) (**ZA7878**), GESIS Panel (**gesis_gesis_2023**), Mannheim Corona Study (MCS) (**ZA7745**), German Family Demography Panel Study (FREDA) (**bujard_freda_2023**).

6.2 Supplementary items

This section provides additional details about this study. We provide descriptive statistics about each of the panel survey datasets (Figure (Appendix) 1, Figure (Appendix) 2, Table (Appendix) 1); details about the modeling (Table (Appendix) 2), details about our definition of nonresponse (Table (Appendix) 3), a data quality checklist (Table (Appendix) 4); and further results (Figure (Appendix) 3, Figure (Appendix) 4, Figure (Appendix) 5, Figure (Appendix) 6, Figure (Appendix) 7, Figure (Appendix) 8, Table (Appendix) 5, Table (Appendix) 6).

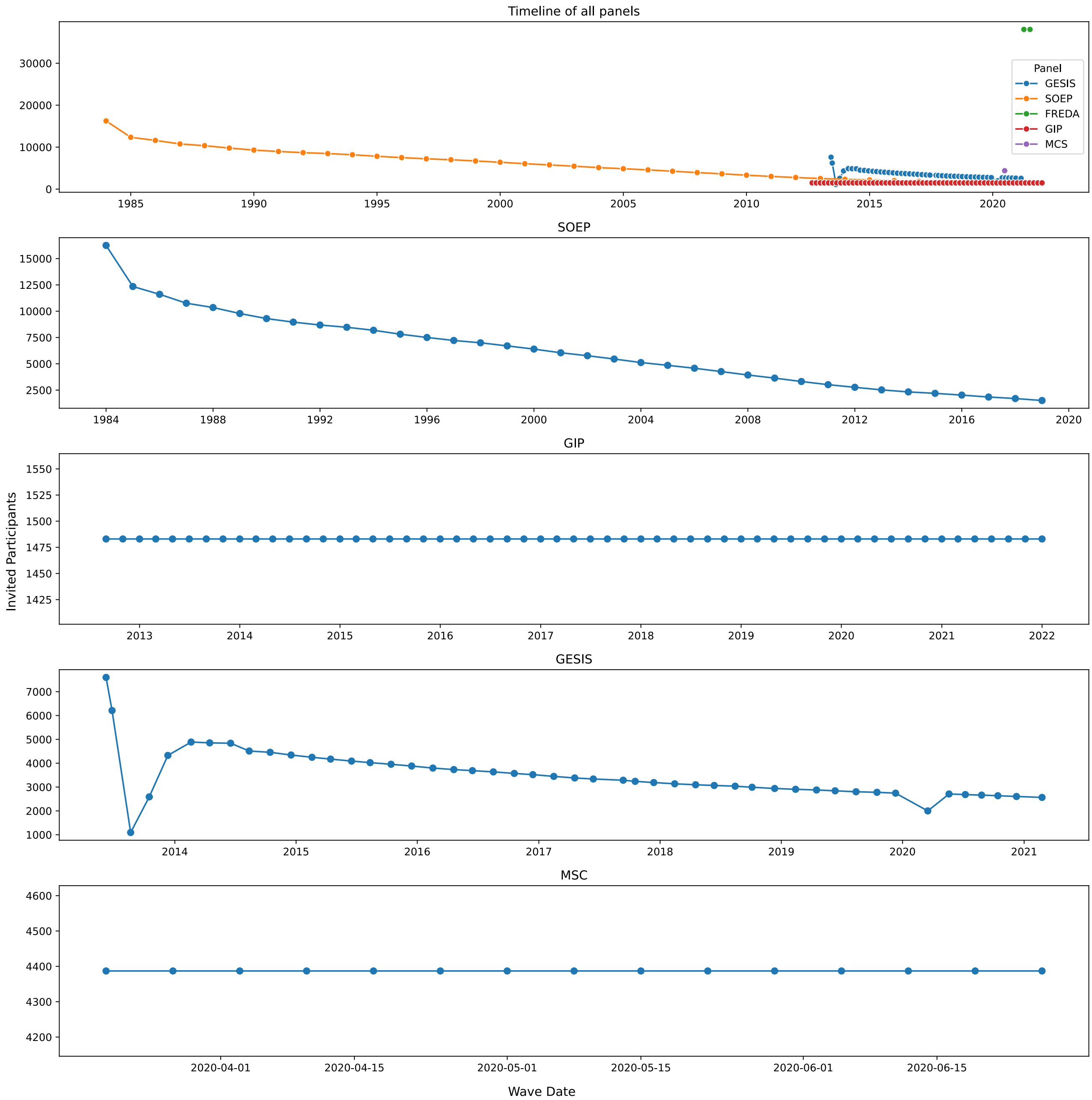

Figure (Appendix) 1. Timeline of the number of invited participants for each panel. Note that we include only those participants who were invited as of the first wave, so these values do not include any participants recruited since then. FREDA had only accumulated three waves by the time of this study, and 38,056 individuals were invited to each wave.

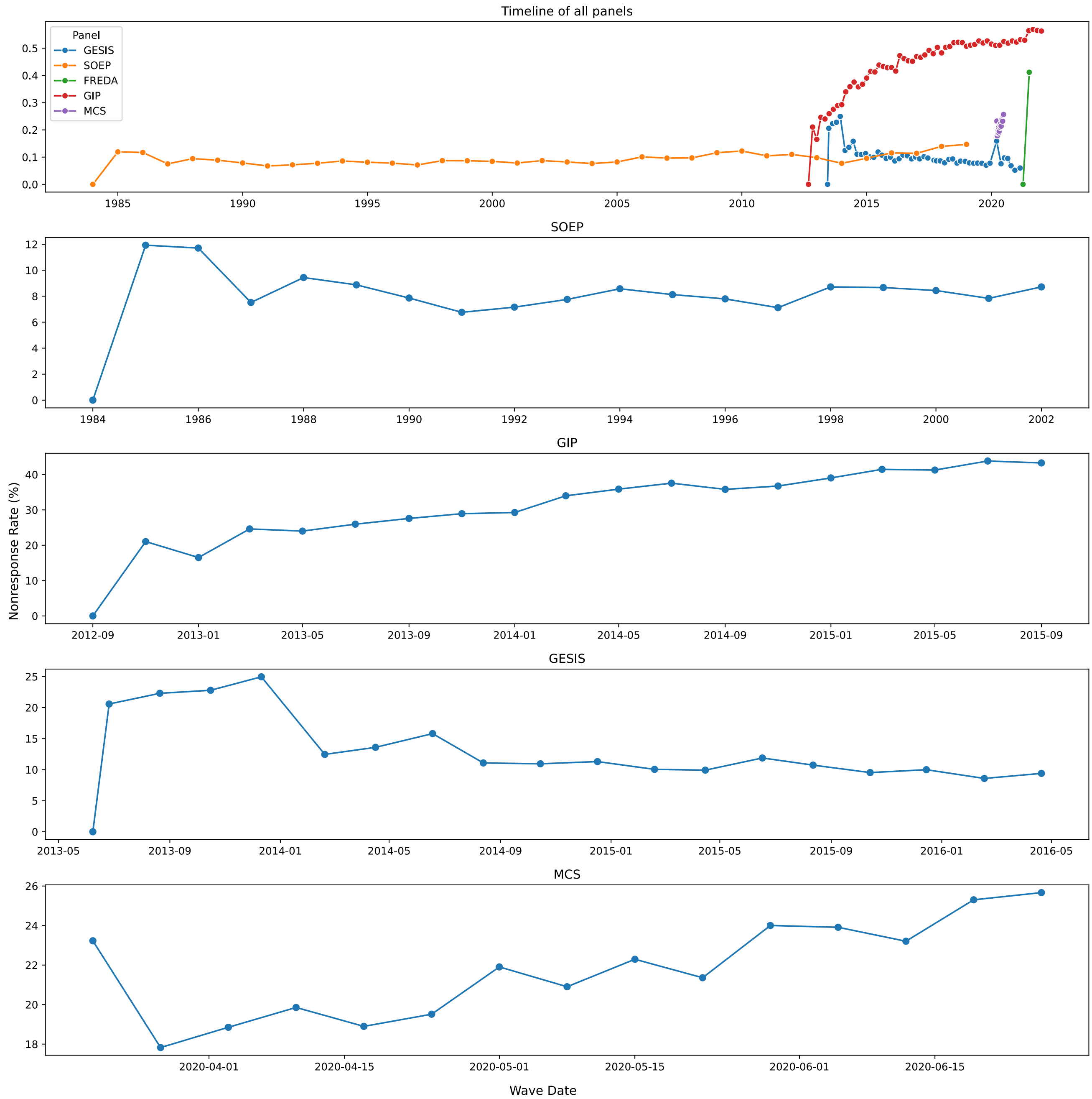

Figure (Appendix) 2. Timelines of each of the panels. FREDA is not included because only the first two waves are included in our analysis. The first wave has a nonresponse rate of zero because no nonrespondent data is retained. Nonresponse rates were 41% and 45% across the second and third FREDA waves.

Table (Appendix) 1

Distributions of predictive features across each panel

Variable	Value	SOEP	GIP	GESIS	MCS	FREDA
Age	mean	46.380	52.058	49.416	51.661	33.418
Age	std	18.409	15.605	14.632	15.862	10.161
Age	min	0.000	0.000	0.000	0.000	0.000
Age	max	102.000	87.000	78.000	85.000	68.000
Household Size	mean	2.957	2.530	2.622	2.354	2.897
Household Size	std	1.454	1.140	1.152	1.111	1.438
Household Size	min	1.000	0.000	0.000	0.000	0.000
Household Size	max	17.000	6.000	5.000	6.000	20.000
Household Income	mean	1,224.505	2,277.657	1,989.130	2,609.574	999.193
Household Income	std	1,658.368	1,784.550	1,624.572	2,043.399	2,765.467
Household Income	min	0.000	0.000	0.000	0.000	0.000
Household Income	max	29,000.000	7,500.000	6,000.000	7,500.000	250,000.000
Personal Income	mean	1,396.277	1,468.971	1,498.441	1,752.576	0.000
Personal Income	std	1,491.114	1,309.104	1,149.260	1,391.522	0.000
Personal Income	min	0.000	0.000	0.000	0.000	0.000
Personal Income	max	51,128.000	7,500.000	5,000.000	7,500.000	0.000
Invited Waves	mean	11.984	29.000	20.455	8.000	1.500
Invited Waves	std	8.984	16.452	13.529	4.321	0.500
Invited Waves	min	1.000	1.000	1.000	1.000	1.000
Invited Waves	max	36.000	57.000	48.000	15.000	2.000
Nonresponse This Wave	mean	0.084	0.438	0.104	0.218	0.206
Historic Nonresponse Rate	mean	0.025	0.330	0.059	0.207	0.103
Historic Nonresponse Rate	std	0.081	0.363	0.122	0.315	0.202
Historic Nonresponse Rate	min	0.000	0.000	0.000	0.000	0.000
Historic Nonresponse Rate	max	0.857	0.982	0.857	1.000	0.500
Is Married	mean	0.581	0.101	0.618	0.099	0.124
Missing Is Married	mean	0.000	0.005	0.000	0.002	0.000
Sex Female	mean	0.511	0.498	0.518	0.486	0.431
Missing Sex Female	mean	0.000	0.000	0.000	0.002	0.000
Is Unemployed	mean	0.395	0.355	0.305	0.333	0.017
Missing Is Unemployed	mean	0.000	0.006	0.001	0.017	0.000
Missing Age	mean	0.000	0.000	0.000	0.002	0.022
Missing Household Size	mean	0.000	0.007	0.000	0.028	0.020
Missing Household Income	mean	0.516	0.227	0.066	0.247	0.752
Missing Personal Income	mean	0.232	0.092	0.000	0.067	0.000
Missing Employment Status	mean	0.000	0.000	0.000	0.016	0.012

Table (Appendix) 2

Parameters we hypertune in the fitting process. "N settings" refers to the number of different settings for each hyperparameter. LBFGS: Limited-memory Broyden–Fletcher–Goldfarb–Shanno.

Model Type	Hyperparameter	Values	*N settings*
Logistic Regression	Penalty	L1, L2 Regularization, No Penalty	5
	Optimization solver	Liblinear for Penalized, LBFGS for Unpenalized	
	Fitting stopping tolerance	0.0001	
	C (applies to penalized)	0.5, 1	
Random Forest	Number of trees in the forest	50, 100, 500	3
	Function to measure split quality	Gini impurity	
	Minimum samples for a split	2	
	Minimum samples for a leaf	1	
	Number of features considered at each split	Square root of all features	
Gradient Boosted Classifier	Number of trees in the forest	50, 100, 500	3
	Function to measure split quality	Gini impurity	
	Minimum samples for a split	2	
	Minimum samples for a leaf	1	
	Number of features considered at each split	Square root of all features	

Table (Appendix) 3

For each panel, these are the types of responses or other information used to define a given case as a nonresponse.

Panel	Nonresponse if coded as
SOEP	Currently not available Cannot be found Explicit Refusal Currently not available Cannot be found Deceased
GIP	Implied when no response data for that participant is published
GESIS Panel	Nothing ever returned Explicit refusal Post: Attempted - Addressee not known at place of address Break-off: questionnaire too incomplete to process / break-off or partial with insufficient information Explicit refusal with incentive Known respondent-level refusal Logged on to survey did not complete any items Blank questionnaire mailed back implicit refusal Postal box full Implicit refusal Email Bouncer: Mailbox unknown Other person refusal Email Bouncer: Postbox full Death (including Post: Deceased) Email Bouncer: Delivery problem Physically or mentally unable/incompetent Post: Moved left no address Blank questionnaire with incentive returned Respondent language problem Explicit refusal no incentive Post: Undeliverable as addressed Post: No Mail Receptacle Refusal Blank questionnaire with no incentive returned Returned from an unsampled person Invitation returned undelivered (Email Bouncer)
MCS	Binary response/nonresponse variable
FREDA	No response Moved unknown Refused Not surveyable/deceased/permanently ill/not surveyable during field time

Table (Appendix) 4

PRICSSA Checklist (Seidenberg et al. 2023).

PRICSSA item	Description	Response
1.1 Data collection dates	Describe the survey's data collection dates (e.g., range) to provide historical context that could affect survey responses and nonresponse.	See Figure (Appendix) 1 and Figure (Appendix) 2.
1.2 Data collection mode(s)	Describe the survey's data collection mode(s). Data collection mode can affect survey responses (e.g., to sensitive questions), including nonresponse, and a survey's data collection mode may change over time (e.g., during the COVID-19 pandemic).	See Section 3.1.
1.3 Target population	State the target population the survey was designed to represent and describe all weighted estimates with respect to this target population.	See Table 1 and Section 3.1. We use only unweighted data.
1.4 Sample design	Describe the survey's sample design, including information about stratification, cluster sampling, and unequal probabilities of selection.	See Table 1 and Section 3.1.
1.5 Survey response rate(s)	State the survey's response rate and how it was calculated.	See Figure (Appendix) 2 and Table (Appendix) 3.
2.1 Missingness rates	Report rates of missingness for variables of interest and models, and describe any methods (if any) for dealing with missing data (e.g., multiple imputation).	See Table (Appendix) 1.
2.2 Observation deletion	State whether any observations were deleted from the dataset. If observations were deleted, provide a justification. Note: It is best practice to avoid deleting cases and use available subpopulation analysis commands no matter what variance estimation method is used.	We included only cases from the first recruitment wave to avoid any impact on model results caused by the introduction of fresh participants to the training data.
2.3 Sample sizes	Include unweighted sample sizes for all weighted estimates.	See Figure (Appendix) 1.
2.4 Confidence intervals/ standard errors	Include confidence intervals or standard errors when reporting all estimates to inform the reliability/precision of each estimate.	Significance tests are not applicable to our models, but instead, we provide predictive performance metrics (See Section 4).
2.5 Weighting	State which analyses were weighted and specify which weight variables were used in analysis.	Not applicable.
2.6 Variance estimation	Describe the variance estimation method used in the analysis and specify which design variables (e.g., PSU/stratum, replicate weights) were used.	Not applicable.
2.7 Subpopulation analysis	Describe the procedures used for conducting subpopulation analyses (e.g., Stata's "subpop" command, SAS's "domain" command).	Not applicable.
2.8 Suppression rules	State whether or not a suppression rule was followed (e.g., minimum sample size or relative standard error).	Not applicable.
2.9 Software and code	Report which statistical software was used, comprehensively describe data management and analysis in the manuscript, and provide all statistical software code.	See Section 6.1.
2.10 Singleton problem (as needed)	Taylor Series Linearization requires at least two PSUs per stratum for variance estimation. Sometimes an analysis is being performed and there is only a single PSU in a stratum. There are several possible fixes to this problem, which should be detailed if the singleton problem is encountered.	Not applicable.
2.11 Public/ restricted data (as needed)	If applicable, state whether the public use or restricted version of the dataset was analyzed.	See Section 6.1.
2.12 Embedded experiments (as needed)	If applicable, provide information about split sample embedded experiments (e.g., mode of data collection or varying participant incentives) and detail whether experimental factors were accounted for in the analyses.	Not applicable.

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6.3 Additional Results

Figure (Appendix) 3. Model performance over time, but with Recall instead of AUROC.

Figure (Appendix) 4. Model performance over time, but with Precision instead of AUROC.

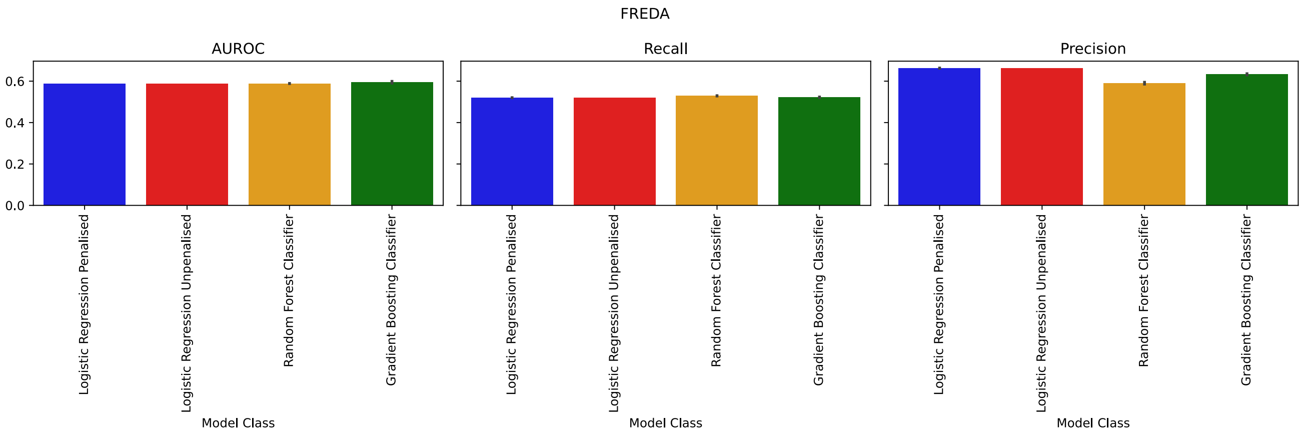

Figure (Appendix) 5. Performance metrics for the second wave of FREDA for which we can make predictions with a model trained on the first FEDA wave.

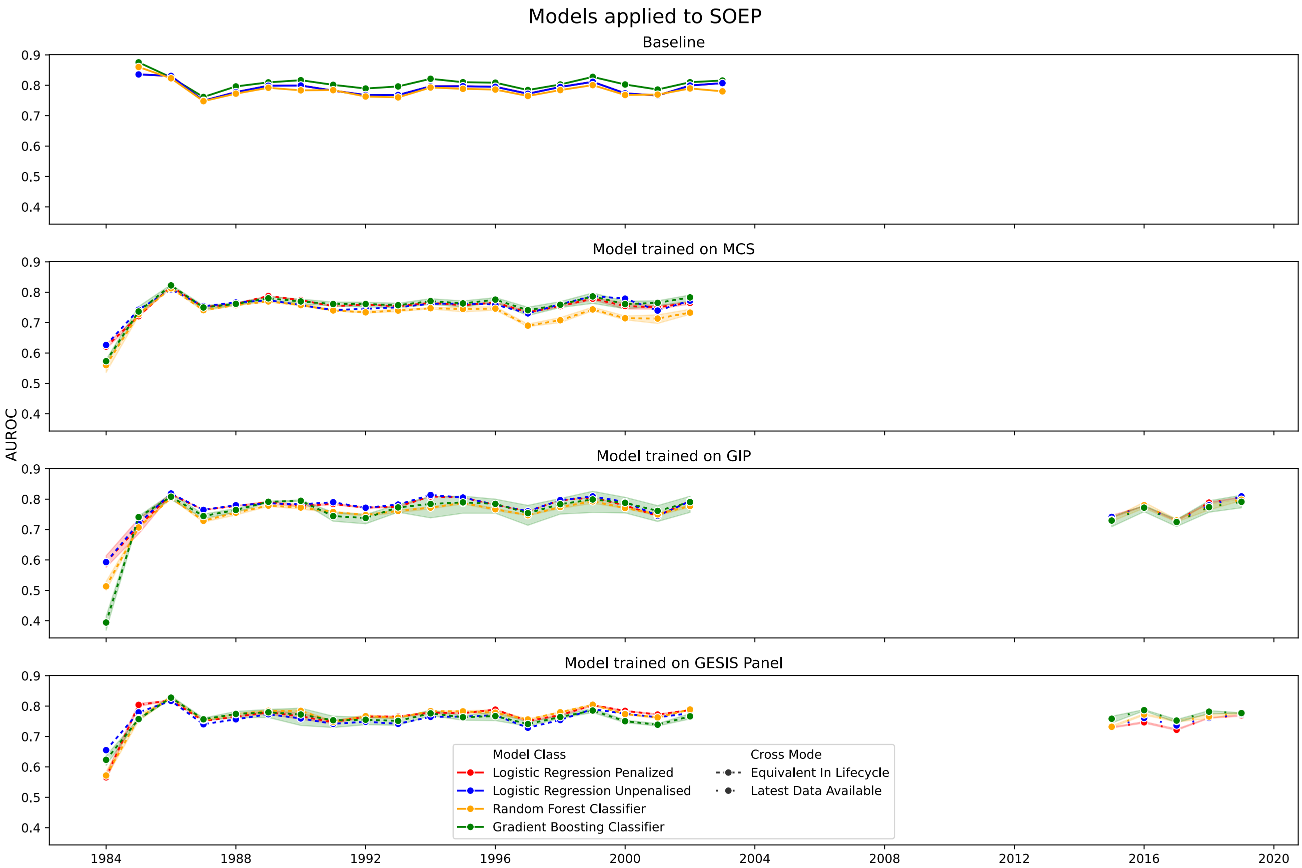

Figure (Appendix) 6. Models trained on other surveys but applied to the SOEP Panel. The 'Baseline' subplot shows performance results when models are trained using training data of the same panel as the target wave. Auras around the lines indicate the range of performance values across different hyperparameter settings.

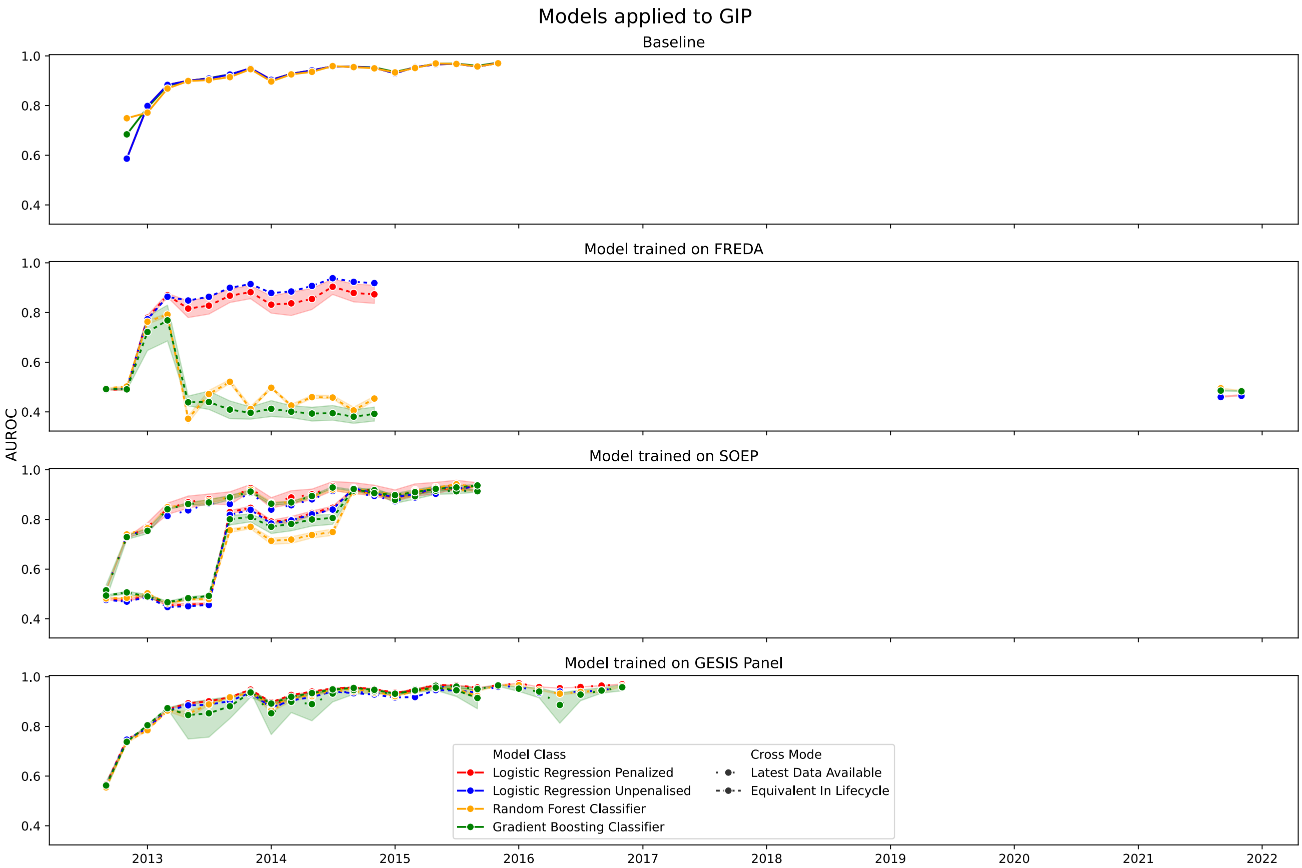

Figure (Appendix) 7. Models trained on other surveys but applied to the GIP Panel. The 'Baseline' subplot shows performance results when models are trained using training data of the same panel as the target wave. Auras around the lines indicate the range of performance values across different hyperparameter settings.

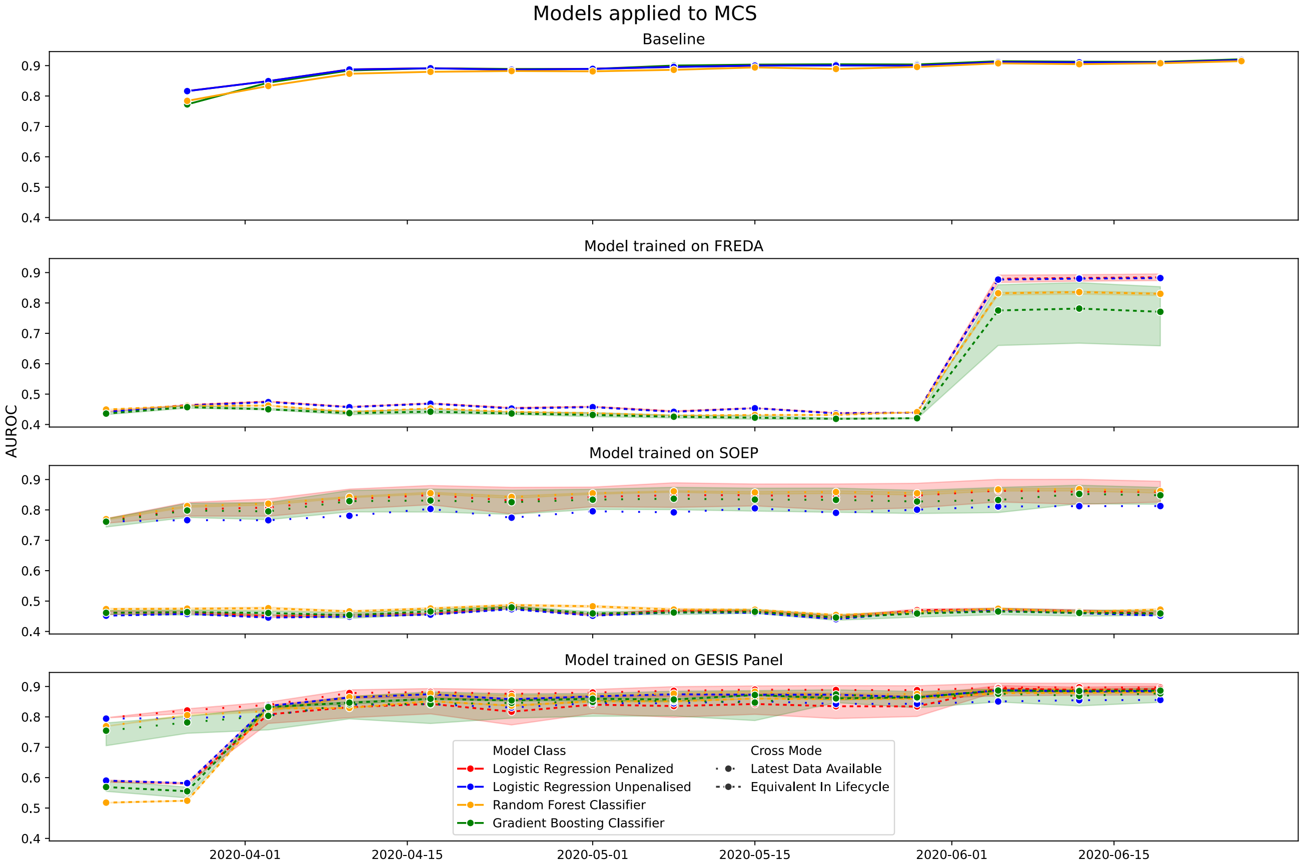

Figure (Appendix) 8. Models trained on other surveys but applied to the MCS. The 'Baseline' subplot shows performance results when models are trained using training data of the same panel as the target wave. Auras around the lines indicate the range of performance values across different hyperparameter settings.

Table (Appendix) 5

Models trained on other surveys but applied to FREDA Panel. Part one: Latest Data Available method.

Cross Mode	Test Wave	Model Class	Train Data	AUROC
Baseline	7/07/2021	Gradient Boosting Classifier	-	0.60
		Logistic Regression Penalised	-	0.59
		Logistic Regression Unpenalised	-	0.59
		Random Forest Classifier	-	0.59
Equivalent In Lifecycle	7/04/2021	Gradient Boosting Classifier	GESIS Panel	0.51
			GIP	0.49
			MCS	0.50
			SOEP	0.53
		Logistic Regression Penalized	GESIS Panel	0.53
			GIP	0.52
			MCS	0.49
			SOEP	0.51
		Logistic Regression Unpenalised	GESIS Panel	0.49
			GIP	0.52
			MCS	0.50
			SOEP	0.51
		Random Forest Classifier	GESIS Panel	0.51
			GIP	0.51
			MCS	0.51
			SOEP	0.54
	7/07/2021	Gradient Boosting Classifier	GESIS Panel	0.87
			GIP	0.80
			MCS	0.86
			SOEP	0.74
		Logistic Regression Penalized	GESIS Panel	0.88
			GIP	0.88
			MCS	0.87
			SOEP	0.57
		Logistic Regression Unpenalised	GESIS Panel	0.88
			GIP	0.88
			MCS	0.87
			SOEP	0.53
		Random Forest Classifier	GESIS Panel	0.87
			GIP	0.86
			MCS	0.86
			SOEP	0.75

Table (Appendix) 6

Models trained on other surveys but applied to FREDA Panel. Part two: Equivalent In Lifecycle.

Cross Mode	Test Wave	Model Class	Train Data	AUROC
Latest Data Available	7/04/2021	Gradient Boosting Classifier	GESIS Panel	0.51
			GIP	0.51
			MCS	0.49
			SOEP	0.49
		Logistic Regression Penalized	GESIS Panel	0.49
			GIP	0.51
			MCS	0.48
			SOEP	0.51
		Logistic Regression Unpenalised	GESIS Panel	0.49
			GIP	0.51
			MCS	0.49
			SOEP	0.51
		Random Forest Classifier	GESIS Panel	0.51
			GIP	0.53
			MCS	0.53
			SOEP	0.50
	7/07/2021	Gradient Boosting Classifier	GESIS Panel	0.87
			GIP	0.87
			MCS	0.86
			SOEP	0.87
		Logistic Regression Penalized	GESIS Panel	0.86
			GIP	0.88
			MCS	0.87
			SOEP	0.87
		Logistic Regression Unpenalised	GESIS Panel	0.86
			GIP	0.87
			MCS	0.87
			SOEP	0.87
		Random Forest Classifier	GESIS Panel	0.87
			GIP	0.87
			MCS	0.86
			SOEP	0.87