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Introduction to the Fundamentals of Panel Data
Prof. Dr. David Richter
Summersemester 2022

Open - Social - Happy?
How does personality influence the effect of social activity on mental health

Research Report
by
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Contents

1 Motivation and Hypothesis

1.1 Mental Health - A rising challenge

In the past decades, mental health has become a growing concern across the world. Historically, the research, diagnosis and treatment of mental health conditions has drastically lagged behind corresponding efforts made to tackle physical health conditions. More recently, awareness for the challenges mental disorders pose has risen, however investment in both research and treatment still lags behind the investments made to tackle physical disorders.

However, mental health conditions do have a massive impact on both individuals and societies. In 2007, the costs of depression and anxiety disorders alone have created estimated costs of 136.3 billion Euro within the EEA (European Economic Area) [9]. In 2010, the total costs of mental disorders - both direct and indirect - were estimated at 2.5 trillion US$ (EU 798 billion Euro) and are expected to grow exponentially in the next decades [18]. In 2013, Mental disorders accounted for 11 % of DALYs (Disability Adjusted Life Years) lost, a sharp increase over the 7.8 % estimate in 2010 [3]. In middle- and high-income countries, more than half of the population will be affected by a mental disorder at least once during their lifetime [18]. These numbers stand in sharp contrast to the low amount of spending on mental health conditions. For example, in 2015, only 2.4 % of government health spending in the Americas went towards mental health, despite it causing 19 % of DALYs lost in the same year across the continents [19]. To address this huge mismatch between the size of the problem and the resources allocated for tackling it, in 2015 the United Nations added mental health as one of the key challenges when they released the new set of SDGs (Sustainable Development Goals), signalling that the global mental health crisis requires more attention from governments all around the world [20].

Over the course of the last two years, both academic as well as clinical discussions around mental health have gained a new momentum as multiple studies are showing significant increases in mental health conditions globally connected to the Covid-19 pandemic. In their 2022 World Mental Health Report, the WHO (World Health Organization) concluded that in the first year of the pandemic alone the number of depression and anxiety cases rose by more than 25 % [13]. According to the WHO, this is caused by a number of factors, such as "fear of contracting the virus", "significant changes to our daily lives" due to movement restrictions, "working from home, temporary unemployment, home-schooling of children and lack of physical and social contact with family members, friends and colleagues" [12]. The CovSocial Project by the MPG (Max Planck Gesellschaft) and BUA (Berlin University Alliance) which conducted a survey among a representative sample of the population in Berlin concluded that the levels of depressiveness, loneliness, anxiety and stress increased sharply during the first lockdown in 2020, recovered somewhat in summer 2020 and - for stress, loneliness and depressiveness - reached their peaks during the second lockdown from November 2020 on-wards [17]. In their report, the authors mentioned loneliness and a decrease in social contacts and cohesion caused by Covid-19 mitigation measures imposed by governments as well as self-imposed protection measures from the virus as some of the main causes for these increases. This is not surprising, as the importance of social interactions for mental health is well established in research literature [6] and in general a higher level of social activity is associated with a higher level of mental health.

1.2 A question of personality

One key challenge for research and treatment is that - in contrast to many physical health conditions - mental health conditions are not visible from the outset and can manifest in many different forms in different people. Therefore, an individualized approach to diagnosis and therapy is required based on the personality of patients. This is one of the drivers of many new mental health smartphone applications that have entered the market in the last couple of years [5] - however, many are based on a questionable scientific basis. One common, scientifically accepted way to describe people's personalities is the Big Five inventory. As the name suggests, it is comprised of five continuous scales (Extraversion, Agreeableness, Conscientiousness, Openness and Neuroticism) and has been introduced in order to reduce and standardize the number of variables in personality research while at the same time covering as much individual diversity as possible.

In repeated studies, these personality traits have been associated with mental health events or outcomes. High levels of Extraversion, Agreeableness, Conscientiousness and Openness are generally associated with higher levels of mental health (or less serious mental health events), while Neuroticism shows opposite trends [7] [1].

In addition to this, some personality traits are also associated with social behaviour, as they contain items measuring sociability or social skills. All three items included to measure Extraversion correspond to social activity (being communicative, being out-going and not being reserved). The items for Agreeableness (esp. being respectful) can also be considered social items, while Openness and Conscientiousness contain no special social aspects. For Neuroticism it could be argued that some of the items contributing positively to that scale are rather detrimental to strong social life [14] [16]. An overview over all items included in each personality trait is shown in figure 10 in the supplemental.

As social interactions are shown to increase the level of mental health, one intervention strategy to treat or mitigate mental health conditions is based on increasing social activities (e.g. through social skills therapy) [2]. While the research mentioned above shows that - in general and not just during pandemics - an increased level of social activity is positively correlated with better mental health outcomes, people with different personalities might react differently to such an intervention strategy. The goal of this research paper is to assess, whether different social- and non-social activities show different or opposing effects based on different personality traits. Smoking and drinking behaviours will also be modelled as they can be considered social activities and have been associated with mental health before. If those differences could be observed, it would suggest that taking into account personality traits when choosing intervention strategies could be a promising step to individualize and improve therapy for mental health conditions.

2 Methods

In this study, the influence of smoking, alcohol and a range of behaviours on the mental health are assessed in individual models, while controlling for age, sex, wealth and physical health. Both age and sex have a clear impact on mental health, as can be seen in figure 2b. Both wealth [4] and physical health [11] have also been reported to influence mental health. Within and between subject modelling was explored, the choice was made to model between subjects as both the Big Five scales as well as the categorization of the behavioural items remained quite consistent over time and not a lot of variation in the behaviour of individuals between survey years could be observed.

To assess potential differences in the effect size and direction between different personality traits,

individual models were run on stratified sub-populations. For each test item or scale, POLS (Pooled Ordinary Least Square) regressions were run on the whole population. In addition, for each personality trait, an individual model was run with the data from the 20 % sub-population with the lowest and the 20 % sub-population with the highest score on each respective trait as well as the remaining 60 % of the population. All five personality traits were added as controls when the model was run on the entire population, on the stratified populations the personality trait for which the stratification was performed was removed as a control variable.

If not otherwise specified, all analyses were run as Python scripts, some of the pre-processing was performed with Stata.

3 Data and Pre-processing

All data used for models in this analysis is part of the SOEP Core v37 dataset, which covers survey data for a representative sample in Germany from 1984-2020 [8]. Here, short descriptions for the items and scales included in this paper will be provided. The years for which data is included in the models might differ from the years for which data is available as only those years are included for which data is available for all relevant items.

3.1 Big Five Scales

The Big Five scales to be used in this study are constructed from a total of 15 items from the BFI-S (Big Five Inventory - Short) questionnaire, in which each personality trait is the summary scale of three items [14] [16]. The items of the BFI-S questionnaire have been included in the panel study for the first time in 2005 as well as 2009, 2013, 2017 and 2019. From 2009 on-wards, a forth item (eager for knowledge) was included in the Big Five calculation of Openness. As data for this item was not available for 2005, it was omitted for all survey years to keep the Openness scale comparable.

The Big Five summary scales were created using a Stata script. Each of the five personality traits shows a distinct and typical distribution repeating itself in each of the five survey year. The combined distribution of the Big Five personality scales can be seen in figure 1.
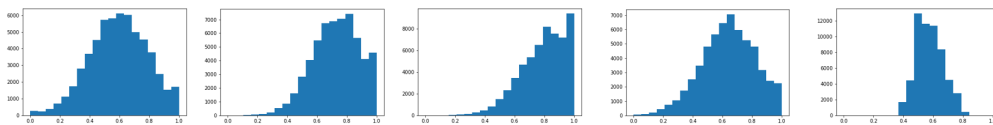
Figure 1: Aggregated distributions for all five survey years, from left to right: Openness, Agreeableness, Conscientiousness, Extraversion, Neuroticism

3.2 Mental and Physical Health Data

In the SOEP panel study, data on mental and physical health is collected through the SF12 questionnaire since the year 2002. This part of the panel is included every 2 years. SF12 is comprised of 12 questions covering the participants' health-related quality of life. Of these questions, 4 are used to create a mental (mcs) and the remaining ones are used to create a physical component scale (pcs) as described in the manual by DIW / SOEP [10]. Both mcs and pcs are originally scaled between 0 and 100, in for modelling they are re-scaled between 0 and 1. Figure 2a displays the

aggregated distributions of the mcs, figure 2b the development of the mcs based on the age of the survey participants, stratified by sex. This shows that the mcs is strongly influenced by both sex and age, therefore both of these variables will be included as control variables. Women across all ages display a lower self reported mental health level compared to men. While a slightly lower level of self reported health for women is also true for physical health, mental health seems to increase for both women and men just before entering retirement age, while physical health is on a continuous downward trend with increasing age, as shown in figure 3.
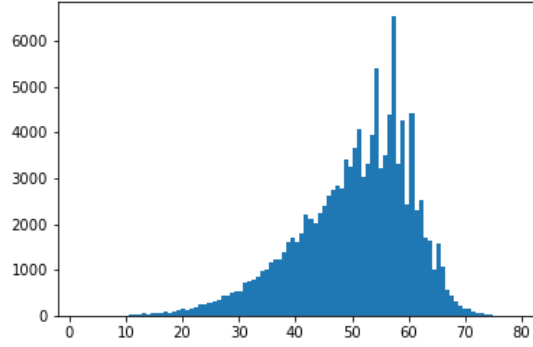
(a) Aggregated distribution of the mcs for all nine survey years on a scale between 0 and 100
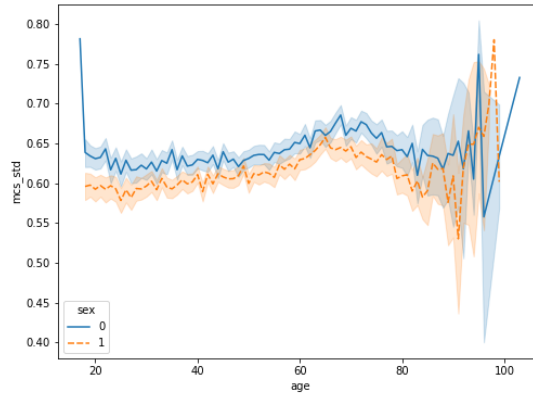
(b) The mean and standard deviations of the mcs stratified by sex and based on the age of the survey participants. Women shown in orange, men shown in blue

Figure 2: The Mental Health Component Scale

3.3 Further Control Variables

As mentioned in the Methods section and in addition to age, sex and pcs, the wealth of the participants is also included as a control variable. For this, item **pl/w0111a** is used, which represents the self-reported net wealth of participants. This data is available for the years 2002, 2007, 2012 and 2017. Values below $-100,000$ and above $500,000$ Euro have been omitted from the analyses as they can be considered outliers due to their low numbers (126, 1612 respectively). Figure 4 displays the wealth distribution among the panel study participants between $-100,000$ and $500,000$ Euro.

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Figure 3: The mean and standard deviations of the physical health component scale stratified by sex and based on the age of the survey participants. Women shown in orange, men shown in blue
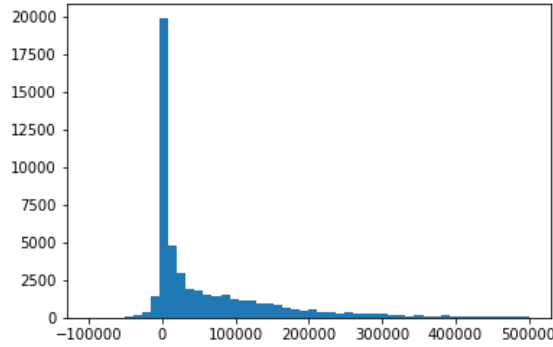
Figure 4: Aggregated wealth distribution for all four survey years between, only values between $-100,000$ and $500,000$ Euro shown

3.4 Consumption Data

As both smoking behaviour as well as alcohol consumption have been linked to mental health outcomes and both can in certain situations be considered social activities, models with these items as independent variables (IV) were fitted.

Smoking

For smoking, the item **ple0081_v2** was included. This asks the participants "Do you currently smoke?" It, however, does not consider the frequency of smoking or the type of tobacco products involved. Data for this item was available for the years 2006, 2010, 2014, 2018 and 2020. The item was recoded to a True / False encoding. An initial look at this item suggests a lower level of mental health among smokers in almost all age groups, as can be seen in figure 5.

Alcohol consumption

For alcohol consumption, a total of four items were polled in the SOEP. **ple0090, ple0091, ple0092, ple0093** represent beer, wine/champagne, spirits and mixed drinks consumption respectively. These questions were included into the questionnaire only in the years 2006, 2008 and 2010. The participants were given four possible answers (regularly, once in a while, seldom or never), which
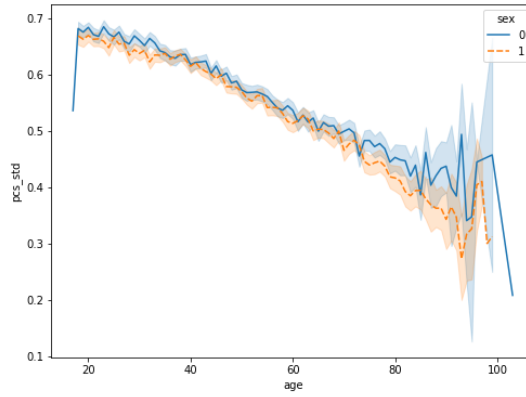
Figure 5: The mean and standard deviations of the mental health component scale, stratified by smoking status based on the age of the survey participants. Smokers shown in orange, Non-smokers shown in blue
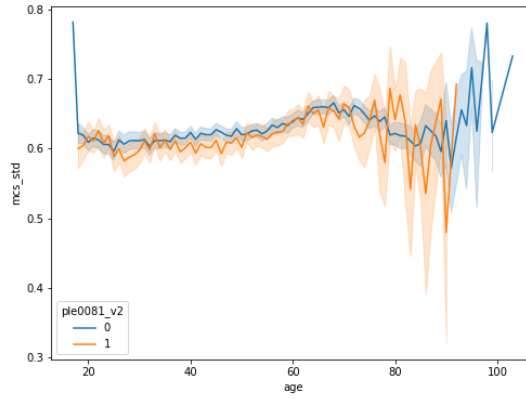
were recoded to 3, 2, 1 and 0. Models were run for spirits and mixed drinks items individually, while the beer and wine/champagne consumption was combined to a summary scale of alcohol which can be legally sold to 16 year old youth in Germany. A model was also run on a combined summary scale of all four items. The summary scales were created using a Stata script.

3.5   Activities Data

To assess the impact of social and non-social activities on mental health levels, a total of 17 further items was analyzed. Not all of these items have been included into the SOEP questionnaire at the same time, an overview over all of them including the years in which they were available to fit the models can be found in table 1 in the results section. An overview over the years in which the questions were included in the questionnaire is given in table 2 in the supplemental section. Participants were asked about the frequency in which they would participate in those activities, the options to answer - daily, weekly, monthly, less frequent, never - were recoded to 4, 3, 2, 1 and 0 respectively.

4   Results

In this section, the results of the modelling will be presented. As described in the Methods section above, a total of 16 models is run for every item / scale. For each model, the total number of datapoints is given. Please note that in the stratified models, the actual number of data points will be only 20 % (for the populations that are on the high / low end for each personality trait) or 60 % (for the remaining population) of the indicated number of datapoints. Therefore effects in sub-populations are often non-significant even as there was a significant effect in the total population.

4.1   Alcohol consumption

In the models for alcohol consumption, only the years 2006 and 2010 were included, as only for those years personality trait data was available in sufficiently close years (2005 and 2009). Four individual items / scales were modelled using a total of 14,320 datapoints. The summary scale of all

four items, the summary scale of the beer, wine and champagne consumption (legal from 16 years of age) as well as the item of spirit consumption were all significantly positively associated with better mental health. For both spirits consumption and the combined scale, this effect turned negative in the sub-population with high Openness, on the combined scale it additionally turned negative in the sub-population with high Extraversion. All of these diverging effects were non-significant. The item of mixed drinks consumption is significantly negatively associated with better mental health, this effect was consistent throughout all sub-populations apart from the one with high neuroticism. The slightly positive effect there was also non-significant. A detailed overview over the coefficients of the models on alcohol consumption is given in figure 6.

4.2 Smoking

To analyze the relationship between smoking behaviour and mental health, data was included for the years 2006, 2010, 2014, 2018 and 2020. This resulted in a total of 41,974 datapoints. Two different modelling approaches were chosen.

In one approach, all datapoints were used to fit a POLS models following the same approach as was used in the modeling of alcohol consumption. This showed a significantly negative effect of smoking on mental health. This effect was negative throughout all the stratified sub-populations, only two of those were non-significant. The coefficients of this model are presented in figure 7. This is in line the lower level of mental health in smokers as compared to non-smokers which was clearly visible in figure 5.

 In the second approach, only those datapoints were included for which the smoking status changed in two subsequent survey years. All other datapoints were removed from the analysis and two individual models were run to analyze changes in mental health as people start or stop smoking. This reduced the number of datapoints included in the models, as only 1,179 participants started smoking, while 2,138 participants stopped smoking during the SOEP in the indicated years. The coefficients of both starting and stopping to smoke were positive for the whole population. However, due to the small sample size, none of the coefficients in the starting models reached statistical significance. For the stopping models, the overall effect in the whole population as well as in some sub-populations was statistically significant. Due to the encoding (1 being smokers, 0 non-smokers), the positive effects in this model mean that stopping to smoke is negatively associated with mental health - or in other words - associated with a decrease in mental health levels. All effects and coefficients for both models are presented in figure 8.

The fact that starting to smoke improves mental health while stopping to smoke does the opposite seems counterintuitive to the more robust effect presented above where smoking is negatively associated with mental health. It is important to note that the sample sizes of smoking status changes as compared to the general smoking status are smaller by a magnitude of 40 and 20 respectively. Therefore, even though the effect for stopping to smoke reached statistical significance, these effects should be interpreted very cautiously. The non-significant positive effect of starting to smoke on mental health could be a sign that people who start to smoke do so in order to decrease an already high level of stress which might decrease in the following years - either by natural fluctuation or as a placebo effect. The negative effect of stopping to smoke might be associated to an increased level of stress caused by withdrawal symptoms as people try to avoid a relapse.

4.3 Activities

As previously mentioned, not all of the 17 questions on the frequency of performed activities were polled in every survey year. This results in the number of datapoints ranging between about 30,000 if four years (2003, 2008, 2013 and 2019) and about 8,600 if only one year (2019) of polling data is available. All activities have also been classified as to whether they can be considered "social" activities. The distinction between which activity is considered "social" is not always easy to draw and other classifications are certainly possible. Here, a total of seven activities are clearly considered social activities, three are potentially considered social, two are social but virtual and four are classified as non-social activities.

The exact number of datapoints, the years for which data was available, the aforementioned classification as well as the POLS coefficient for the combined model are presented in Table 1. The models were run with exactly the same control variables as the smoking and alcohol consumption models, for reasons of simplicity only the coefficients of the described activities on the mcs are given. All activities considered social have a significantly positive effect on mental health. This confirms the assumption that people who are participating in social activities more often tend to have better mental health. Statistically significant positive associations with mental health levels were also observed for going on excursions or short trips (which here was considered a potentially social event) as well as for the private consumption of motion pictures and books (considered non-social). Non-significant positive effects were observed for going to religious events, reading newspapers, doing housework and just doing nothing. Both of the virtual social activities trended negatively, however none reached statistical significance. The same applies to artistic and musical activities.

In Figure 9, the effects for the models fitted on the stratified sub-populations are presented. Again, only the effects of the activities on mcs are included, effects for control variables are not shown. Notably, for all activities, for which the overall effect on mental health was significant and positive, all the models run on the sub-populations also showed positive effects (apart from one diverging value in the population with low Agreeableness and going to sporting activities). Also, only the effects for *pli0181* "keeping in touch with friends and relatives abroad" were consistently non-significant. For the other activities, for which the effect in the combined population was non-significant, there were significant effects in some sub-populations. However, in most cases, these significant coefficients had the same direction as the coefficient from the total population. A notable exception to this is *plh0394* "Just doing nothing, dreaming, chilling". The non-significant total effect is positive, while the effects for 5 sub-populations (high Openness, high and low Conscientiousness, low Neuroticism and high Agreeableness) are negative. Out of these, only the effect for high Conscientiousness is significant. In all the other activities, in which both positive and negative effects were observed, there was a clear trend towards either a positive or negative effect. There was no activity, for which similar numbers of positive and negative effects were observed. Those outlier effects could be statistical artefacts caused by the smaller sample sizes in the sub-populations, they could also be indicative of a real difference in how certain activities affect mental health in people with different personality traits. These results can provide a first guidance as to which personalities and which activities are worth taking a closer look at in future research projects.

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	const	open	cons	extra	neuro	agree	sex	age	alcohol_combined	wealth_std	pcs_std
combined	0.75855	0.0055	0.06584	0.03186	-0.46175	0.06077	-0.01095	0.00032	0.007880172	0.048262966	-0.02978
open_low	0.70594		0.07977	0.04656	-0.45083	0.06494	-0.01454	0.00022	0.017257333	0.053884285	0.01473
open_high	0.76279		0.03752	0.0468	-0.43629	0.07863	-0.01047	0.00078	-0.002035606	0.047542367	-0.07719
open_normal	0.78538		0.06362	0.02306	-0.4705	0.0553	-0.00928	0.00028	0.006487613	0.044707305	-0.03656
cons_low	0.7959	0.03405		0.05595	-0.50473	0.04949	-0.01103	3.8E-05	0.000132881	0.072580975	-0.00064
cons_high	0.78323	0.00305		0.01768	-0.43238	0.06868	-0.00495	0.00052	0.007120832	0.075921621	-0.01363
cons_normal	0.81295	0.00149		0.03209	-0.46433	0.06777	-0.01218	0.00042	0.009318282	0.038088494	-0.03773
extra_low	0.79485	0.01523	0.0894		-0.52761	0.04531	-0.00991	-2.4E-05	0.010347173	0.062455081	-0.00629
extra_high	0.85777	0.01542	0.00068		-0.43433	0.03245	-0.0165	0.00086	-0.00270058	0.046860059	-0.08013
extra_normal	0.76771	0.00373	0.07038		-0.45834	0.07267	-0.00924	0.00032	0.008942144	0.043434035	-0.0309
neuro_low	0.61464	0.01975	0.06065	0.02051		0.03123	-0.00677	0.00042	0.000361134	0.046584307	-0.09503
neuro_high	0.38634	-0.00621	0.07566	0.07032		0.06262	-0.00854	0.00016	0.020407078	0.067852359	-0.01383
neuro_normal	0.46703	0.00829	0.06779	0.03506		0.07805	-0.01933	0.00041	0.004563681	0.04813769	-0.00759
agree_low	0.77499	-0.00185	0.06357	0.057	-0.4816		-0.01299	0.00037	0.01005676	0.049298459	-0.00282
agree_high	0.80713	0.0102	0.07267	0.02249	-0.41782		-0.00807	4.1E-05	0.00322303	0.06607751	-0.0351
agree_normal	0.80897	0.00765	0.07221	0.02623	-0.4776		-0.00951	0.00039	0.007793452	0.042962585	-0.034

(a) Relation between the **summary scale of all 4 alcohol consumption items** and the **mental health component scale**

	const	open	cons	extra	neuro	agree	sex	age	alcohol_16	wealth_std	pcs_std
combined	0.75914	0.00497	0.06552	0.03131	-0.46122	0.06138	-0.00946	0.00028	0.009129091	0.044941552	-0.03386
open_low	0.70832		0.07638	0.04547	-0.45011	0.0666	-0.01188	0.00014	0.017663502	0.04830843	0.00945
open_high	0.75917		0.03874	0.04602	-0.43627	0.07941	-0.00962	0.00078	0.001173125	0.045757579	-0.0784
open_normal	0.78592		0.06387	0.0224	-0.47033	0.05566	-0.00792	0.00024	0.007681806	0.041877504	-0.04052
cons_low	0.79623	0.03326		0.05473	-0.50644	0.05012	-0.00936	1.5E-05	0.004477012	0.069167423	-0.00545
cons_high	0.78055	0.0032		0.01763	-0.43082	0.0691	-0.00322	0.0005	0.009129672	0.072191007	-0.01756
cons_normal	0.81409	0.00073		0.03134	-0.46388	0.06819	-0.01067	0.00037	0.010039665	0.034630303	-0.04173
extra_low	0.79736	0.01452	0.08881		-0.52805	0.04553	-0.00817	-7.4E-05	0.010230432	0.058021535	-0.00992
extra_high	0.85033	0.01534	0.00326		-0.43448	0.03391	-0.01447	0.00085	0.003390203	0.042992825	-0.08373
extra_normal	0.76856	0.00323	0.06969		-0.45728	0.07308	-0.008	0.00027	0.009480892	0.040504072	-0.03486
neuro_low	0.61311	0.01982	0.06048	0.02014		0.03213	-0.00617	0.00041	0.002104509	0.045664871	-0.09624
neuro_high	0.39232	-0.00592	0.07432	0.06944		0.06219	-0.00655	6E-05	0.01826311	0.062477944	-0.01999
neuro_normal	0.46684	0.0075	0.06787	0.03426		0.07879	-0.0177	0.00038	0.007202322	0.044909633	-0.01186
agree_low	0.77652	-0.00144	0.06356	0.05646	-0.47984		-0.01217	0.00032	0.008728081	0.046510339	-0.0052
agree_high	0.80624	0.00969	0.07269	0.02149	-0.41773		-0.0062	1.7E-05	0.007427467	0.062020185	-0.03947
agree_normal	0.81036	0.00683	0.07188	0.02575	-0.47738		-0.00785	0.00034	0.009307469	0.039802174	-0.03867

(b) Relation between the **summary scale of alcohol consumption items for drinks legal above 16 years in Germany** and the **mental health component scale**

	const	open	cons	extra	neuro	agree	sex	age	spirits	wealth_std	pcs_std
combined	0.76001	0.00593	0.06544	0.03302	-0.46127	0.06103	-0.01156	0.00031	0.00428	0.050692612	-0.02601
open_low	0.71469		0.07905	0.04972	-0.45462	0.06447	-0.01717	0.00017	0.00618	0.061215452	0.02327
open_high	0.76437		0.03666	0.04403	-0.43079	0.07411	-0.01013	0.0008	-0.0017	0.050429358	-0.07776
open_normal	0.78587		0.06365	0.0248	-0.472	0.05647	-0.00943	0.00027	0.00457	0.045298913	-0.03359
cons_low	0.79043	0.03146		0.05835	-0.50344	0.05209	-0.01085	4.5E-05	0.00061	0.074443345	0.00334
cons_high	0.78501	0.0048		0.01876	-0.42921	0.0697	-0.00523	0.00046	0.00613	0.078455267	-0.01475
cons_normal	0.81547	0.00237		0.03317	-0.46513	0.06712	-0.01317	0.00041	0.00393	0.04064197	-0.03233
extra_low	0.79437	0.01613	0.09094		-0.52963	0.04465	-0.00987	-4.1E-05	0.00801	0.067376458	0.00044
extra_high	0.85007	0.01447	0.0043		-0.43121	0.03767	-0.01588	0.00083	0.00239	0.044862136	-0.08324
extra_normal	0.77212	0.00467	0.06858		-0.45776	0.072	-0.01034	0.00031	0.00325	0.045788322	-0.02636
neuro_low	0.61347	0.01799	0.06725	0.0198		0.0285	-0.00624	0.0004	0.00193	0.04463141	-0.09507
neuro_high	0.39359	-0.00262	0.07552	0.07513		0.06002	-0.01198	8.5E-05	0.00957	0.076067708	-0.00551
neuro_normal	0.46717	0.00802	0.0657	0.03554		0.08085	-0.01945	0.00041	0.00235	0.049715462	-0.00449
agree_low	0.77755	-0.00083	0.06287	0.05742	-0.4805		-0.01271	0.00035	0.00682	0.051506768	-0.0001
agree_high	0.81231	0.00879	0.06948	0.02638	-0.42214		-0.00758	2.9E-05	0.00601	0.063462919	-0.03517
agree_normal	0.81014	0.00854	0.07211	0.02655	-0.47573		-0.01068	0.00037	0.00293	0.046343654	-0.0295

(c) Modelling the relation between **spirits consumption** and the **mental health component scale**

	const	open	cons	extra	neuro	agree	sex	age	mixed	wealth_std	pcs_std
combined	0.77148	0.0068	0.06231	0.03423	-0.46202	0.05951	-0.01271	0.00023	-0.00538	0.05072957	-0.02583
open_low	0.73001		0.07615	0.05048	-0.45611	0.06164	-0.01882	6.6E-05	-0.00659	0.06280041	0.0247
open_high	0.77122		0.03446	0.04335	-0.43415	0.07595	-0.0092	0.00075	-0.00307	0.0487952	-0.08004
open_normal	0.79742		0.06123	0.02626	-0.47249	0.05472	-0.01065	0.0002	-0.00564	0.04522166	-0.03328
cons_low	0.80356	0.03255		0.0588	-0.50338	0.05157	-0.01073	-0.00012	-0.00847	0.07422119	0.00025
cons_high	0.79727	0.00454		0.02003	-0.43119	0.06635	-0.00681	0.00038	-0.01217	0.07933711	-0.01263
cons_normal	0.82319	0.00323		0.03442	-0.46577	0.06539	-0.01421	0.00035	-0.00427	0.04042723	-0.03209
extra_low	0.81335	0.01622	0.0893		-0.53409	0.04138	-0.01166	-0.00015	-0.00571	0.06736481	0.00024
extra_high	0.86977	0.01542	-0.00059		-0.43333	0.03626	-0.01651	0.00067	-0.01065	0.0457438	-0.08373
extra_normal	0.77984	0.0058	0.06658		-0.45752	0.07087	-0.01121	0.00026	-0.00355	0.04573728	-0.02625
neuro_low	0.6197	0.01891	0.0627	0.02182		0.02867	-0.00603	0.00035	-0.0042	0.04485558	-0.09447
neuro_high	0.40178	-0.00139	0.07278	0.07633		0.05878	-0.01498	6.7E-05	0.0016	0.07765179	-0.00453
neuro_normal	0.48009	0.00862	0.06311	0.03648		0.07888	-0.02008	0.0003	-0.00792	0.0494194	-0.00535
agree_low	0.78554	-0.00126	0.062	0.05957	-0.48121		-0.01476	0.0003	-0.00147	0.05385162	-0.00022
agree_high	0.82511	0.00842	0.06568	0.02941	-0.42182		-0.00937	-9.5E-05	-0.0136	0.06271323	-0.03073
agree_normal	0.82029	0.00999	0.06854	0.02713	-0.47699		-0.0113	0.0003	-0.00493	0.04583003	-0.0301

(d) Relation between **mixed drinks consumption** and the **mental health component scale**

Figure 6: Coefficient of POLS models for the effect of alcohol consumption on the mental health level (third column from the right). Values which reached a significance with a p-value smaller than 0.05 are marked in green. In the models with the stratified sub-populations, the personality trait on which the stratification was performed was omitted, therefore no values exists.

	age	agree	cons	const	extra	neuro	open	pcs_std	ple0081_v2	sex	wealth_std
combined	0.0003	0.03901	0.06391	0.79399	0.03973	-0.46082	0.00551	-0.04523	-0.01064338	-0.01518	0.04236253
open_low	0.00014	0.05583	0.06271	0.77695	0.04927	-0.47505		-0.00472	-0.01191272	-0.02493	0.04803269
open_high	0.0007	0.03947	0.06398	0.76665	0.03129	-0.40719		-0.07821	-0.02010151	-0.0102	0.05312362
open_normal	0.00029	0.03488	0.06243	0.81181	0.03934	-0.47025		-0.0504	-0.00835658	-0.01284	0.03651163
cons_low	-7.9E-05	0.05701		0.83343	0.06843	-0.49787	0.00476	-0.04096	-0.01504718	-0.01862	0.06312098
cons_high	0.00063	0.03311		0.83529	0.02665	-0.43712	0.00912	-0.03547	-0.01336694	-0.0134	0.03285868
cons_normal	0.00038	0.04117		0.84623	0.03819	-0.46578	0.00482	-0.04771	-0.00838193	-0.01403	0.04111927
extra_low	-5.5E-05	0.04601	0.08429	0.83117		-0.54535	0.00826	-0.01716	-0.0053948	-0.01438	0.06386138
extra_high	0.00092	0.02926	0.0205	0.85705		-0.42598	-0.0003	-0.09029	-0.01658228	-0.01481	0.03137335
extra_normal	0.00028	0.03988	0.06723	0.81433		-0.45697	0.01081	-0.04503	-0.00957758	-0.01391	0.03741587
neuro_low	0.00048	0.03659	0.05934	0.62432	0.02512		0.01002	-0.10756	-0.00158225	-0.01343	0.03244079
neuro_high	-4.7E-05	0.03255	0.07754	0.42361	0.08769		0.00443	-0.01662	-0.01516623	-0.0156	0.07558377
neuro_normal	0.0004	0.0567	0.06839	0.50532	0.04096		0.00296	-0.02654	-0.01165141	-0.02186	0.04183349
agree_low	0.00041		0.07761	0.77737	0.05609	-0.45876	0.00746	-0.03299	-0.01094091	-0.01567	0.04480084
agree_high	0.00024		0.07004	0.80611	0.03538	-0.42492	0.00874	-0.04205	-0.01260805	-0.01445	0.05244863
agree_normal	0.0003		0.06164	0.83985	0.03566	-0.47591	0.00475	-0.04889	-0.01046585	-0.01426	0.03870908

Figure 7: Relation between the **smoking status** and the **mental health component scale**. Values which reached a significance with a p-Value smaller than 0.05 are marked in green. In the models with the stratified sub-populations, the personality trait on which the stratification was performed was omitted, therefore no values exists.

	age	agree	cons	const	extra	neuro	open	pcs_std	ple0081_v2	sex	wealth_std
combined	6E-05	0.07034	0.00638	0.83034	0.03126	-0.43885	-0.01402	-0.06142	0.00125321	-0.03704	0.0784188
open_low	-4.4E-05	0.0544	-0.04399	0.76282	0.02203	-0.36275		0.04567	0.007753	-0.0369	0.1030912
open_high	-9.1E-05	0.08826	0.00061	0.76538	0.00619	-0.30911		-0.12465	-0.01743375	-0.02624	0.1931572
open_normal	0.00019	0.06753	0.01837	0.87175	0.03305	-0.50717		-0.07798	0.0020648	-0.04267	0.039325
cons_low	1.2E-05	0.02035		0.85595	0.10209	-0.60624	0.01577	0.07548	0.00158887	-0.02321	-0.021109
cons_high	0.0005	0.1135		0.78223	0.03867	-0.36238	0.01552	-0.12437	-0.01149126	-0.02177	0.0356597
cons_normal	-7.1E-05	0.0569		0.86418	0.01442	-0.44384	-0.02386	-0.07799	0.00724053	-0.03742	0.111651
extra_low	0.00068	0.1413	-0.0254	0.82105		-0.55721	-0.04345	0.02954	0.01160175	-0.03569	0.07075
extra_high	0.00175	0.03326	0.04502	0.92166		-0.41316	-0.09281	-0.15675	-0.00437437	-0.0742	0.0161281
extra_normal	-0.0003	0.05047	0.0118	0.84885		-0.42117	0.01239	-0.0624	-0.00077679	-0.03175	0.07667
neuro_low	0.00028	-0.00405	0.03527	0.68579	-0.03962		-0.01333	-0.02006	-0.02992048	-0.0378	0.0744107
neuro_high	0.00112	0.09601	0.01443	0.44508	0.04119		-0.00357	-0.01471	-0.02254093	-0.0069	-0.146334
neuro_normal	-0.0001	0.08672	-0.00588	0.56878	0.07079		-0.0176	-0.08482	0.01649716	-0.05137	0.1299556
agree_low	0.00103		-0.09558	0.92368	0.11903	-0.58089	-0.08297	0.03106	0.01757509	-0.04748	0.0413026
agree_high	-0.00047		0.2786	0.59248	0.0879	-0.26161	-0.01608	-0.13736	-0.02290494	-0.03528	0.1012012
agree_normal	-0.00033		0.02281	0.88475	-0.00502	-0.4213	0.01361	-0.07385	0.00380228	-0.03494	0.087031

(a) Relation between **starting to smoke** and the **mental health component scale**.

	age	agree	cons	const	extra	neuro	open	pcs_std	ple0081_v2	sex	wealth_std
combined	0.00051	0.04413	0.0453	0.7484	0.06321	-0.45027	-0.01789	-0.01796	0.0203524	-0.02171	0.0588293
open_low	0.00135	0.10629	-0.01646	0.62522	0.08101	-0.43545		0.11427	0.0361354	-0.0372	0.0055174
open_high	0.00086	0.06622	0.04044	0.69154	0.01421	-0.38431		-0.04908	0.0268454	-0.01675	0.1273438
open_normal	0.00025	0.01754	0.06256	0.7938	0.05805	-0.4809		-0.04646	0.0150353	-0.01781	0.0588222
cons_low	0.00037	0.03626		0.80405	0.07091	-0.54802	-0.01288	0.03628	0.0243417	-0.02191	0.0414481
cons_high	0.00232	0.05303		0.66782	0.01406	-0.39207	0.01843	0.02515	0.0078954	-0.00553	0.0178288
cons_normal	0.00022	0.04349		0.81374	0.06739	-0.4598	-0.02897	-0.03648	0.0228916	-0.02427	0.0776566
extra_low	3.1E-06	0.10313	0.01633	0.85758		-0.63198	0.0117	0.00711	0.0251615	-0.05486	0.1182088
extra_high	0.00016	-0.00814	0.01718	0.92742		-0.42608	-0.05916	-0.10171	0.0169413	-0.0096	0.0852496
extra_normal	0.00063	0.05091	0.06087	0.74179		-0.41908	-0.01144	-0.00513	0.019901	-0.01544	0.0372856
neuro_low	0.00117	-0.03767	0.03367	0.63997	0.02492		-0.01408	-0.05518	0.0211384	0.00096	-0.008483
neuro_high	0.0014	0.04927	0.03498	0.30141	0.12029		-0.00801	0.0646	0.0423094	-0.03196	0.0312655
neuro_normal	0.00018	0.06793	0.04715	0.4875	0.06961		-0.01814	-0.02213	0.0116048	-0.02831	0.0929064
agree_low	0.00082		0.02792	0.78659	0.1054	-0.51604	-0.02626	0.01118	0.0143644	-0.031	0.0171397
agree_high	0.00105		0.07715	0.70219	0.00778	-0.49044	-0.0087	0.0743	0.0153951	0.00069	0.1285161
agree_normal	0.00034		0.0606	0.78322	0.0588	-0.42849	-0.02116	-0.044	0.0235626	-0.02016	0.0587705

(b) Relation between **stopping to smoke** and the **mental health component scale**. As smoking is encoded with 1, a positive effect here means a negative effect for stopping to smoke.

Figure 8: Coefficients of POLS models for the effect of changes in smoking behaviour on the mental health level (third column from the right). Values which reached a significance with a p-value smaller than 0.05 are marked in green. In the models with the stratified sub-populations, the personality trait on which the stratification was performed was omitted, therefore no values exists.

Item	Description	Datapoints	Included in Analysis	Social	Coefficient
pli0079	Going out for dinner or drinks (café, pub, restaurant)	30833	2003, 2008, 2013, 2019	Yes	0.0068
pli0080	Visiting or being visited by neighbors, friends, or acquaintances	30768	2003, 2008, 2013, 2019	Yes	0.0072
pli0081	Visiting or being visited by family members or relatives	30771	2003, 2008, 2013, 2019	Yes	0.0041
pli0181	Keeping in touch with friends or relatives abroad	22604	2008, 2013, 2019	Virtual	-0.0002
plh0390	Using Social Networks / Chats	8626	2019	Virtual	-0.0013
pli0082	Going on an excursion or short trip	30776	2003, 2008, 2013, 2019	Potentially	0.0134
pli0098_h	Going to church, attending religious events	30741	2003, 2008, 2013, 2019	Potentially	0.0013
pli0083	Watching TV / Movies, Series or Videos	30811	2003, 2008, 2013, 2019	No	0.0074
plh0391	Reading of Books (incl. E-Books)	8637	2019	No	0.0043
plh0392	Reading of (daily) Newspapers (incl. E-Papers)	8643	2019	No	0.0017
pli0093_h	Artistic and musical activities	30766	2003, 2008, 2013, 2019	Potentially	-0.0009
plh0393	Repairs or care of home, flat, garden or vehicles	8635	2019	No	0.0013
pli0092_h	Taking part in sports	30737	2003, 2008, 2013, 2019	Yes	0.0039
pli0089	Going to sporting events	30726	2003, 2008, 2013, 2019	Yes	0.0024
pli0091_h	Going to the cinema, pop concerts, dance events, clubs	30791	2003, 2008, 2013, 2019	Yes	0.0054
pli0090_h	Going to cultural events such as opera, classical concerts, theater, exhibitions	30802	2003, 2008, 2013, 2019	Yes	0.0090
plh0394	Just doing nothing, dreaming, chilling	8601	2019	No	0.0005

Table 1: Overview over activity items from the SOEP panel data, including the number of total datapoints available, the survey years included in the analysis, the social classification and the coefficient of the combined models, significant coefficients with a p-value smaller than 0.05 are marked in green.

	pli0079	pli0080	pli0081	pli0181	plh0390	pli0082	pli0098_h	pli0083	plh0391	plh0392	pli0093_h	plh0393	pli0092_h	pli0089	pli0091_h	pli0090_h	plh0394
combined	0.00682	0.00716	0.0041	-0.00022	-0.00128	0.01343	0.00131	0.00741	0.00429	0.00169	-0.00093	0.00128	0.00392	0.00242	0.00542	0.00897	0.00046
open_low	0.01092	0.00702	0.00536	-0.00047	-0.00367	0.01819	-0.00051	0.0066	0.00425	0.00089	0.00046	0.00561	0.00449	0.0002	0.00315	0.01258	0.00156
open_high	0.0041	0.01256	0.00498	-0.00069	-2.3E-05	0.01312	0.00462	0.00803	0.00548	0.00118	-0.00312	-0.00135	0.00527	0.00405	0.00824	0.00599	-0.00306
open_normal	0.00596	0.00617	0.00328	7.9E-05	-0.0011	0.01153	0.00116	0.0067	0.00379	0.00186	0.00015	0.00036	0.00323	0.00247	0.00537	0.00868	0.00099
cons_low	0.00574	0.00651	0.00817	-0.00011	0.00346	0.0187	0.00313	0.00854	0.00283	0.00463	-0.00177	0.00965	0.00649	0.0035	0.00623	0.01211	-0.00099
cons_high	0.00843	0.00763	0.00539	-0.00105	-0.00195	0.01723	0.00497	0.01434	0.00694	0.0023	-0.00005	-0.00295	0.00478	0.00465	0.00652	0.00979	-0.00548
cons_normal	0.00611	0.00662	0.00304	-3.4E-05	-0.00229	0.01114	6.1E-05	0.00565	0.00373	0.00076	-0.00129	0.00057	0.00301	0.00152	0.00437	0.00762	0.00149
extra_low	0.00765	0.00652	0.00731	0.0009	-0.00068	0.01783	-0.00312	0.00625	0.00211	0.00236	-5.7E-05	0.00473	0.00196	0.00457	0.0065	0.01212	0.0013
extra_high	0.0057	0.0046	0.00155	-0.00243	-0.0041	0.01278	0.00013	0.00688	0.00761	0.00507	-0.0009	0.00022	0.00386	0.00462	0.00708	0.00912	0.00058
extra_normal	0.00715	0.00841	0.00401	9.6E-05	-0.00103	0.01232	0.00284	0.00792	0.00372	0.0063	-0.00128	0.00047	0.00439	0.00213	0.00526	0.00767	0.00018
neuro_low	0.00491	0.00398	0.00102	-0.00253	-0.00033	0.0081	-0.00217	0.00614	0.0064	0.00052	-0.00368	0.00082	0.00347	0.00149	0.00295	0.00448	-0.00039
neuro_high	0.01239	0.0141	0.0085	0.00237	-0.00447	0.0231	0.00149	0.00701	0.00252	-0.00169	0.00271	0.00209	0.00641	0.00459	0.01229	0.01528	8.2E-05
neuro_normal	0.00666	0.00614	0.00306	-0.00011	-0.00113	0.01276	0.00155	0.00731	0.00466	0.00314	-0.00093	0.00107	0.00406	0.00303	0.00501	0.00946	0.00086
agree_low	0.00626	0.00555	0.005	0.0018	-0.00091	0.0109	-0.00289	0.00827	0.00268	-0.00302	0.0015	0.00392	0.00463	-0.00029	0.0069	0.00887	0.00118
agree_high	0.00554	0.00593	0.00683	-0.00192	4.4E-05	0.01609	0.0026	0.00957	0.00573	0.00357	-0.00279	-0.00066	0.00496	0.00801	0.00561	0.00643	-0.00402
agree_normal	0.00717	0.00805	0.00341	-0.00039	-0.00162	0.01354	0.00219	0.0067	0.00441	0.00258	-0.00106	0.00107	0.00349	0.00199	0.00501	0.00968	0.00118

Figure 9: Relation between **17 different activities** and the **mental health component scale**. Values which reached a significance with a p-value smaller than 0.05 are marked in green.

5 Discussion

This study is an exploratory analysis, in which many different models have been fitted. 17 social activities, smoking behaviour and 4 different drinking behaviours have been included as items. After the creation of scales for alcohol consumption and the different models for starting and stopping smoking, this results in a total of 20 IVs for which models were run. For each IV - accounting for the models on sub-populations - 16 individual models were fitted resulting in a total of 320 models. Not all of these models were run on the same parts of the SOEP data as different questions were answered in different years. However, there clearly are strong overlaps between the datasets of different items. In addition to that and due to the tests performed on sub-populations, each datapoint for each IV was included in 6 different models (one for the whole population and one for each sub-population separated on the one personality trait). Therefore, when interpreting these results, it is important to keep the influence of multiple testing in mind and not interpret single statistically significant coefficients independent of the context of this study.

Furthermore, there were no activities in which both positive and negative effects on mental health turned significant. This means that some of the results presented above require further confirmation before they can be considered real effects. The analyses presented here can give some initial hints about the directions in which further studies might be warranted.

However, the results do confirm the basic assumption that social activities have a positive effect on mental health and this effect - while potentially differing in strength - is real in all sub-populations and therefore consistent among personality traits. Interestingly, this effect cannot be seen for social activities that are performed virtually. This is in line with the sharp increase in mental health conditions during the Covid-19 pandemic, where many people in Germany were forced to rely entirely on virtual means to keep social connections - either due to government regulations or due to self-imposed caution. Parts of the mostly positive effect alcohol consumption seems to have on mental health might also be explained by social aspects. The answer categories of these questions (regularly, once in a while, seldom, never) do not allow for an adequate differentiation between people who suffer from an addiction to alcohol and people who are drinking alcohol as part of social settings. More precise answer options might be helpful in order to differentiate between potential negative effects of addiction on mental health and alcohol as a co-variable for social activity .

A clearly negative effect of addiction on mental health can be observed for smokers. While some researchers [15] have created links between social and smoking behaviours - e.g. describing a trend towards social smokers (people who do not smoke daily and only in social settings) - the effects of smoking on mental health are clearly negative and among the strongest seen across all models.

These results are contrasted by the fact that the limited data available suggests a beneficial effect for starting and a detrimental effect for stopping to smoke. This contradiction might suggest that the true relationship between smoking and mental health is more complex.

To shed light on what the causation between these items and the mental health status might be and to assess how changing behaviours might affect mental health, within person modelling could prove to be a promising approach. This is challenging with the existing dataset, as not just the answers for alcohol consumption, but also for the frequency of activities are quite broad and therefore the number of behavioural changes between the years is rather low. To allow for such analysis in the future, more answer options and more precise descriptions could be given. One option might be to have answers along the lines of:

- never

- between one and four times a year

- between four and twelve times a year

- at least once a month

- several times a month

- at least once a week

- several times a week

- daily

- several times a day

However, since the standard frequency of behaviours might vary substantially it could be beneficial to use different answer categories for different questions. For example watching TV, using social media or just doing nothing might be better measured in hours per day or week, while activities such as going out for dinner or drinks could be measured with the suggested categories. Adapting answer options to the observed mean frequencies of activities in the population might help to receive more meaningful responses from SOEP participants.

6   Postscript

The scientific community and health systems across the world are only just starting to address the long term health effects of the Covid-19 pandemic. Long-Covid receives a lot of attention in the public and research community, but the long term mental health effects of the pandemic can also not be foreseen yet. As many untreated mental health conditions turn into chronic diseases, the impact that not reacting to these conditions quickly enough might have on health and social systems will be severe. This - in combination with the systematic under-funding of the existing mental health system - leads to high demand for more targeted and personal therapy approaches. While this research project has not found any clear evidence of diverging effects on populations with different personality traits, there are some promising indications for a mental health assessment that takes personality into account. Further research into this direction could allow for personality based therapy or mental health advise. It also creates the opportunity to fuel the increasing number of available mental health applications with an evidence based personalization.

7   Supplemental

Items

I see myself as someone who (Ich bin jemand, der):

Openness
1. is original, comes up with new ideas (originell ist, neue Ideen einbringt).
2. values artistic, aesthetic experiences (künstlerische, ästhetische Erfahrungen schätzt).
3. has an active imagination (eine lebhafte Phantasie, Vorstellungen hat).
4. is eager for knowledge (wissbegierig ist).

Scale: 1 (Not at all / Trifft überhaupt nicht zu) to 7 (Absolutely / Trifft voll zu)

Conscientiousness
1. does a thorough job (gründlich arbeitet).
2. tends to be lazy (R) (eher faul ist).
3. does things effectively and efficiently (Aufgaben wirksam und effizient erledigt).

Scale: 1 (Not at all / Trifft überhaupt nicht zu) to 7 (Absolutely / Trifft voll zu)

Extraversion
1. is communicative, talkative (kommunikativ, gesprächig ist).
2. is outgoing, sociable (aus sich herausgehen kann, gesellig ist).
3. is reserved (R) (zurückhaltend ist).

Scale: 1 (Not at all / Trifft überhaupt nicht zu) to 7 (Absolutely / Trifft voll zu)

Agreeableness
1. is sometimes somewhat rude to others (R) (manchmal etwas grob zu anderen ist).
2. has a forgiving nature (verzeihen kann).
3. is considerate and kind to others (rücksichtsvoll und freundlich mit anderen umgeht).

Scale: 1 (Not at all / Trifft überhaupt nicht zu) to 7 (Absolutely / Trifft voll zu)

Neuroticism
1. worries a lot (sich oft Sorgen macht).
2. gets nervous easily (leicht nervös wird).
3. is relaxed, handles stress well (R) (entspannt ist, mit Stress gut umgehen kann).

Scale: 1 (Does not apply to me at all / Trifft überhaupt nicht zu) to 7 (Applies to me perfectly / Trifft voll zu)

Figure 10: The Big Five personality traits and their contributing items taken from [14]. (R) indicates that the item contributes in reverse to the scale. Note that for item 4 in the Openness scale (eager for knowledge) there is no data available for the year 2005, therefore this item was omitted following the methodology reported in [16]

Item	Description	Included in SOEP
pli0079	Going out for dinner or drinks (café, pub, restaurant)	1990 1995 1998 2003 2008 2013 2017 2018 2019
pli0080	Visiting or being visited by neighbors, friends, or acquaintances	1990 1995 1998 2003 2008 2013 2019
pli0081	Visiting or being visited by family members or relatives	1990 1995 1998 2003 2008 2013 2019
pli0181	Keeping in touch with friends or relatives abroad	2008 2013 2017 2018 2019
plh0390	Using Social Networks / Chats	2019
pli0082	Going on an excursion or short trip	1990 1995 1998 2003 2008 2013 2017 2018 2019
pli0098_h	Going to church, attending religious events	1990 1992 1994 1995 1996 1997 1998 1999 2001 2003 2005 2007 2008 2009 2011 2013 2015 2017 2018 2019
pli0083	Watching TV / Movies, Series or Videos	1990 1995 1998 2003 2008 2013 2019
plh0391	Reading of Books (incl. E-Books)	2019
plh0392	Reading of (daily) Newspapers (incl. E-Papers)	2019
pli0093_h	Artistic and musical activities	1990 1995 1998 2001 2003 2005 2007 2008 2009 2011 2013 2015 2017 2018 2019
plh0393	Repairs or care of home, flat, garden or vehicles	2019
pli0092_h	Taking part in sports	1984 1985 1986 1988 1990 1992 1994 1995 1996 1997 1998 1999 2001 2003 2005 2007 2008 2009 2011 2013 2015 2017 2018 2019
pli0089	Going to sporting events	1990 1995 1998 2003 2008 2013 2017 2018 2019
pli0091_h	Going to the cinema, pop concerts, dance events, clubs	1985 1986 1988 1990 1992 1994 1995 1996 1997 1998 1999 2001 2003 2005 2007 2008 2009 2011 2013 2015 2017 2018 2019
pli0090_h ,	Going to cultural events such as opera, classical concerts, theater	1984 1985 1986 1988 1990 1992 1994 1995 1996 1997 1998 1999 2001 2003 2005 2007 2008 2009 2011 2013 2015 2017 2018 2019
plh0394	Just doing nothing, dreaming, chilling	2019

Table 2: Overview over activity items from the SOEP panel data, years they were included in the panel

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