Morbidity profiles in Europe and Israel: international comparisons from 20 countries using biopsychosocial indicators of health via latent class analysis

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Abstract

Aim I examined health/morbidity profiles across 20 countries, determined their associated demographic characteristics and risk factors and compared the distribution of these health/morbidity profiles across countries.

Subject and methods I used population-based data drawn from the European Social Survey ($N = 20092$, 52% female, ages 40+) covering 20 mostly European countries (Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Israel, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden and Switzerland) from 2014. Diverse indicators of health/morbidity were used, including self-rated health, self-rated disability, self-reported health problems and mental health symptoms using the CES-D. Latent class analysis was conducted to determine health/morbidity profiles across countries.

Results I found that four distinct health profiles best describe overall health/morbidity status in the international sample, each associated with specific demographic and behavioural risk factors: ‘healthy’ profile (62% of participants), ‘unhappy but healthy’ profile (14%), ‘high morbidity, mostly physical’ profile (16%) and ‘high morbidity, mostly psychological’ profile (8%). With few exceptions, participants from Northern Europe and Western Europe were more likely to belong to the ‘healthy’ and the ‘unhappy but healthy’ profiles, whereas participants from Eastern Europe were more likely to belong to the ‘high morbidity, mostly physical’ profile. Distribution of the ‘high morbidity, mostly psychological’ profile appeared to be more uniform across regions.

Conclusions Distinct morbidity/health profiles could be identified across countries, and countries varied regarding the relative distribution of these profiles. Specific prevention and treatment consequences associated with each profile are discussed. Future studies should further investigate the patterns of overall health and morbidity in Europe’s populations.

Keywords Morbidity · Health · Mental health · Population · International comparison

With the increasing age of the world’s populations it is expected that there will be accompanying changes in health and health care, as for example proposed by the compression of morbidity and expansion of morbidity hypotheses (Gruenberg 1977; Fries 1980; Manton 1982; Fries et al. 2011). Consequently, several studies have been conducted to understand the health status of these populations. These studies have mostly focused on specific dimensions of health, such as specific diseases, self-rated health, depressive symptom

burden or physical and cognitive functioning (e.g. Beller et al. 2019; Beller and Epping 2020; Safieddine et al. 2020; Schröder et al. 2020; Beller et al. 2020a; Sperlich et al. 2020; Grasshoff et al. 2021). However, health is seen as a complex biopsychosocial construct comprising diverging systems of diseases, syndromes and functioning (Huber et al. 2011). To adequately represent the multidimensionality of the individual health status, it is necessary to employ more comprehensive approaches that can account for multiple variables simultaneously.

One such approach that can capture the heterogeneity of individuals’ health status is latent class analysis (LCA), which has also been recommended in the literature (Zhou et al. 2018; Mori et al. 2020). LCA is a subset of classification methods, especially applicable for questionnaire data

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(Collins and Lanza 2010). LCA finds groups of cases with similar characteristics in multivariate categorical data. It has been favourably used in health studies (Ulbricht et al. 2018; Xiao et al. 2019; e.g. Mori et al. 2020). However, to my knowledge, no studies have used this approach to identify health/morbidity profiles in international comparisons of health status. This will be the focus of the current study. The study question is: Which health profiles can be identified internationally, and how do proportions of these profiles differ across countries? Thereby, the current study will be useful in understanding international variations in health status and morbidity. It will also inform public health policies, such as treatment guidelines and the development of targeted interventions approaches associated with each profile.

Methods

Sample Data were drawn from the public release of the 7th round of the European Social Survey (ESS) that aims to provide comparative data on attitudes, beliefs and behaviour patterns of the various populations in Europe (Jowell et al. 2007). The ESS also includes rotating modules, which are dedicated to specific themes. I used data from the 20 countries (Austria, Belgium, Czechia, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Israel, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, and Switzerland) that participated in the 7th round of the ESS, sampled in 2014, which included a rotating module relating to health. To date, only the 7th round incorporated measures of overall health in the ESS, and as such only this wave could be included in the current study. The ESS provides population-based cross-sectional samples of non-institutionalized participants aged 14 years and older with the interviews conducted face-to-face at the respondent's place of residence. In this study, only data from middle-aged and older adults will be used (ages 40+). Thusly, population-based cross-sectional samples of first-time responders were obtained. Response rates varied between 31% and 74% per country (Austria 57%, Belgium 68%, Czechia 52%, Denmark 60%, Finland 63%, France 51%, Germany 31%, Great Britain 44%, Hungary 53%, Ireland 61%, Israel 74%, Lithuania 69%; Netherlands 59%, Norway 54%, Poland 66%, Portugal 43%, Slovenia 52%, Spain 68%, Sweden 50%, Switzerland 53%). All procedures were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments. After excluding participants with missing values listwise (approx. 20% of the sample), a final sample size of $N = 20092$ resulted (with country sample sizes ranging from $n = 622$ in Slovenia to $n = 1867$ in Germany).

Measures Health/morbidity was measured with multiple instruments, including self-rated health, self-reported disability, self-reported health problems and the items of the Centre of Epidemiologic Studies Depression Scale 8 Item Version (CES-D 8). Self-rated health was measured by asking about participant's self-rated health with answer options ranging from 'very bad', 'bad', 'fair', 'good' to 'very good'. Self-rated health was dichotomized such that possible scores of (1) 'very bad or bad health' and (0) 'fair, good and very good' resulted. Furthermore, disability was measured by asking participants whether they were hampered in their daily activities. Participants could choose to respond with either 'no', 'yes to some extent' or 'yes a lot'. The latter two answer categories were combined such that a disability score of (0) represents 'has no disability' and (1) represents 'has disability'. Health problems were measured by inquiring whether participants had health problems in the past 12 months regarding a list of items, including pain in back, pain in arms and hands, pain in legs and feet, stomach problems, skin problems, diabetes, breathing problems and heart problems. Pain in back, pain in arms and hands, pain in legs and feet was combined into one item 'pain in back or extremities' indicating whether participants reported pain in at least one of the three body areas. Scores of (0) indicate no problems regarding these health aspects, whereas scores of (1) indicate problems. Regarding the CES-D 8, multiple studies have demonstrated the scale's validity, reliability and applicability to measure affective and somatic depressive symptoms in different cultures and throughout the lifespan (Karim et al. 2015; Vilagut et al. 2016; Kliem et al. 2020a, b; Beller et al. 2020b). The CES-D 8 measures the frequency of depressive symptoms, including affective and somatic components, in the week prior to the interview. Participants were asked whether they 'felt depressed', 'felt lonely', 'felt sad', (reverse scored) 'were happy', (reverse scored) 'enjoyed life', 'felt everything was an effort', 'had restless sleep' and 'could not get going'. Participants could choose to respond with one of four response options ranging from 'none or almost none of the time', 'some of the time', and 'most of the time' to 'all or almost all of the time'. Answers with 'most of the time' or 'all or almost all of the time' were coded as (1), other answer options as (0). Furthermore, information regarding participant's health behaviours (less than weekly fruit consumption, less than weekly vegetables consumption, no physical exercise in previous week, daily smoking, daily alcohol consumption, obesity, general care contact in previous 12 months, specialist care contact in previous 12 months) was measured in such a way that scores of (0) represent the absence of the risk factor and scores of (1) represent the applicability of the risk factor. In general, all items were recoded such that scores of (1) represent morbidity/worse health outcomes. In addition, age, sex, education (measured via the years of full-time education completed) and income

were measured. Income was measured by presenting participants with a list of 10 income categories, which represent the actual countries' income deciles. Participants were asked to denote the income decile to which their household income belongs, such that answer options could range from (1) 'lowest income decile' to (10) 'highest income decile'.

Data analysis First, descriptive statistics of all variables across and within countries were computed. Then latent class analysis (LCA) was conducted, a statistical technique based on maximum likelihood estimation that identifies groups of similar cases, as defined by specific combinations of observed variables (Collins and Lanza 2010). In the case of the current study on health/morbidity profiles, groups of participants with similar health/morbidity characteristics were identified. Via LCA it was then possible to assign group membership to each participant by estimating the probability of the participant belonging to each subgroup. Participants were assigned class memberships based on modal probabilities. Then, prevalence of profiles across and within countries was calculated and demographic and risk factors were calculated for each profile. All statistical analyses were performed with R.

Results

Overall, participants were on average 59.7 (standard deviation [SD] = 12.3) years old, with 52% being female. Participants had on average 12.6 (SD = 4.2) years of education and belonged on average to the 5.3 decile regarding their country's average household income (SD = 2.8). Furthermore, only 10% reported that they had bad health and 33% reported that they were limited in their daily activities. Further sample statistics are depicted in Table 1. Sample statistics for each country are reported in Table 2 and Table 3.

To determine health/morbidity profiles, latent class analysis was conducted. Via a scree plot, it was found that a four-class solution best fit the data (Fig. 2). Based on a plot of the class-specific response probabilities (Fig. 1), these profiles can be described as: 'healthy' profile (62% of participants; lowest probabilities of reporting morbidity regarding each aspect); 'unhappy but healthy' profile (14% of participants; very high probabilities of reporting unhappiness and no joy but comparatively low probabilities regarding each other indicator); 'high morbidity, mostly physical' profile (16% of participants; high probabilities of reporting morbidity on all indicators, with the highest probabilities of reporting physical morbidity indicators among all profiles); 'high morbidity, mostly psychological' profile (8% of participants; high probabilities of reporting morbidity on all indicators, with highest probabilities of reporting affective mental and affective somatic morbidity indicators among all profiles).

Table 1 Sample characteristics, health/morbidity and risk factors across countries (N = 20092)

	Mean / %	SD
Age	59.7	12.3
Female	52%	-
Income decile	5.3	2.8
Education in years	12.6	4.2
Unhappy	28%	-
Did not enjoy life	29%	-
Sad	7%	-
Lonely	7%	-
Depressed	6%	-
Could not get going	8%	-
Everything is an effort	12%	-
Sleep problems	17%	-
Bad self-rated health	10%	-
Disability	33%	-
Pain in back or extremities	60%	-
Stomach problems	16%	-
Skin problems	8%	-
Diabetes	8%	-
Breathing problems	10%	-
Heart problems	14%	-
Unmet needs for health care	11%	-
General care contact	79%	-
Specialist care contact	46%	-
Less than weekly fruit consumption	6%	-
Less than weekly vegetables consumption	3%	-
No physical exercise	27%	-
Daily smoking	19%	-
Daily alcohol consumption	10%	-
Obesity	19%	-

Furthermore, these profiles also varied regarding their associated socio-demographic and risk behaviour characteristics, as seen in Table 4. Participants belonging to the 'healthy' profile were in general slightly younger, more likely male, slightly more educated and had a slightly higher income. Furthermore, they had the lowest proportion of unmet needs for health care, the lowest contact with the health care system as well as the lowest prevalences of behavioural risk factors. In comparison to the 'healthy' profile, participants in the 'unhappy but healthy' profile were slightly more likely to be female, slightly less educated and had a slightly lower household income. Furthermore, they had a higher proportion of unmet needs for health care, similar rates of contact with the health care system and similar rates of prevalence of behavioural risk factors; only the prevalence of lack of physical exercise was much higher in this profile as compared to the 'healthy' profile. Participants belonging to the 'high morbidity, mostly physical'

Table 2 Sample characteristics within countries (N = 20092)

Country	Age	Female	Income decile	Education in years
Austria	59.7 (12.7)	53%	4.7 (2.4)	12.0 (3.2)
Belgium	58.8 (12.4)	50%	5.7 (2.5)	12.0 (3.9)
Czechia	57.8 (11.0)	56%	4.7 (2.4)	12.8 (2.5)
Denmark	59.0 (12.3)	49%	5.9 (2.8)	13.2 (4.8)
Finland	60.6 (11.9)	50%	5.8 (2.6)	13.2 (4.7)
France	60.1 (12.7)	51%	5.3 (2.9)	12.3 (4.3)
Germany	59.6 (12.0)	48%	5.9 (2.8)	14.1 (3.4)
Great Britain	60.4 (12.9)	52%	4.9 (3.0)	13.3 (3.9)
Hungary	60.2 (12.4)	60%	6.2 (2.7)	11.8 (3.6)
Ireland	59.5 (12.3)	53%	5.0 (2.5)	13.3 (3.5)
Israel	60.9 (12.8)	57%	5.0 (2.6)	12.7 (4.5)
Lithuania	59.5 (11.9)	65%	5.0 (2.8)	12.4 (3.4)
Netherlands	60.0 (12.1)	53%	5.9 (2.7)	13.5 (4.1)
Norway	58.3 (12.2)	46%	5.4 (2.8)	13.9 (4.0)
Poland	59.3 (12.0)	56%	5.0 (2.8)	11.7 (3.5)
Portugal	62.3 (12.9)	56%	4.5 (2.7)	7.6 (5.0)
Slovenia	60.0 (11.7)	55%	4.3 (2.5)	11.7 (3.3)
Spain	57.8 (12.4)	47%	5.0 (2.7)	11.7 (6.0)
Sweden	60.9 (12.9)	50%	6.4 (2.9)	12.9 (3.8)
Switzerland	58.9 (12.3)	47%	5.2 (2.7)	11.0 (3.3)

Values in the table represent either means (standard deviations) for continuous variables or percentages for binary variables. Please note that the comparatively low average years of education in Portugal are in line with the literature, as Portugal generally has also ranked among the lowest in educational comparisons among European countries (Marôco 2021). In Portugal, major public educational reforms were conducted relatively late historically in the 1980s. Therefore, the relatively low average years of education in Portugal in this sample largely result from the older adults in Portugal, who often report only having a level of primary education

profile were, in comparison to the other profiles, slightly older, more likely to be female, slightly less educated and had a slightly lower income. Furthermore, they had the highest proportion of unmet needs for health care, higher probabilities of having had contact with the health care system and high prevalences of behavioural risk factors. Notably, prevalence of lack of physical exercise was highest in this profile. Finally, participants belonging to the ‘high morbidity, mostly psychological’ profile were, in comparison to the other profiles, slightly older, more likely to be female, the least educated and had the lowest household incomes. Furthermore, they had a high proportion of unmet needs for health care, and the highest contact with the health care system among the profiles as well as high prevalences of behavioural risk factors.

Distribution of profiles across countries is depicted in Table 5. With few exceptions, participants from Northern Europe and Western Europe were more likely to belong to the ‘healthy’ and the ‘unhappy but healthy’ profiles,

especially Norway, Ireland and Denmark, whereas participants from Eastern Europe were more likely to belong to the ‘high morbidity, mostly physical’ profile, i.e. Poland, Hungary and Czechia. Results in Southern Europe and the distribution of the ‘high morbidity, mostly psychological’ profile appeared to be more varied and equally distributed across geographical regions. Notably, as compared to the other countries from Western Europe, Germany had a much lower proportion of participants belonging to the ‘healthy’ profile, and a much higher proportion of participants belonging to the ‘high morbidity, mostly psychological’ profile. Also, compared to the other countries, participants from Lithuania and Israel had a high prevalence of belonging to the ‘unhappy, but healthy’ profile.

Discussion

I investigated if and how the overall health status of the various European populations and Israel can be described more comprehensively and found empirical evidence for four health/morbidity profiles: (1) ‘healthy’, (2) ‘unhappy but healthy’, (3) ‘high morbidity, mostly physical’ and (4) ‘high morbidity mostly psychological’. International distribution of these profiles across countries was not random. Rather, as compared to the other countries, participants from countries in Northern and Western Europe tended to more likely belong to the ‘healthy’ profile and were less likely to belong to the ‘high morbidity mostly physical’ profile. Participants from Eastern Europe, however, were more likely to belong to the ‘high morbidity, mostly physical’ profile. Participants from countries of Southern Europe were more equally distributed across profiles. Therefore, the overall health/morbidity status seems to be clustered according to geographical regions.

These results suggest that there are supra-national variations in health status, seemingly specific to geographical regions. This supports theoretical considerations and practical approaches that define and investigate health as a complex interrelated system of at least physical health problems, mental health problems and aspects of functioning (Huber et al. 2011). Additionally, these results suggest that scientific studies on Europeans’ health status might not be limited to the countries they were conducted in but might be more generalizable within geographical regions. On the other hand, the current study also shows that there might be stark differences between regions such that generalizability between very different countries should not be automatically assumed (Henrich et al. 2010). This generalizability might also extend to prevention and treatment programs (St. Sauver et al. 2012). For example, based on the current results, a prevention approach that might have proven to be fruitful

Table 3 Health/morbidity and risk factors within countries (N = 20092)

Country	Un- happy	Did Noten- joy Life	Sad	Lone- ly	De- pressed	Could Notget going	Every- thing isan effort	Sleep- prob- lems	Bad Self- rated health	Dis- abil- ity	Pain inback orex- tre- mities	Stom- ach- prob- lems	Skin- prob- lems	Dia- betes	Breath- ing- prob- lems	Heart- prob- lems	Unmet Needs- for health- care	Gen- eral- car- econ- tact	Spe- cial- ist- care- con- tact	Less than- week- lyfruit- con- sump- tion	Less than- week- lyveg- etable- con- sump- tion	No physi- calex- ercise	Dai- lysmok- ing	Dai- lyAl- cohol- con- sump- tion	Obe- sity
Austria	28%	35%	6%	7%	4%	5%	11%	13%	6%	28%	56%	13%	9%	6%	9%	15%	5%	83%	59%	5%	2%	23%	23%	10%	16%
Belgium	19%	20%	7%	7%	6%	8%	11%	18%	6%	32%	71%	21%	7%	6%	10%	13%	9%	85%	52%	9%	10%	32%	19%	14%	17%
Czechia	25%	37%	11%	14%	13%	21%	19%	21%	7%	38%	50%	12%	5%	11%	9%	10%	7%	83%	42%	8%	8%	29%	25%	7%	20%
Den- mark	25%	21%	3%	3%	4%	6%	10%	16%	6%	29%	65%	14%	11%	8%	9%	11%	6%	80%	43%	6%	2%	16%	18%	14%	14%
Finland	24%	21%	2%	3%	2%	9%	5%	10%	6%	37%	72%	21%	14%	10%	12%	15%	17%	70%	46%	3%	3%	12%	14%	2%	21%
France	3%	2%	6%	13%	6%	5%	11%	24%	10%	3%	67%	19%	8%	8%	10%	12%	16%	87%	52%	7%	3%	33%	20%	21%	15%
Ger- many	33%	37%	5%	3%	5%	4%	12%	19%	12%	37%	69%	18%	11%	9%	12%	16%	13%	84%	68%	4%	1%	15%	21%	11%	20%
Great Brit- ain	25%	23%	5%	7%	5%	8%	12%	23%	11%	33%	62%	20%	12%	9%	16%	12%	13%	79%	39%	9%	3%	30%	16%	9%	22%
Hungary	41%	47%	14%	15%	18%	15%	18%	23%	20%	41%	43%	9%	4%	11%	06%	19%	7%	76%	39%	8%	7%	57%	27%	4%	24%
Ireland	20%	20%	4%	6%	5%	5%	8%	13%	4%	24%	39%	10%	6%	5%	8%	9%	8%	78%	22%	6%	1%	24%	19%	4%	16%
Israel	37%	42%	10%	9%	8%	7%	15%	17%	15%	32%	43%	12%	7%	18%	9%	14%	18%	87%	67%	4%	2%	43%	19%	2%	23%
Lithu- ania	54%	53%	9%	11%	9%	8%	10%	19%	16%	47%	48%	17%	3%	5%	5%	29%	14%	77%	32%	10%	5%	32%	23%	1%	23%
Nether- lands	17%	17%	4%	4%	5%	10%	10%	15%	7%	37%	62%	14%	10%	9%	12%	15%	4%	75%	50%	8%	1%	20%	19%	19%	16%
Norway	23%	10%	2%	2%	2%	4%	4%	10%	7%	30%	63%	15%	10%	4%	11%	9%	11%	81%	29%	3%	1%	20%	16%	1%	13%
Poland	30%	26%	13%	13%	13%	13%	17%	21%	14%	41%	61%	14%	4%	9%	7%	26%	21%	77%	53%	6%	2%	41%	26%	3%	25%
Portugal	42%	43%	13%	15%	11%	14%	26%	24%	16%	24%	68%	19%	7%	15%	9%	19%	16%	84%	45%	3%	4%	54%	14%	28%	20%
Slovenia	23%	28%	9%	8%	5%	9%	13%	21%	14%	45%	64%	16%	5%	10%	9%	16%	8%	80%	46%	2%	1%	29%	17%	1%	26%
Spain	26%	39%	11%	8%	9%	10%	14%	20%	15%	20%	61%	14%	7%	8%	8%	12%	10%	81%	53%	3%	2%	32%	24%	22%	22%
Sweden	23%	28%	3%	5%	3%	7%	6%	12%	4%	34%	67%	20%	9%	7%	10%	10%	9%	58%	38%	7%	2%	18%	11%	2%	17%
Switzer- land	18%	18%	4%	4%	3%	4%	8%	13%	4%	26%	60%	14%	9%	5%	8%	9%	4%	73%	43%	5%	1%	14%	21%	15%	13%

Values in the table represent the percentage of participants per country that indicated to be morbid/have the risk factor regarding the specific indicator

Fig. 1 Class-specific response probabilities of health/morbidity profiles and their population proportions ($N = 20092$)

Table 4 Socio-demographic characteristics and risk factors for the health/morbidity profiles ($N = 20092$)

	Healthy	Unhappybut healthy	High morbiditymostly physical	High morbidity-mostly psychological
Age (M $\pm$ SD)	58.2 $\pm$ 11.9	58.90 $\pm$ 12.2	64.8 $\pm$ 13.0	62.8 $\pm$ 13.0
Gender (% female)	49%	54%	67%	55%
Education in years (M $\pm$ SD)	13.1 $\pm$ 4.0	12.7 $\pm$ 4.2	11.6 $\pm$ 4.3	10.6 $\pm$ 4.3
Income decile (median)	6	5	4	3
Unmet needs for health care	8%	13%	22%	16%
General care contact	75%	78%	89%	90%
Specialist care contact	38%	44%	64%	71%
Less than weekly fruit consumption	5%	7%	13%	6%
Less than weekly vegetables consumption	2%	3%	7%	3%
No physical exercise	19%	31%	56%	41%
Daily smoking	18%	22%	29%	20%
Daily alcohol consumption	10%	8%	9%	11%
Obesity	16%	17%	29%	28%

in Germany, might also be adaptable to France, but less so to Hungary.

Moreover, the current study suggests that the morbidity/health profiles are associated with specific socio-demographic and behavioural risk factors. Based on the results regarding the ‘unhappy but healthy profile’, more prevention

efforts might be directed in medical care and prevention to those who appear to be healthy but report low levels of well-being (Tamosiunas et al. 2019; Trudel-Fitzgerald et al. 2019). As members of this profile were generally similar to the ‘healthy’ profile, but were much more likely to lack physical exercise, participants belonging to this profile might

Table 5 Proportion of respondents belonging to the health/morbidity profiles by country ($N = 20092$)

	Healthy	Unhappy but healthy	High morbidity mostly physical	High morbidity mostly psychological
Northern Europe				
Great Britain	63%	11%	8%	18%
Ireland	75%	10%	5%	10%
Sweden	68%	13%	4%	15%
Finland	64%	12%	3%	21%
Denmark	71%	12%	4%	13%
Norway	76%	6%	2%	17%
Lithuania	43%	29%	13%	16%
Western Europe				
Belgium	68%	9%	7%	16%
Germany	57%	16%	7%	21%
Switzerland	74%	10%	4%	12%
Netherlands	70%	7%	5%	17%
France	63%	13%	7%	17%
Austria	64%	17%	6%	13%
Eastern Europe				
Poland	54%	11%	15%	20%
Hungary	50%	18%	18%	14%
Czechia	57%	14%	15%	15%
Southern Europe				
Slovenia	58%	9%	11%	22%
Spain	61%	16%	11%	12%
Portugal	49%	20%	17%	14%
Israel	53%	22%	8%	16%

Percentages across columns might not add up to 100% because of rounding

thus be much more likely to develop cardiovascular-related morbidity as they age (Nystoriak and Bhatnagar 2018; Kraus et al. 2019). Participants from both high morbidity profiles, on the other hand, were much more likely to report high levels of obesity. Thus, prevention and care for participants from these profiles might focus on preventing and treating obesity.

There are some limitations to the current study. First, the results of some countries diverged from main trends within regions. For example, Lithuania appeared to be very different from other countries in that a high proportion of participants were classified as belonging to the ‘unhappy’ profile. This is, however, in line with the literature, as Lithuania has been found to be among the countries with the highest suicide rates in the world, with increasing rates of social isolation as one potentially explaining factor (Värnik 2012; Zaborskis et al. 2016; Beller and Wagner 2018a, b, 2020). Additionally, as compared to the other countries from Western Europe, Germany had a low proportion of participants belonging to the ‘healthy’ profile. Germany, together with Poland, reported instead high proportions of participants belonging to the ‘high morbidity, mostly psychological’ profile. This is also in line

with some previous studies, where increasing morbidity has been reported, especially for young and middle-aged adults in Germany and Poland (Beller et al. 2019, 2020b; Beller and Epping 2020). However, future studies must investigate the specific reasons for these cross-national variations empirically. As a second limitation, the current study could only use self-reports of health. As such, results might suffer from known self-report biases of health, especially regarding cross-cultural research (van de Vijver and Tanzer 2004; Bauhoff 2011). However, accepting these limitations, the current study could comprehensively study health/morbidity profiles and determine how these profiles vary across multiple countries. More research on health/morbidity profiles is needed. Given recent morbidity trends, it seems especially important to determine how the relative proportion of morbidity/health profiles has changed over time in the general population (Geyer and Eberhard 2021).

Appendix

Fig. 2 Scree-plot of latent class solutions with different number of classes

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Availability of data and material Data can be accessed for free after registration at <https://www.europeansocialsurvey.org/>.

Declarations

Conflict of interest There are no conflicts of interest to disclose.

Ethics approval Ethical approval for original data collection was obtained from the ESS ERIC Research Ethics Board.

Consent to participate Informed consent by participants for data collection was obtained.

Code availability Not applicable.

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