Original Article

The Mental and Physical Health of the Homeless

Evidence From the National Survey on Psychiatric and Somatic Health of Homeless Individuals (the NAPSHI Study)

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Summary

Background: The health status of homeless individuals in Germany has been described incompletely. Mental and somatic illnesses seem to contribute to the high mortality in this cohort.

Methods: In this national, multicenter, cross-sectional study, data were collected on the health of 651 homeless individuals in the metropolitan regions of Hamburg, Frankfurt, Leipzig, and Munich metropolitan regions. The lifetime prevalences of physician-diagnosed mental and somatic illnesses were determined with interview-based questionnaires. Furthermore, clinical and laboratory examinations were carried out. Multivariable regressions were performed to identify determinants of health status and access to care.

Results: High prevalences of both mental and somatic illnesses were confirmed. Particularly, cardiovascular and metabolic diseases were highly prevalent. Evidence for possible unrecognized arterial hypertension and possible unrecognized hypercholesterolemia was found in 27.5% and 15.6% of homeless individuals, respectively. 23.1% of study participants reported having received a diagnosis of a mental illness. Evidence for a possible unrecognized mental illness was found in 69.7%. A history of immigration from another country to Germany was found to be an important determinant of the summed scores for mental, somatic, and possible unrecognized illness. Homeless individuals of non-German origin were more likely to be living without shelter (p = 0.03) and to lack health insurance (p < 0.001).

Conclusion: High prevalence rates for mental and somatic illnesses and limited access to mainstream medical care were found. Homeless individuals appear to receive inadequate care for mental illness. Healthcare programs for homeless individuals in Germany should pay particular attention to homeless migrants.

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An estimated 417 000 homeless persons were living in Germany in 2020 (1). Their health and healthcare situation has been described incompletely. In particular, representative data are lacking on the prevalence of mental and somatic illnesses. Compared with the general population, standardized mortality rates in homeless people are higher by a factor of two to five, depending on the study (2). Common causes of death that have been described are infectious diseases and suicides, injuries, and poisoning (3). In parallel, the presence of mental illnesses—especially misuse or dependence from alcohol, tobacco, and illegal substances—has been identified as a risk factor for premature death in homeless persons (4). Precarious living conditions and the exposure to noxious substances are associated with an increased risk for diverse somatic illnesses (5). With increasing age of homeless people chronic, non-infectious disorders also gain relevance. A recently published narrative review underlines the increased prevalence of cardiovascular disorders, musculoskeletal disorders, and disorders of the respiratory system compared with the general population in Germany (6).

Earlier studies identified the origin of homeless people as an important determinant of health (7, 8). In the literature, a positive as well as a negative association of migration history with health is the subject of discussion (9). In the coming years, an increase in the number of homeless people of non-German origin is expected (10). This underlines the need for stratification of health data according to the individual migration history (11).

Access to medical care is crucial for securing the health of a population in the long term (12). But individual and structural factors make treating homeless people in the regular medical systems difficult. Healthcare is therefore often provided by public or charitable support services that enable easy-access help (13).

Differentiated analyses of the health of and care provision for homeless people can be used by political organizations and care providers in order to create target-group specific support services. The present national cross-sectional study investigated the mental and somatic health and the healthcare provision/situation of 651 homeless persons in Germany with special consideration of their migration history.

Data on the sociodemographic and healthcare situation of homeless people in Germany

	N (%)/median (IQR)
Sex (female)	118 (18.2)
Age (in years)	43 (35–52)
Duration of homelessness (in months)	18 (5–48)
Education	
– No degree	113 (18.1)
– School completion certificate	287 (46.0)
– Vocational training completion certificate	178 (28.5)
– Completion of university degree	46 (7.4)
Marital status	
– Married	74 (11.8)
– Single	421 (67.1)
– Widowed	16 (2.6)
– Divorced	116 (18.5)
Origin	
– Germany	329 (51.8)
– EU migrants	213 (33.5)
– Non-EU migrants	93 (14.6)
ETHOS classification	
– Homeless	255 (41.3)
– Emergency accommodation	100 (16.2)
– People in accommodation for the homeless	225 (36.5)
– Women's shelters	32 (5.2)
– Institutions for immigrants and asylum seekers	2 (0.3)
– People in long-term accommodation	3 (0.5)

EU, European Union; ETHOS, European Typology of Homelessness and Housing Exclusion; IQR, Inter-quartile range

Methods
The *eMethods* section provides a detailed explanation of our methods.

Sample
The National Survey on Psychiatric and Somatic Health of Homeless Individuals (NAPSHI) was carried out between June and September 2021 (ethics approval: PV7333). In total, 651 person in Hamburg, Frankfurt, Wiesbaden, Leipzig, Halle, Munich, and Augsburg were included in the study.

Physical health
Self-reported lifetime prevalence rates of physician-diagnosed somatic illnesses were determined by administering an interview-guided questionnaire. To this end, 12 diagnostic groups were interrogated in a dichotomized form. By adding the affirmative responses, sum scores of somatic illnesses were calculated. The point prevalence of somatic illnesses was determined on the basis of clinical and laboratory based surrogate values.

Mental health
The self-reported lifetime prevalence rates of mental illnesses were determined on the basis of an interview-guided questionnaire. The possible presence of depression was queried on the basis of the Patient Health Questionnaire (PHQ)-9 (14). Data on possible generalized anxiety disorder was collected on the basis of the Generalized Anxiety Disorder (GAD) 2 questionnaire (15). If a study participant reported critical substance consumption several days a week or almost daily, a potential substance-related disorder was assumed. A sum score of the point prevalence rates of the named mental disorders was calculated. Furthermore, the feeling of loneliness was determined on the basis of the California Los Angeles (UCLA) Loneliness Scale Version 3 (16).

Possible unrecognized illnesses
If study participants reported not having received a physician diagnosis (reported lifetime prevalence), although diagnostic indications (measured point prevalence) for the possible presence of a particular illness existed, a potential unrecognized illness was assumed.

Results
A total of 651 homeless persons participated in the study. The median age was 43 years, about 20% of participants were female, and half had been born in Germany. The median duration of homelessness was 18 months. According to the European Typology for Homelessness and Housing Exclusion (ETHOS), a large proportion of the people were living rough. *Table 1* shows additional sociodemographic characteristics.

TABLE 2 a

Lifetime and point prevalence of physical illnesses in homeless persons in Germany

	N (%)/median (IQR)
Physical health	
Lifetime prevalence (self reports of received diagnoses)	
– Cardiovascular disease	69 (10.7)
– Arterial hypertension	119 (18.5)
– Hypercholesterolemia	37 (5.8)
– Stroke or other cerebrovascular disorders	38 (4.3)
– Diabetes mellitus/prediabetes	38 (5.9)
– Chronic lung disease	73 (11.3)
– Cancer	15 (2.3)
– Dementias and memory impairments	36 (5.6)
– Chronic liver disease	93 (14.4)
– HIV/AIDS	7 (1.1)
– Tuberculosis	7 (1.1)
Sum score somatic disorders (self reports of received diagnoses)	**0 (0–1)**
Point prevalence (measured)	
– Possible arterial hypertension (RR systolic $\geq$ 140 mmHg and/or diastolic $\geq$ 90 mmHg)	246 (38.5)
– Possible pulmonary disease (SpO_2 < 95%)	60 (9.5)
– Possible liver disease (MELD score > 10 points)	17 (3.2)
– Possible diabetes mellitus ($HbA1_c \geq 6.5$)	24 (4.4)
– Hypercholesterolemia (serum cholesterol $\geq$ 200 mg/dL)	95 (17.6)
– HIV infection confirmed by serology	4 (0.7)
Sum score somatic disorders (measured)	**0 (0–1)**

AIDS, acquired immunodeficiency syndrome; HbA1c, glycated hemoglobin; HIV, human immunodeficiency virus; IQR, interquartile range; MELD, model of end stage liver disease; RR, blood pressure according to Riva-Rocci; SpO_2, peripheral oxygen saturation

Mental and physical health

When asked for the lifetime prevalence, physician diagnoses of cardiovascular disease, liver disease, and chronic pulmonary disease were reported particularly often. Also, high measured point prevalence rates of cardiovascular and metabolic disorders were found among homeless persons (*Table 2a*). Altogether, indications of possible unrecognized somatic disorders were seen in half of the survey participants (*Table 2c*).

Among study participants, 23.1% reported a physician-diagnosed mental illness. Validated questionnaires indicated a possible anxiety disorder in 27.% and possible depression in 26.9% of study participants. Possible substance-related disorders indicated by increased consumption of alcohol or illegal substances were identified in 42.3% and 29.4% of participants, respectively (*Table 2b*). Overall about two thirds of participating homeless persons showed indications of a possible unrecognized mental illness (*Table 2c*).

Healthcare services and service use

Two thirds of study participants reported having health insurance. Among the surveyed homeless persons, 72% reported having had outpatient contact with a doctor within the preceding 12 months. In this subgroup, the median number of consultations was 3. Furthermore, 42.4% of the homeless people reported having received inpatient treatment in the preceding year. The median number of hospital stays in this subgroup was 4 and the median duration 6 nights (*Table 2c*).

Comparison of the health of homeless persons with the German general population

The comparison of self-reported lifetime prevalence rates of physician-diagnosed somatic illnesses showed a lower prevalence of known hypercholesterolemia among homeless persons than in the general population. A significantly increased prevalence of dementia was reported by the surveyed homeless persons than was the case in the general population. The lifetime

TABLE 2 b

Lifetime and point prevalence rates of mental illnesses in homeless persons in Germany

	N (%)/median (IQR)
Mental health	
Lifetime prevalence (self reports of received diagnoses)	
– Mental disorders	148 (23.1)
Point prevalence (measured)	
– Depression (PHQ-9 ≥ 10)	163 (26.9)
– Generalized anxiety disorder (GAD-2 ≥ 3)	172 (27.6)
– Loneliness (UCLA-3 ≥ 6)	263 (42.1)
– Critical alcohol consumption (almost daily/several times weekly)	263 (42.3)
– Consumption of illegal substances (almost daily/several times weekly)	183 (29.4)
Sum score of mental illnesses (measured)	**1 (1–2)**

GAD-2, Generalized Anxiety Disorder 2; IQR, interquartile range; PHQ-9, Patient Health Questionnaire 9;
UCLA-3, University of California Los Angeles loneliness scale version 3

prevalence of HIV infections was also higher in homeless persons than in the general population (*eFigure 1a*). The lower lifetime prevalence of physician-diagnosed mental illness among homeless persons is in contrast to the increased point prevalence of possible anxiety disorders and depression compared with the general population (*eFigure 1c*).

Sociodemographic determinants of health and healthcare services
Our exploration of sociodemographic determinants of health and healthcare showed an association of a high sum score of self-reported physician-diagnosed somatic illnesses with old age, female sex, and living in an institution run by homelessness services (*eTable 3*). An increased sum score of measured somatic illnesses was also associated with older age, but also with originating from an EU country. The self-reported physician diagnosis of a mental illness was, by contrast, inversely associated with non-German origin, as was a high sum score of possible mental disorders. By contrast, an association was seen for a possible unrecognized illnesses and the non-German origin. Use of medical services was not associated with sociodemographic parameters, but having health insurance was associated with German origin (*Table 3*).

Origin and migration history
eFigure 2 shows information regarding people's migration history. Homeless migrants originated primarily from outside the EU (*eFigure 2a*). Homeless migrants from the EU spend a mean of 66.7% of their time living in Germany without fixed abode, whereas for homeless non-EU migrants this was 22.2% (*eFigure 2b*). Homeless persons of German origin mentioned as the cause of their continued homelessness often the lack of suitable accommodation and their mental health, whereas homeless EU migrants often cited economic factors as the reason for their continued homelessness (*eFigure 2c*) and cited these as the reason for migrating (*eFigure 2d*).

Discussion
This multicenter cross-sectional study investigated 651 homeless persons in Germany. Overall, we found high prevalence rates of mental and somatic illnesses; validated screening instruments suggest underdiagnosis, especially regarding mental illness. Non-German origins were associated with a lower prevalence of mental illness, difficulty accessing healthcare, and the presence of possible unrecognized illnesses.

Physical health
This study confirmed high prevalence rates of somatic illnesses from the metabolic and cardiovascular spectrum. As already found in other studies, infectious diseases, such as HIV/AIDS and tuberculosis, as well as liver and lung diseases are more common in homeless persons than in the general population (6, 17). The results of clinical and laboratory tests show for possible diabetes mellitus, possible chronic lung disease, and HIV infection measured point prevalence rates that are comparable to the reported lifetime prevalence rates. By contrast, cardiovascular disorders and hypercholesterolemia were reported more rarely than observed. In the German general population too, studies have found a difference between the reported diagnoses and examination findings (18). Especially as regards possibly unrecognized arterial hypertension, which affects about 5% of the general population, this study showed a raised prevalence of possible unrecognized arterial hypertension among homeless people of 27.5% (19). The collected

TABLE 2 c

Healthcare services and service use by homeless persons

	N (%)/median (IQR)
Services and service use	
– Health insurance	430 (67.7)
– Receipt of transfer payments	287 (46.0)
– Contact with doctor in the past 12 months	460 (73.0)
– Number of doctor contacts (individuals with doctor contact)	3 (2–10)
– Inpatient stay in the past 12 months	255 (42.4)
– Number of inpatient stays (individuals with inpatient stays)	4 (2–12)
– Number of nights in hospital (individuals with inpatient stays)	6 (1–20)
Possible unrecognized illnesses*	
– Possible unrecognized arterial hypertension (possible arterial hypertension, no arterial hypertension reported)	174 (27.5)
– Possible unrecognized pulmonary disease (possible pulmonary disease, no chronic pulmonary disease reported)	50 (7.8)
– Possible unrecognized liver disease (possible liver disease, no liver disease reported)	11 (2.0)
– Possible unrecognized diabetes mellitus (possible diabetes mellitus, no diabetes or raised blood glucose concentrations reported)	6 (1.2)
– Possible unrecognized hypercholesterolemia (possible hypercholesterolemia, no hypercholesterolemia reported)	84 (15.6)
– Possible unrecognized HIV infection (possible HIV infection, no HIV infection reported)	2 (0.3)
– Possible unrecognized mental disorder (depression and/or anxiety disorder and/or critical alcohol consumption and/or consumption of illegal substances, no mental disorder reported)	325 (69.7)
Sum score possible unrecognized illnesses	**1 (1–2)**

*The presence of an unrecognized illness is assumed when study participants self reported not having received a relevant medical diagnosis, but clinical symptoms, laboratory tests, or people's medical history provide indications of a disorder.
HIV, human immunodeficiency virus; IQR, interquartile range

data show than especially the lifetime prevalence of disorders associated with substance misuse are more common in homeless persons than in the general population. Laboratory tests showed an indication of chronic liver disease in only 2.3% of homeless people under study. Since the MELD score was validated primarily to estimate the prognosis of advanced cirrhotic liver disease (20), a lower sensitivity overall can be assumed.

Mental health
The critical consumption of alcohol and illegal substances among homeless persons in Germany is similar to the rates in other high-income countries (21). Furthermore, the point prevalence of mental disorders investigated by means of screening instruments is largely consistent with the already published results of a monocenter cross-sectional study from 2020, which also identified high prevalence rates of loneliness, possible anxiety disorders and depression (7, 22).

In contrast to the recent literature, the lifetime prevalence of physician-diagnosed mental disorders among homeless persons is lower than in the German general population (29). It is possible that the described discrepancy is down to the use of more detailed data collection instruments in the comparison study under consideration. Point prevalence rates of depression and generalized anxiety disorder—which measured higher across all age groups than in the general population (23)—also suggest underdiagnosed mental illness in homeless persons, as does the presence of a possible unrecognized mental illness in more than two thirds of study participants.

A systematic study of 166 homeless persons in North America also showed that some 60% of study participants with indications of a mental illness shown in screening instruments had not received a physician diagnosis of a mental illness (24). The direct comparison of mentally ill homeless people

with people of the same age and sex who were not homeless but had contact with the police because of mental abnormalities identified among homeless persons a more acute need for help and simultaneously a lower probability of further specialist treatment (25). These data underline the huge need for psychotherapeutic/psychiatric healthcare services for homeless people, which presumably is not adequately met in Germany.

Origin and migration history as determinants of health

We used multivariable linear and logistic models to study the sociodemographic determinants of health and healthcare access. As expected we found an association of old age with a high point prevalence and lifetime prevalence of somatic illnesses. Interestingly, in addition to this, statistically significant associations of the origin of homeless people were identified with different parameters.

The effects of migration history on health is the subject of controversial discussion in the literature. The „healthy migrant effect" describes better health in migrants than in the native comparator population. This is explained mainly with the fact that especially persons in good health decide to migrate (9). The described phenomenon is seen in the dataset under study with regard to mental health: homeless persons from Germany had significantly higher prevalence rates of mental illness (eTable 2b).

As regards the point prevalence of somatic illnesses (eTable 2a) and possible unrecognized illnesses, homeless people with a migration history were affected more commonly, which is possibly directly associated with the healthcare situation in their countries of origin and difficult access to healthcare in Germany. It has been described that legal and linguistic obstacles make it harder to integrate into the social security system and have a negative influence on migrants' health (26). Access to regular medical care has been found to be particularly difficult for homeless EU migrants (eTable 2c). This may be due to the fact that mandatory health insurance according to book V of the German Social Code does not apply to economically inactive EU migrants if their residence permit is predicated on their being a member of a health insurance scheme. In addition to nationality, the reason for migration is crucial for integration into statutory emergency support services and social support services (27). More structured support for asylum seeker that was implemented during the refugee wave in the years around 2015 may have contributed to improving the situation of non-EU migrants (28).

Strengths and limitations of the study

This study is the first multicenter cross-sectional study of the mental and physical health of homeless persons in Germany. Recruiting study participants from a multitude of different support services aimed to reflect the baseline totality of homeless persons in Germany in as representative a fashion as possible. The representive-

TABLE 3

Selected sociodemographic determinants (aOR [95% CI]) of the health of and services for homeless persons*1

	Physical health (sum score)		Mental health		Services and service use	
	LP (self reports of received diagnoses)	PP (measured)	LP (self reports of received diagnoses)	PP (measured)	Health insurance	Undetected illness (sum score)
Age (in years)	1.01*4 [1.01; 1.03]	1.02*4 [1.01; 1.03]	1.00 [0.98; 1.02]	0.98*3 [0.97; 0.99]	1.00 [0.98; 1.02]	1.01 [1.00; 1.02]
Sex (ref.: male)	1.54*4 [1.19; 1.98]	0.92 [0.74; 1.14]	1.56 [0.91; 2.67]	1.05 [0.76; 1.44]	1.07 [0.59; 1.97]	0.95 [0.71; 1.27]
Origin ref.: Germany)						
– EU migrants	0.84 [0.68; 1.03]	1.35*4 [1.15; 1.59]	0.49*3 [0.30; 0.82]	0.60*4 [0.45; 0.78]	0.09*4 [0.05; 0.15]	1.51*4 [1.22; 1.87]
– Non-EU migrants	0.90 [0.68 ;1.18]	1.24 [1.00; 1.54]	0.46*2 [0.22; 0.93]	0.89 [0.63; 1.25]	0.25*4 [0.13; 0.46]	1.42*3 [1.07; 1.90]
ETHOS classification (Ref.: homeless)						
– Emergency accommodation	1.09 [0.83; 1.42]	1.11 [0.89; 1.38]	0.52 [0.26; 1.03]	0.87 [0.62; 1.21]	2.29*2 [1.21; 4.34]	1.00 [0.75; 1.33]
– People in accommodation for the homeless	1.27*2 [1.03; 1.56]	1.06 [0.91; 1.25]	0.94 [0.58; 1.51]	1.02 [0.78; 1.33]	2.61*4 [1.59; 4.28]	1.01 [0.82; 1.24]
– Women's shelters	1.08 [0.70; 1.67]	1.31 [0.91; 1.88]	0.84 [0.33; 2.17]	0.78 [0.45; 1.34]	1.61 [0.56; 4.60]	0.99 [0.62; 1.56]
– Institutions for immigrants and asylum seekers	0.47 [0.06; 3.74]	1.99 [0.46; 8.60]	-empty-	0.99 [0.07; 13.19]	-leer-	1.18 [0.24; 5.89]
– People in long-term accommodation	1.34 [0.41; 4.42]	9.96*3 [2.35; 42.20]	-empty-	1.22 [0.20; 7.46]	1.90 [0.13; 28.02]	4.95*2 [1.03; 23.83]

*1 For metric datasets we carried out linear regression and for categorical ones logistic regression. The complete statistical model is in eTable 3.
aOR, adjusted odds ratios; ETHOS, European Typology of Homelessness and housing exclusion; EU, European Union; LP, lifetime prevalence; PP, point prevalence; ref., reference category; 95% CI, 95% confidence interval;
marking/indicating statistical significance: *2p ≤ 0.05; *3p ≤ 0.01; *4p ≤ 0.001; Example of interpretation: increasing homeless individuals' ages by 1 year was associated with a 1.01-fold [95% confidence interval: 1.01;1.03] risk increase for a high sum score of self reported physical diagnoses.

ness of the included cohort is difficult to assess as response rates have not been systematically evaluated. Furthermore, the dataset may be biased as a result of not being able to reach homeless persons. The lifetime prevalence of mental and somatic illnesses was determined via the question of whether an illness had ever been physician-diagnosed. Although this is a commonly used method, underdiagnosis in the cohort can lead to falsely low assumptions. Furthermore, responses given in the sense of social desirability and recall bias may affect the dataset. For this reason, we additionally collected surrogates for possible mental and somatic illnesses. These are subject to relevant limitations as they mostly do not meet the diagnostic gold standard and therefore do not allow definitive diagnoses. The data should therefore be interpreted with caution. The statistical analysis was based on the size of the total dataset after forming sum scores for mental and somatic illnesses. Even though this is an established method, the sum scores we used were not individually validated and do not consider the severity of an individual disorder. Studying persons from different national background can be made difficult by linguistic hurdles. For this reason the questionnaires were translated by native speakers into other languages and the data collection was accompanied by interpreters. The comparison of lifetime prevalence rates of mental and somatic illnesses with the German general population was not successful in each case because of the limited availability of suitable datasets of the German general population. In those cases we took recourse to datasets with lifetime prevalence rates by sex or datasets with (25) year prevalence rates.

In summary, our study confirms high prevalence rates of mental and somatic illnesses in homeless persons in Germany. Deficiencies in healthcare provision can be assumed especially as regards mental illnesses. Homeless people with a history of migration, especially homeless EU migrants, seem disadvantaged as regards their integration into social security systems.

Conflict of interest statement
Prof Ondruschka is a board member of the German Society of Forensic Medicine.

The remaining authors declare that no conflict of interest exists.

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📷 CLINICAL SNAPSHOT

Chronic Leriche Syndrome with Prominent Right Testicular Artery

Coronal CTA imaging of the abdominal vessels (volume rendering technique, VRT) with chronic complete occlusion of the infrarenal aorta and dominant testicular artery running a coiled course to the scrotum (white arrow at the level of the scrotum).

A 64-year-old male patient presented with bilateral intermittent claudication in the thigh region. Cardiovascular risk factors included arterial hypertension, dyslipidemia, approximately 100 cumulative pack years of smoking, and obesity. The ankle-brachial index at rest was reduced to 0.7 on both sides. Provocation testing resulted in a bilaterally relevant drop in the ankle-brachial index (right, 0.4; left, 0.3). Computed tomography angiography (CTA) revealed chronic complete occlusion of the infrarenal aorta, the superior and inferior mesenteric arteries, as well as the bilateral iliac arteries. Typical iliac collateralization with unusually dilated right testicular artery (arrow), potentially contributing in part to the collateral supply to the right leg. Due to the high cardiopulmonary risk and the absence of critical limb-threatening ischemia, the patient initially remained under clinical surveillance, while at the same time risk factors were reduced (recommendation regarding nicotine abstinence/weight reduction, antihypertensive and blood lipid-lowering therapy). Chronic Leriche syndrome is a rare variant of peripheral arterial occlusive disease. In the case presented here, knowledge of arterial conglomerations is crucial, particularly for urologic procedures.

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The Mental and Physical Health of the Homeless

Evidence From the National Survey on Psychiatric and Somatic Health of Homeless Individuals (the NAPSHI Study)

by Franziska Bertram, André Hajek, Katharina Dost, Wiebke Graf, Anna Brennecke, Veronika Kowalski, Victoria van Rüth, Hans-Helmut König, Birgit Wulff, Benjamin Ondruschka, Klaus Püschel, and Fabian Heinrich

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eMETHODS

Sample

The data were collected in the context of the National survey on psychiatric and somatic health of homeless individuals (NAPSHI) between June and September 2021. In total, 651 individuals in metropolitan regions in the north (n=206), south (n=188), west (n=137) and east (n=104) of Germany were included. In detail, 39 different institutions providing homelessness assistance in Hamburg, Frankfurt (plus Mainz and Wiesbaden), Leipzig (plus Halle) and Munich (plus Augsburg) participated in the study.

In the preparatory phase of the NAPSHI study, municipal administrative authorities were contacted and asked to name all institutions proving care for homeless individuals in the respective regions. The concept of NAPSHI study was presented to the organizations. In all institutions that agreed to participate in the data collection, visitors were invited to participate after earlier verbal and written announcements. Study participants had to be at least 18 years old and had to have lived for 7 or more days without a fixed abode. Informed written consent was documented. An expense allowance of 5 Euros per 1/2 hour's study participation was paid in cash to the participants afterwards. Interviews were translated into German, English, French, Italian, Polish, Bulgarian, Russian, Romanian, and Arabic. Furthermore, translated questionnaires were available in German, English, Russian, Polish, and Bulgarian. If available these included the phrases from the validated scales in the respective language. Because of lacking datasets regarding their migration history, 15 participants were excluded from parts of the data analysis. Data on sociodemographic characteristics, lifetime prevalence of mental and somatic illnesses, and access to healthcare services and service use were collected.

Study participants were categorized according to the ETHOS classification (the European Typology of Homelessness and housing exclusion) (14). The lowest allocated ETHOS classification was considered in the evaluation. The migration history was determined by asking for place of birth and nationalities. Further we determined the subjective reasons for homelessness in analogy to a study by Chiu et al. (e15). The reasons for migration were documented according to the data collection regarding the biography in the context of flight and migration in the German Socio-Economic Panel (SOEP, e16). Study participants were interviewed in a separate room. The study received ethics approval from the ethics committee of the Hamburg Medical Association (PV7333) and was carried out in accordance with the Declarations of Helsinki.

Physical health

The lifetime prevalence rates of physician diagnosed somatic illnesses were determined by means of an interview-guided questionnaire. To this end, the lifetime prevalence of all 12 diagnostic groups was interrogated in dichotomized form (yes/no), the questions were formulated according to the catalogue of questions of the Survey of Health, Aging and Retirement in Europe (SHARE): myocardial infarction; heart failure or other cardiac disorders; hypertension; raised cholesterol concentrations; stroke or other cerebrovascular disorders; diabetes or raised blood glucose concentrations; chronic diseases of the lung; cancer (malignant tumors, leukemias, lymphomas); Alzheimer's disease, dementia, memory impairments; chronic liver disease (cirrhosis of the liver, liver injury); HIV/AIDS; tuberculosis. By adding up the affirmative responses, sum scores of the lifetime prevalence of somatic illnesses were calculated according to the self reported received diagnoses.

The point prevalence of somatic illnesses were determined by means of clinical and laboratory based surrogates. Non-invasive blood pressure

measurement was carried out in a seated position after 5–30 minutes. A validated wrist blood pressure monitor [lt. Marketing-Material der Firma](Microlife AG, Wildenau, Switzerland) was used for this purpose. Peripheral oxygen saturation was measured using a pulse oximeter (Beurer, Ulm, Germany). Furthermore venous blood was taken by a qualified technician. Laboratory testing for cholesterol, Hba1c, and confirmation of HIV on serology was done following clinical routines. This was also the case for INR, creatinine, bilirubin, sodium, from which the MELD score was calculated according to the published formula (e17). A sum score of the point prevalence rates of possible somatic illnesses was developed by adding the clinical and laboratory tested indications of possible somatic illnesses, in analogy to the lifetime prevalence.

Mental health

The lifetime prevalence rates of mental illnesses was determined by using an interview-guided questionnaire. To this end, the lifetime prevalence of psychological problems (for example, anxiety disorder, mental problems) was interrogated in dichotomized form (yes/no).

The possible presence of depression was determined by administering the internationally validated Patient Health Questionnaire (PHQ)-9. A sum score was calculated in accordance with the evaluation manual (e18). In analogy to already published data from Germany's general population, the existence of depressive symptoms was assumed from a PHQ-9 sum score of 10 or above (e19). A possible generalized anxiety disorder was determined by administering the Generalized Anxiety Disorder(GAD)-2 questionnaire. A sum score was calculated in accordance with the evaluation manual. The presence of a possible anxiety disorder was assumed from a score of 3 points or more (e20). The consumption of alcohol and illegal substances was interrogated by means of a 5-point Likert scale (1=never, [. . .] 5=almost daily] (alcohol consumption in the preceding year (men: more than five glasses a day; women: more than four glasses a day), consumption of illegal drugs in the preceding year). If alcohol consumption to a critical level or illegal drug consumption occurred several times a week or almost daily, a possible substance related disorder was assumed. A sum score of the point prevalence rates of the mentioned possible mental illnesses was calculated. Furthermore, loneliness was determined by using the University of California Los Angeles (UCLA) Loneliness Scale Version 3 in accordance with the published manuals (e21). The presence of loneliness was assumed from a point score of 6 or higher (e22).

Healthcare services and service use

Access to the healthcare system was determined by asking the study participants whether they had health insurance (yes/no). Use of medical services was determined by asking about contacts with doctors and hospital inpatient stays in the previous 12 months (yes/no). If participants answered "yes," the number of contacts with a doctor , inpatient stays, and nights spent in hospital were determined.

Possible unrecognized illnesses

For mental as well as physical health, the lifetime prevalence was determined on the basis of self reported diagnoses and the point prevalence rates of possible illnesses by means of surrogates based on clinical test, laboratory tests, and medical histories. If study participants reported that they had not received a medical diagnosis of a certain illness, although the measured surrogates indicate its possible presence, a possible unrecognized illness was assumed. If an individual reported having received a medical diagnosis of a disease, independently of history, laboratory tests results, or clinical indications, no unrecognized illness was assumed. This was also the case for individuals who reported not having had a diagnosis from a physician, in

whom their history, laboratory results, or clinical indications hinted at the presence of such a disorder. Individuals with incomplete datasets for the lifetime and point prevalence rates were excluded. In analogy to the point prevalence, a sum score of possible unrecognized illnesses was formed.

Comparison of the lifetime prevalence of mental and somatic illnesses of homeless persons in Germany with the German general population

The entire dataset (n=651) was considered in the analysis of the lifetime prevalence of mental and somatic illnesses. Age and sex dependent lifetime prevalence rates were calculated with their Clopper-Pearson 95% confidence intervals. Where possible, data was compared to corresponding age- and sex-adjusted lifetime prevalence rates from the German general population obtained from the literature. In the context of a comprehensive literature search in German and English, the database PubMed, the information system of health reporting from the federal government, and the databases of the Robert Koch-Institute were searched. The data obtained from the NAPSHI Study was evaluated stratified by age and sometimes sex, in analogy to the published data, and visualized in form of a graphic. Differences between homeless persons and the German general population were rated statistically significant where the published confidence intervals with the applied 95% confidence intervals did not overlap, corresponding to an applied significance level of $\alpha = 0.05$.

Statistical analysis

Categorical variables were reported as numbers and percentages and metric variables as medians with interquartile ranges. We used the Chi square test or Fisher's exact test to compare categorical variables. We compared metric variables by using the Mann-Whitney U test or the Kruskal-Wallis-H test. Adjusted odds ratios for metric variables (sum scores of somatic illnesses, mental illnesses, and possible unrecognized illnesses, as well as contact with doctors and inpatient stays in the previous 12 months) were determined by using linear regression; adjusted odds ratios for categorical variables (health insurance yes/no, physician diagnosed mental illness yes/no) were determined by using logistic regression. The socio-demographic characteristics of the cohort were included in the models as independent variables. Robust estimators and 95% confidence intervals were reported. The model estimator for the logistical models was the likelihood quotient test and for linear models the determination coefficient. A significance level of $a = 0.05$ was applied to the statistical analyses. We used STATA 17.0 (Stata Corp, Texas, USA) for the statistical evaluation of the data.

eTABLE 1

Sociodemographic characteristics of homeless persons in Germany stratified by origin

	German origin N (%)/median (IQR)	EU migrants N (%)/median (IQR)	Non-EU migrants N (%)/median (IQR)	Comparative statistics* p value
	N = 329	N = 213	N = 93	
Sex (female)	72 (22.3)	33 (15.8)	10 (10.8)	0.02
Age (in years)	43 (35–53)	42 (36–52)	40 (32–51)	0.33
Education				< 0.0001
– No degree	38 (11.9)	45 (23.3)	26 (28.9)	–
– School completion certificate	166 (51.9)	70 (36.3)	41 (45.6)	–
– Vocational training certificate	94 (29.4)	62 (32.1)	15 (16.7)	–
– University degree	22 (6.9)	16 (8.3)	8 (8.9)	–
Marital status				< 0.0001
– Single	231 (73.8)	129 (63.9)	47 (51.6)	–
– Married	18 (5.8)	37 (18.3)	18 (19.8)	–
– Widowed	9 (2.9)	4 (2.0)	3 (3.3)	–
– Divorced	55 (17.6)	32 (15.8)	23 (25.3)	–
ETHOS classification				0.03
– Homeless	123 (39.8)	96 (48.2)	24 (27.3)	–
– Emergency accommodation	51 (16.5)	29 (14.6)	15 (17.0)	–
– People in accommodation for the homeless	113 (36.6)	65 (32.7)	43 (48.9)	–
– Women's shelters	21 (6.8)	6 (3.0)	5 (5.7)	–
– Institutions for immigrants and asylum seekers	0 (0.0)	2 (1.0)	0 (0.0)	–
– People in long-term accommodation	1 (0.3)	1 (0.5)	1 (1.1)	–
Duration of homelessness (in months)	21 (6–48)	13.5 (3–60)	12 (5–36)	0.17
Length of time in Germany since migration (in months)	Not applicable	60 (12–144)	96 (48–300)	0.001
Naturalization	Not applicable	0 (0.0)	9 (9.7)	0.08

*The comparative statistical analysis was done using the Chi^2-test/Wilcoxon-Mann-Whitney-U-test. A p value < 0.05 was categorized as significant.
ETHOS, European Typology of Homelessness and housing exclusion; EU, European Union; IQR, interquartile range

eTABLE 2 a

Point and lifetime prevalence rates of somatic illnesses in homeless persons in Germany stratified by origin

	German origin N (%)/median (IQR)	EU migrants N (%)/median (IQR)	Non-EU migrants N (%)/median (IQR)	Comparative statistics p value*
	N = 329	N = 213	N = 93	
Physical health				
Lifetime prevalence (self reports of received diagnoses)				
– Cardiovascular disease	42 (12.9)	20 (9.4)	7 (7.5)	0.24
– Arterial hypertension	66 (20.4)	32 (15.1)	18 (19.4)	0.29
– Hypercholesterolemia	28 (8.7)	7 (3.3)	2 (2.2)	0.01
– Stroke or other vascular cerebral disorders	15 (4.6)	11 (5.2)	2 (2.2)	0.49
– Diabetes mellitus/prediabetes	16 (5.0)	14 (6.7)	7 (7.5)	0.55
– Chronic lung disease	48 (14.7)	17 (8.1)	8 (8.6)	0.04
– Cancer	11 (3.4)	3 (1.4)	0 (0.0)	0.09
– Dementias and memory impairment	16 (4.9)	16 (7.5)	6 (6.6)	0.45
– Chronic liver disease	63 (19.3)	19 (9.0)	11 (12.0)	0.003
– HIV/AIDS	3 (0.9)	2 (0.9)	2 (2.2)	0.57
– Tuberculosis	7 (2.1)	1 (0.5)	0 (0.0)	0.12
Sum score for somatic illnesses (self reports of received diagnoses)	**1 (0–1)**	**0 (0–1)**	**0 (0–1)**	**0.03**
Point prevalence (measured)				
– Possible arterial hypertension (RR systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg)	118 (36.5)	86 (41.5)	35 (38.0)	0.51
– Possible pulmonary disease (SpO$_2$ < 95 %)	30 (9.3)	20 (9.6)	7 (7.9)	0.89
– Liver disease (MELD score >10 points)	8 (3.0)	1 (0.6)	7 (9.6)	0.001
– Possible diabetes mellitus (HbA1c ≥ 6.5)	8 (2.9)	11 (6.1)	5 (6.6)	0.18
– Possible hypercholesterolemia (serum cholesterol ≥ 200 mg/dL)	30 (10.9)	52 (28.9)	10 (13.5)	< 0.0001
– HIV infection confirmed by serology	1 (0.3)	3 (1.5)	0 (0.0)	0.23
Sum score somatic illnesses (measured)	**1 (0–1)**	**1 (0–1)**	**1 (0–1)**	**0.02**

* Comparative statistical analysis was done by using the Chi^2 test/ ANOVA. A p value < 0.05 was defined as significant.
AIDS, acquired immunodeficiency syndrome; HIV, human immunodeficiency virus; IQR, interquartile range; MELD, model of end stage liver disease; RR, blood pressure according to Riva-Rocci;
SpO$_2$ peripheral oxygen saturation

eTABLE 2 b

Point and lifetime prevalence rates of mental illnesses in homeless persons in Germany stratified by origin

	German origin N (%)/median (IQR)	EU migrants N (%)/median (IQR)	Non-EU migrants N (%)/median (IQR)	Comparative statistics p value*
	N = 329	N = 213	N = 93	
Mental health				
Lifetime prevalence (self reports of received diagnoses)				
– Mental illnesses	96 (29.6)	33 (15.6)	12 (13.2)	< 0.0001
Point prevalence (measured)				
– Depression (PHQ-9 ≥ 10)	90 (28.5)	45 (23.8)	25 (29.1)	0.47
– Generalized anxiety disorder (GAD-2 ≥ 3)	94 (29.1)	48 (24.2)	24 (27.3)	0.48
– Loneliness (UCLA3 ≥ 6)	153 (47.4)	64 (32.2)	40 (44.9)	0.02
– Alcohol consumption (almost daily/several times weekly)	138 (43.1)	83 (41.9)	32 (36.0)	0.48
– Consumption of illegal substances (almost daily/several times weekly)	119 (37.4)	28 (13.9)	33 (37.1)	< 0.001
Sum score for mental disorders	**2 (1–3)**	**1 (0–2)**	**2 (1–3)**	**< 0.001**

* The comparative statistical analysis was done by using the Chi^2 test/ ANOVA. A p value < 0.05 was defined as significant.
EU, European Union; GAD-2, General Anxiety Disorder 2. IQR, interquartile range. PHQ-9, Patient Health Questionnaire 9;
UCLA, University of California Los Angeles loneliness scale version 3

eTABLE 2 c

Healthcare services and service use of homeless persons in Germany, stratified by origin[*1]

	German origin N (%)/median (IQR)	EU migrants N (%)/median (IQR)	Non-EU migrants N (%)/median (IQR)	Comparative statistic p value[*2]
	N = 329	N = 213	N = 93	
Healthcare services and service use				
– Health insurance	281 (86.7)	77 (37.6)	62 (67.4)	< 0.001
– Receipt of transfer payments	205 (63.9)	35 (17.4)	38 (43.7)	< 0.001
– Contact with a doctor in previous 12 months	244 (76.3)	144 (69.9)	63 (69.2)	0.19
– Number of contacts with doctor (total cohort)	2 (0–6)	1.5 (0–5)	1 (0–5)	0.58
– Number of contacts with doctor (individuals having contact with doctor)	4 (2–10)	3 (1–10)	3 (1–10)	0.88
– Inpatient stay in preceding 12 months	133 (42.9)	81 (41.8)	37 (44.1)	0.85
– Number of inpatient stays (total cohort)	0 (0–1)	0 (0–1)	0 (0–1)	0.86
– Number of inpatient stays (individuals having inpatient stays)	1 (1–3)	1 (1–3)	1 (1–2)	0.14
– Number of nights in hospital (total cohort)	0 (0–5)	0 (0–2)	0 (0–4)	0.58
– Number of nights in hospital (indivbiduals with inpatient stay)	4 (2–10)	3 (1–10)	3 (1–10)	0.92
Possible unrecognized illnesses				
– Possible unrecognized arterial hypertension (possible arterial hypertension, no arterial hypertension reported)	79 (24.8)	68 (33.0)	21 (22.8)	0.07
– Possible unrecognized pulmonary disease (possible pulmonary disease, no chronic lung disease reported)	22 (6.9)	18 (8.7)	7 (8.9)	0.74
– Possible unrecognized liver disease (possible liver disease, no liver disease reported	4 (1.4)	1 (0.6)	6 (8.0)	<0.0001
– Possible unrecognized diabetes mellitus (possible diabetes mellitus, no diabetes nor raised blood glucose concentrations reported)	2 (0.8)	4 (2.3)	0 (0.0)	0.2
– Possible unrecognized hypercholesterolemia (possible hypercholesterolemia, no hypercholesterolemia reported)	79 (24.8)	68 (33.0)	21 (22.8)	0.07
– Possible HIV infection (possible HIV infection, no HIV infection reported)	0 (0.0)	2 (1.0)	0 (0.0)	0.15
– Possible unrecognized mental disorder (depression and/or anxiety disorder and/or critical alcohol consumption and/or consumption of illegal substances, no mental disorder reported)	154 (61.6)	109 (76.8)	56 (82.4)	< 0.0001
Sum score of possible unrecognized disorders	**1 (1–2)**	**1 (1–2)**	**1 (1–2)**	**< 0.0001**

[*1] Presence of a possible unrecognized illness is assumed when study participants themselves reported having received no medical diagnosis.
but laboratory tests and their medical history provides relevant indications.
[*2] Comparative statistical analysis was done using the Chi^2 test/ ANOVA . A p value < 0.05 was classed as significant.
EU, European Union; HIV, human immunodeficiency virus; IQR, interquartile range.

eTABLE 3

Sociodemographic determinants (aOR [95% CI]) of health and healthcare services for homeless persons*1

	Physical health (sum score)		Mental health (sum score)		Healthcare provision and use			
	LP (self reports of received diagnoses)	PP (measured)	LP (self reports of received diagnoses)	PP (measured)	Health insurance	Contact with a doctor in past 12 months	Inpatient stay in past 12 months	Possible unrecognized disorders (sum score)
Age (in years)	1.01*4 [1.01; 1.03]	1.02*4 [1.01; 1.03]	1.00 [0.98; 1.02]	0.98*3 [0.97; 0.99]	1.00 [0.98; 1.02]	1.02 [1.00; 1.04]	1.00 [0.98; 1.02]	1.01 [1.00; 1.02]
Sex (ref.: male)	1.54*4 [1.19; 1.98]	0.92 [0.74; 1.14]	1.56 [0.91; 2.67]	1.05 [0.76; 1.44]	1.07 [0.59; 1.97]	0.89 [0.52; 1.53]	0.98 [0.60; 1.60]	0.95 [0.71; 1.27]
Education (ref.: no certificate of completion)								
– School completion certificate	1.04 [0.80; 1.34]	1.17 [0.96; 1.43]	0.80 [0.43; 1.46]	0.92 [0.67; 1.28]	1.15 [0.65; 2.05]	1.32 [0.76; 2.28]	0.85 [0.51; 1.42]	1.17 [0.90; 1.52]
– Vocational training completion certificate	1.05 [0.79; 1.39]	1.16 [0.93; 1.44]	1.09 [0.56; 2.09]	0.88 [0.61; 1.26]	1.31 [0.68; 2.49]	1.06 [0.58; 1.94]	0.97 [0.56; 1.70]	1.23 [0.91; 1.65]
– University degree	0.99 [0.66; 1.48]	1.33 [0.99; 1.79]	1.61 [0.68; 3.83]	0.56*2 [0.34; 0.93]	1.64 [0.64; 4.16]	1.20 [0.50; 2.87]	1.26 [0.58; 2.73]	1.05 [0.68; 1.62]
Marital status (ref.: single)								
– Married	1.02 [0.75; 1.39]	0.82 [0.65; 1.05]	1.24 [0.61; 2.53]	0.96 [0.65; 1.44]	1.38 [0.69; 2.76]	0.58 [0.31; 1.09]	1.80 [0.99; 3.27]	0.71*2 [0.51; 0.99]
– Widowed	0.82 [0.46; 1.49]	0.73 [0.47; 1.13]	1.04 [0.30; 3.62]	1.02 [0.49; 2.14]	3.85 [0.75; 19.76]	1.41 [0.37; 5.38]	1.76 [0.59; 5.22]	1.00 [0.55; 1.80]
– Divorced	1.28 [0.99; 1.66]	0.97 [0.79; 1.19]	0.98 [0.54; 1.79]	1.13 [0.81; 1.57]	0.98 [0.53; 1.81]	1.41 [0.76; 2.60]	1.28 [0.76; 2.15]	0.93 [0.71; 1.21]
Origin (ref.: Germany)								
– EU migrants	0.84 [0.68; 1.03]	1.35*4 [1.15; 1.59]	0.49*3 [0.30; 0.82]	0.60*4 [0.45; 0.78]	0.09*4 [0.05; 0.15]	0.84 [0.54; 1.33]	0.81 [0.53; 1.23]	1.51*4 [1.22; 1.87]
– Non-EU migrants	0.90 [0.68; 1.18]	1.24 [1.00; 1.54]	0.46*2 [0.22; 0.93]	0.89 [0.63; 1.25]	0.25*4 [0.13; 0.46]	0.94 [0.51; 1.73]	0.90 [0.52; 1.54]	1.42*3 [1.07; 1.90]
Duration of homelessness (months)	1.00 [1.00; 1.00]	1.00 [1.00; 1.00]	1.00 [1.00; 1.01]	1.00*3 [1.00; 1.00]	1.00 [1.00; 1.00]	1.00 [1.00; 1.00]	1.00 [1.00; 1.00]	1.00 [1.00; 1.00]
ETHOS classification (ref.: homeless)								
– Emergency shelters	1.09 [0.83; 1.42]	1.11 [0.89; 1.38]	0.52 [0.26; 1.03]	0.87 [0.62; 1.21]	2.29*2 [1.21; 4.34]	0.97 [0.55; 1.70]	1.42 [0.84; 2.39]	1.00 [0.75; 1.33]
– People in accommodation for the homeless	1.27*2 [1.03; 1.56]	1.06 [0.91; 1.25]	0.94 [0.58; 1.51]	1.02 [0.78; 1.33]	2.61*4 [1.59; 4.28]	1.45 [0.92; 2.31]	1.16 [0.77; 1.76]	1.01 [0.82; 1.24]
– Women's shelters	1.08 [0.70; 1.67]	1.31 [0.91; 1.88]	0.84 [0.33; 2.17]	0.78 [0.45; 1.34]	1.61 [0.56; 4.60]	0.97 [0.38; 2.46]	0.80 [0.32; 2.02]	0.99 [0.62; 1.56]
– Institutions for immigrants and asylum seekers	0.47 [0.06; 3.74]	1.99 [0.46; 8.60]	-empty-	0.99 [0.07; 13.19]	-empty-	-empty-	-empty-	1.18 [0.24; 5.89]
– People in long-term accommodation	1.34 [0.41; 4.42]	9.96*3 [2.35; 42.20]	-empty-	1.22 [0.20; 7.46]	1.90 [0.13; 28.02]	-empty-	1.57 [0.09; 26.00]	4.95*2 [1.03; 23.83]
Model estimator	N = 507 p = 0.000 R2 = 0.11	N = 412 p = 0.000 R2 = 0.14	N = 518 p = 0.0478 LR = 23.85	N = 485 p = 0.0003 R2 = 0.06	N = 527 p = 0.000 LR = 136.55	N = 518 p = 0.2499 LR = 17.12	N = 506 p = 0.8006 LR = 10.30	N = 288 p = 0.0050 R2 = 0.06

*1 For metric datasets we carried out linear regression, for categorical ones logistic regression. Indicating/marking statistical significance: *2 $p \leq 0.05$, *3 $p \leq 0.01$, *4 $p \leq 0.001$.
Example of interpretation: Increasing the age of homeless individuals by 1 year was associated with a 1.01-fold [95% confidence interval: 1.01; 1.03] increased risk for a high sum score of self reported physical diagnoses.
aOR, adjusted odds ratios; ETHOS, European Typology of Homelessness and housing exclusion; EU, European Union; LP, lifetime prevalence; LR, likelihood ratio; PP, point prevalence;
Ref., reference category; R^2, adjusted R square; 95% CI, 95% confidence interval
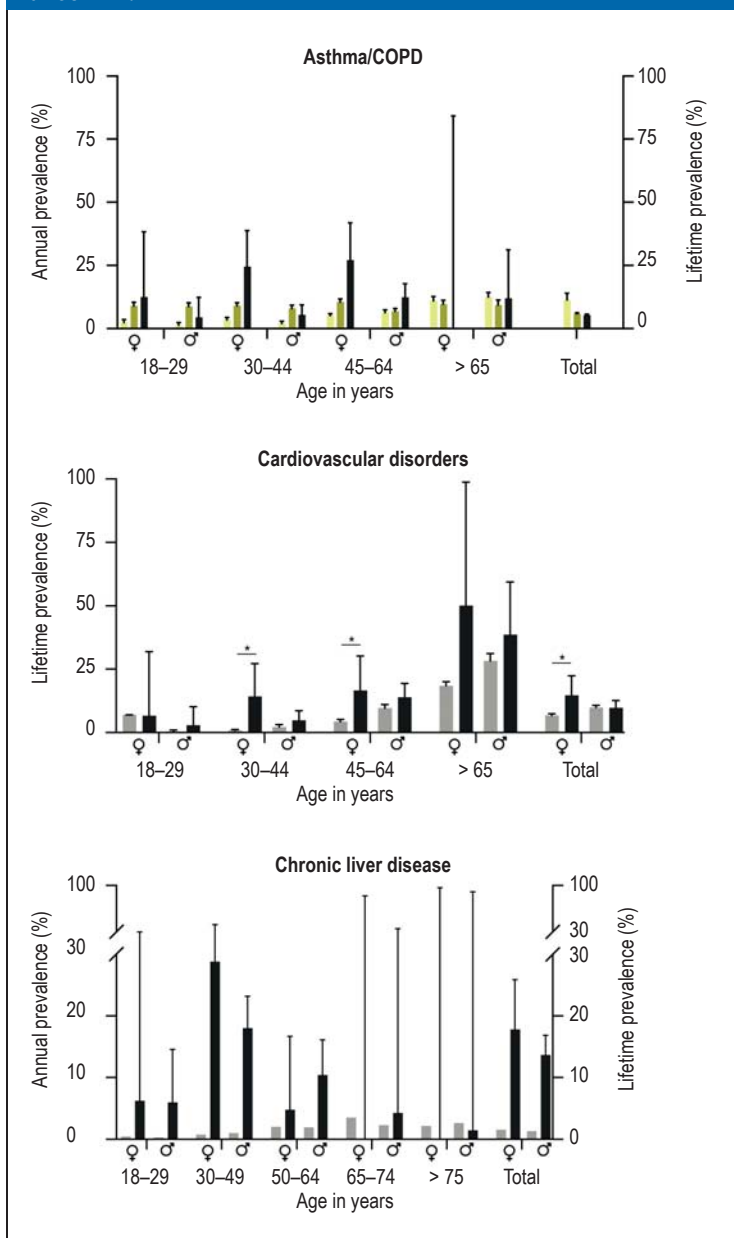
eFIGURE 1 a
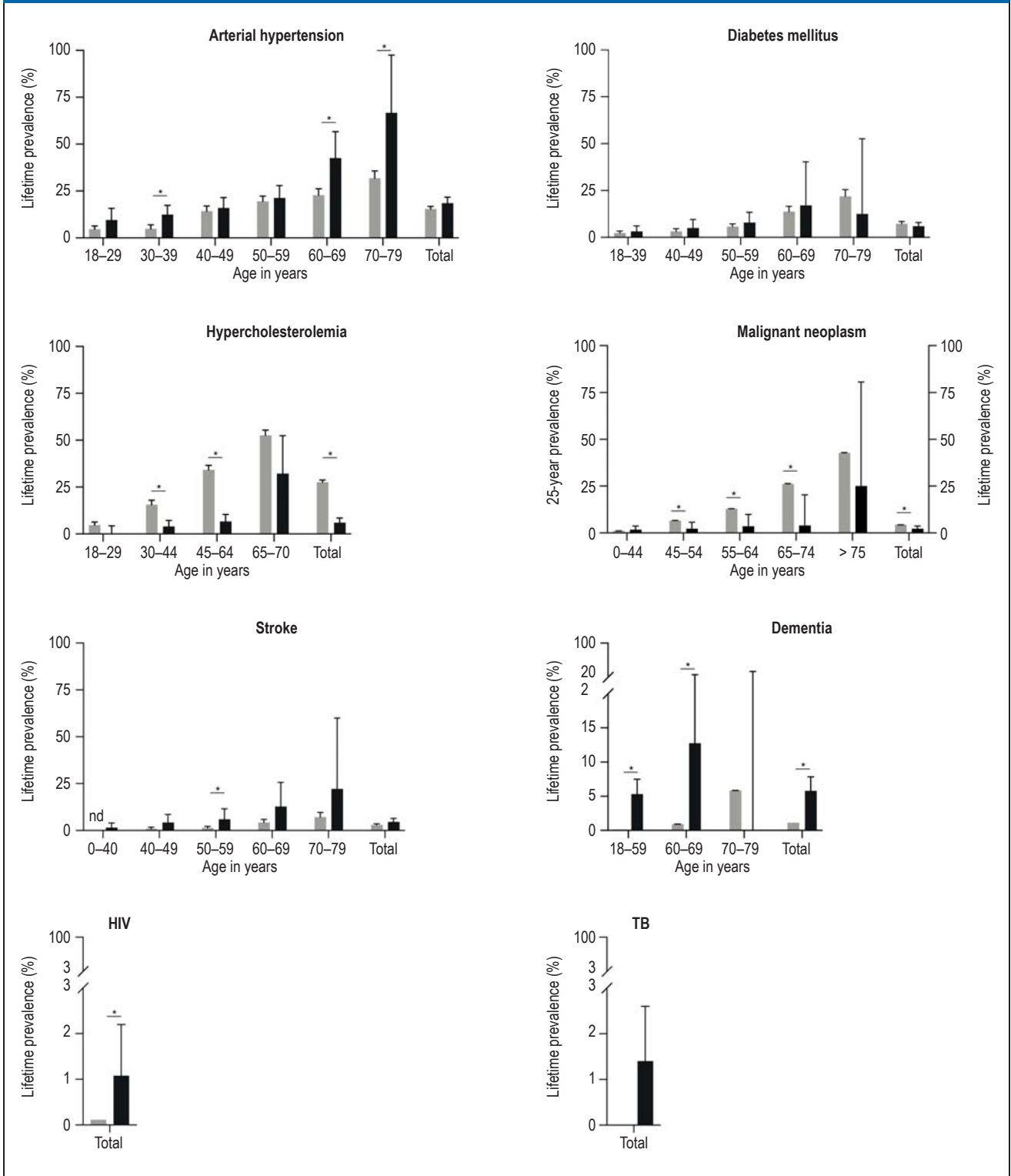
Total

Comparison of lifetime prevalence rates of mental and somatic illnesses in homeless persons with the general population
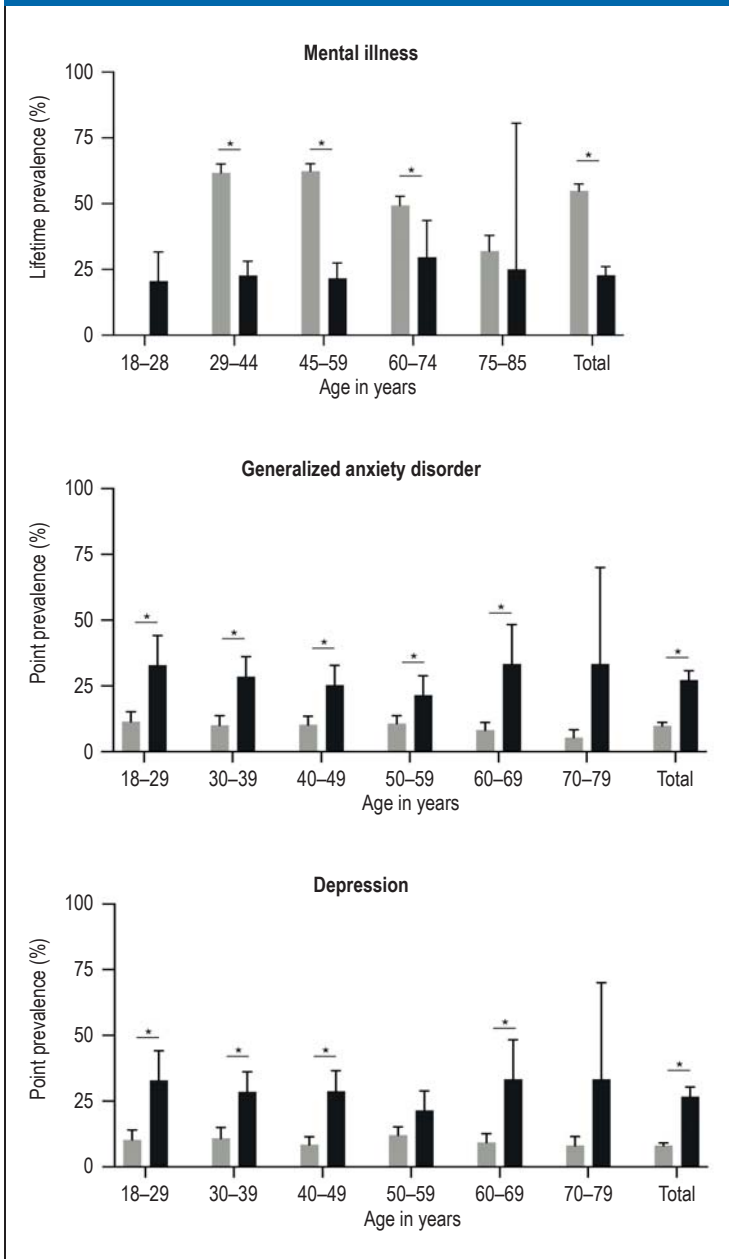
Age-adjusted lifetime prevalence rates (95% confidence intervals) of physician-diagnosed somatic illnesses in homeless persons (black) with those of the German general population (gray). The figure shows prevalence rates of arterial hypertension (e1), diabetes mellitus (e2), hypercholesterolemia (e3), cancer (e4), stroke (e5), dementia (e6), HIV infection (HIV)(e7), and tuberculosis (TB).

eFIGURE 1 b

Comparison of lifetime prevalence rates (95% confidence intervals) of physician-diagnosed somatic illnesses in homeless persons (black) with those of the German general population (gray). The figures shows prevalence rates of COPD are shown in pale yellow (e8), bronchial asthma in olive green (e9), cardiovascular disorders (e9), and chronic liver disease (e10).

eFIGURE 1 c

Comparison of prevalence rates of mental illnesses in homeless persons with the general population

Age-adjusted lifetime/point prevalence rates (95% confidence intervals) in homeless persons (black) and those of Germany's general population (gray). The figures shows age-adjusted lifetime prevalence rates of mental illnesses (e11) and measured point prevalence rates of possible depression (e12) and generalized anxiety disorders (e13).

eFIGURE 2 a
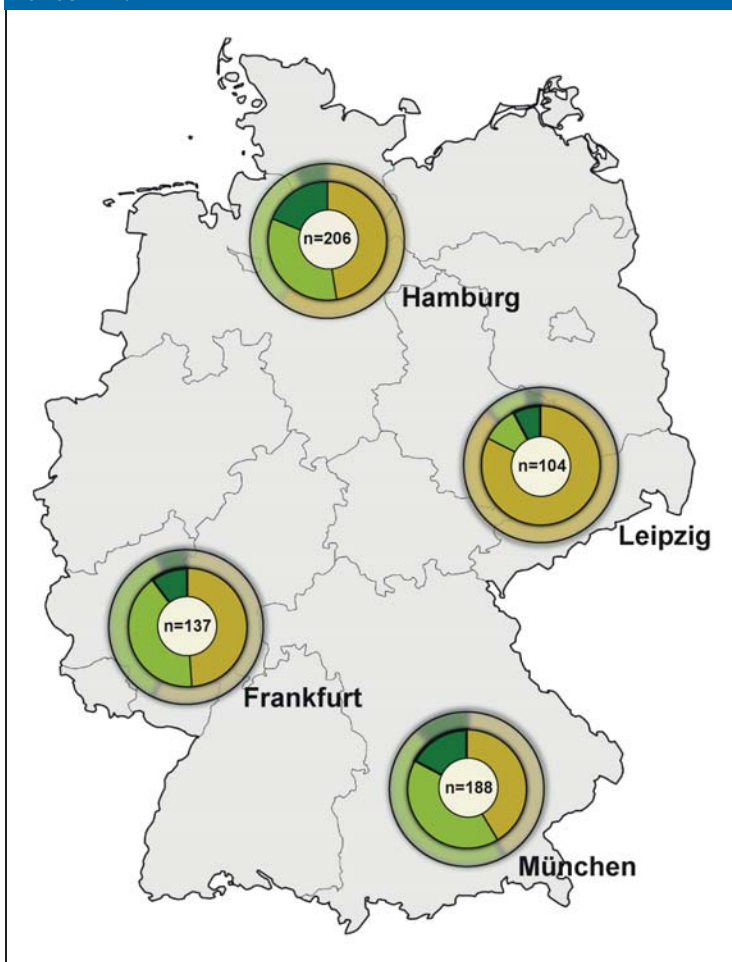
Migration history of homeless persons in Germany
Numbers of homeless persons by metropolitan regions of recruitment. The figure shows origin from (%, inner pie chart) and nationality (%, outer pie chart) from Germany (yellow), EU countries (light green), and non-EU countries (dark green).
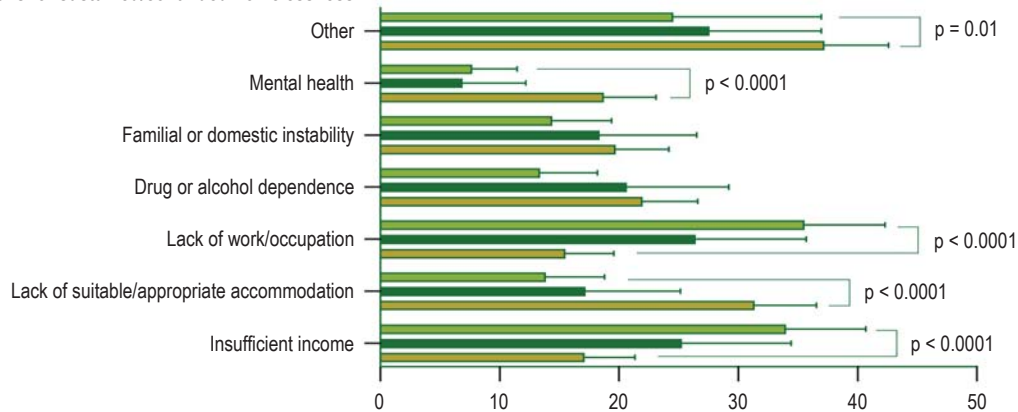
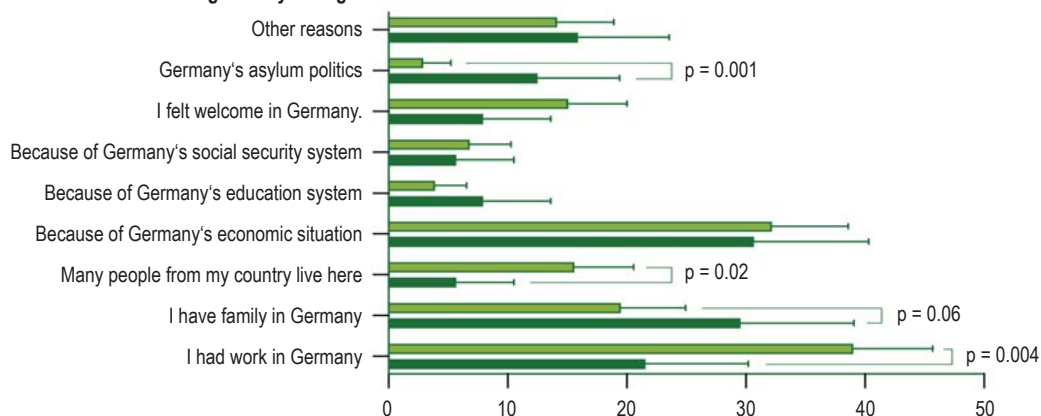eFIGURE 2 b
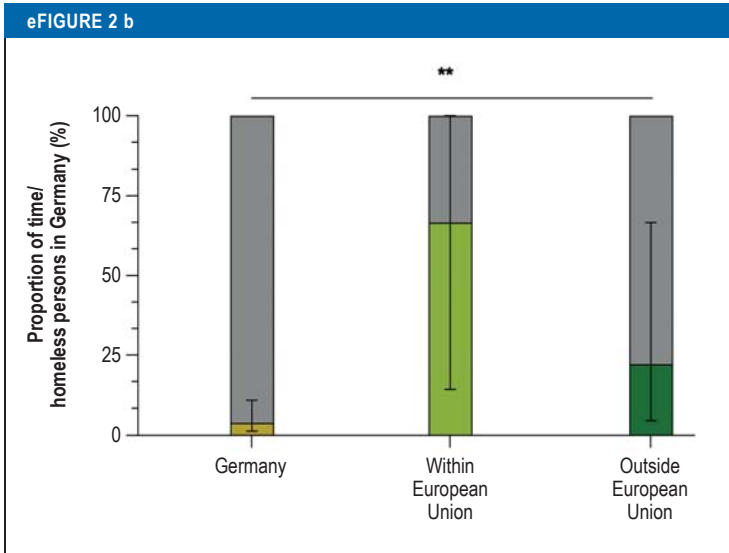
Migration history of homeless persons in Germany
Time period of homelessness (in %, 95% confidence interval) as a proportion of time spent in Germany stratified by origin. Where differences reach significance, P values are given.
Germany (yellow), EU countries (light green), and non-EU countries (dark green), proportion of time in Germany with a fixed abode (grey)
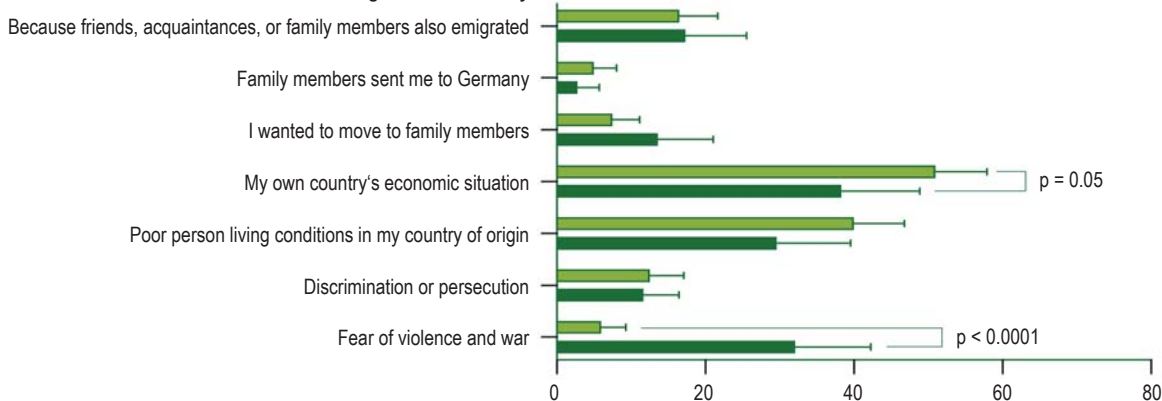
eFIGURE 2 c

Migration history of homeless persons in Germany
Distribution of answers (%, 95 % confidence interval) regarding reasons for continued homelessness, emigration from country of origin, an immigration into Germany stratified by origin. Where differences reach significance, P values are shown. Germany (yellow), EU countries (light green), and non-EU countries (dark green); proportion of time in Germany with a fixed abode (gray)