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Original Research

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Somatic multicomorbidity and disability in patients with psychiatric disorders in comparison to the general population: a quasi-epidemiological investigation in 54,826 subjects from 40 countries (COMET-G study)

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Abstract

Background. The prevalence of medical illnesses is high among patients with psychiatric disorders. The current study aimed to investigate multi-comorbidity in patients with psychiatric disorders in comparison to the general population. Secondary aims were to investigate factors associated with metabolic syndrome and treatment appropriateness of mental disorders.

Methods. The sample included 54,826 subjects (64.73% females; 34.15% males; 1.11% nonbinary gender) from 40 countries (COMET-G study). The analysis was based on the registration of previous history that could serve as a fair approximation for the lifetime prevalence of various medical conditions.

Results. About 24.5% reported a history of somatic and 26.14% of mental disorders. Mental disorders were by far the most prevalent group of medical conditions. Comorbidity of any somatic with any mental disorder was reported by 8.21%. One-third to almost two-thirds of somatic patients were also suffering from a mental disorder depending on the severity and multicomorbidity. Bipolar and psychotic patients and to a lesser extent depressives, manifested an earlier (15–20 years) manifestation of somatic multicomorbidity, severe disability, and probably earlier death. The overwhelming majority of patients with mental disorders were not receiving treatment or were being treated in a way that was not recommended. Antipsychotics and antidepressants were not related to the development of metabolic syndrome.

Conclusions. The finding that one-third to almost two-thirds of somatic patients also suffered from a mental disorder strongly suggests that psychiatry is the field with the most trans-specialty and interdisciplinary value and application points to the importance of teaching psychiatry and mental health in medical schools and also to the need for more technocratically oriented training of psychiatric residents.

Introduction

The prevalence of medical illnesses is reported to be high among people with mental illness. In fact, mentally ill people are more likely than the general population to develop medical conditions, develop them at a younger age, and die earlier from them.[1–3] In a population-based cohort study of 4.6 million people in Denmark (from 1994 to 2007), results indicated that 5 years after their first contact with the healthcare system for heart disease, 8.26% of people with a comorbid severe mental disorder had died, versus 2.86% of those without.[4]

It has been reported that approximately 50–90% of people with severe psychiatric disorders have at least one chronic medical illness[5] and the rates are even higher in those with comorbid substance-use disorders.[6] Obesity, diabetes, hypertension, and dyslipidemia, a cluster of conditions also known as metabolic syndrome, occur at rates 1.5 to 5 times greater than the rates seen in the general population[7] and at a rate 2 to 3 times higher in schizophrenia and bipolar disorder in comparison to the general population,[7,8] with the use of atypical antipsychotics being an additional risk factor.[9] The rates seem to increase with the severity of mental disorders.[10] From a reverse angle, almost half of the general population suffers from a chronic somatic condition[1] and those persons with more somatic disorders tend to have more psychiatric disorders.[2]

This leads to greater symptom burden and functional impairment, poorer quality of life, higher costs, and excess mortality,[11,12] especially in elderly patients with psychiatric disorders.[13,14]

There are only a few studies that have investigated the prevalence and the patterns of lifetime co-occurrence of mental health conditions with a broader range of somatic conditions in large study samples. The current study aimed to investigate the rates of mental disorders in the general population as well as somatic multicomorbidity and its relationship to specific mental disorders and their treatment, with the use of the COMET-G dataset. Secondary aims were to investigate factors associated with metabolic syndrome and treatment appropriateness of mental disorders.

Material and methods

The data used in this study is from the COVID-19 Mental Health International for the General Population (COMET-G) study, the main findings of which have been already published.[15–20] The full protocol used is available in the web appendix of the first published COMET study.[17]

The data were collected online and anonymously from April 2020 to March 2021. Announcements and advertisements were made on social media and news sites, but no other organized effort

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was taken. The first page included a declaration of consent which everybody accepted by continuing with the participation.

Approval was initially given by the Ethics Committee of the Faculty of Medicine, Aristotle University of Thessaloniki, Greece, and locally concerning each participating country.

The study sample included data from 40 countries (Figure 1) concerning 55,589 responses, but for the current article, complete data were available for 54,826 subjects (64.73% females; 34.15% males; 1.11% nonbinary gender).

The contribution of each country and the gender and age composition, as well as details concerning various sociodemographic variables (marital status, education, work, etc.), have been already reported.[15–20]

The study population was self-selected, and the only limitation was age >17. It was not possible to apply post-stratification on the sample as it was done in a previous study,[15] because this would mean that we would utilize a similar methodology across many different countries and the population data needed were not available for all.

The protocol, which is also available in previous publications,[17] included the registration of already existing (not emerged during the pandemic) somatic and mental disorders. The questions B2, B3, B5, and B6 were used as the source of variables for the current study. The current treatment status was registered but not its history. The COVID-19 pandemic acted as a stressful condition and triggered the emergence of both somatic and mental disorders even de novo, but previous history could serve as a fair approximation for the lifetime prevalence of various medical conditions in the study sample in a quasi-epidemiological frame for the time point just before the pandemic.

The complete list of conditions registered and their grouping is shown in Table 1. All the data were self-reported, no clinical assessment was made and this constitutes a significant problem for the interpretation of the results. A composite score reflecting the presence of hypertension, dyslipidemia, diabetes mellitus, and obesity (0–4) was created and used as a factor reflecting the presence and severity of the metabolic syndrome.

Statistical analysis

- Detailed descriptive statistics were calculated and tables were created.
- The *t*-test was used to search for differences between groups, with the *p*-level of $p < 0.001$ used as the level of significance since many tests were performed.
- Risk ratios (RR) were calculated as the ratio of the percentage of pathological state divided by the percentage of nonpathological state.

The statistical package SPSS v.29 (Aristotle University of Thessaloniki, Greece) was used for the analysis.

Results

Demographics

The study sample included data from 40 countries (Figure 1). In total, data from 54,826 participants were utilized (aged 35.45 ± 13.51 years); of them, 35,489 were females (64.73%; aged 35.80 ± 13.61 years) and 18,725 males (34.15%; aged 34.90 ± 13.29 years), while 612 declared "nonbinary gender" (1.11%; aged 31.64 ± 13.15 years). The age means and standard deviations were identical to the original study sample of 55,589 subjects.[15,17] Less than 6.5% of the participants were older than 60 years.

Figure 1. Map of the 40 participating countries.

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Table 1. Percentages of Major Groups of Somatic Disorders and Specific Disorders in the Patients with Psychiatric Disorders' Diagnostic Groups and Also Under the Age of 46

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Any somatic condition	F	No	23.39		17.60											
	F	Yes	32.55	1.39	26.93	1.53	24.63	1.40	26.45	1.50	35.17	2.00	36.48	2.07	29.84	1.70
	M	No	19.80		13.96											
	M	Yes	28.33	1.43	22.99	1.65	21.96	1.57	23.76	1.70	23.50	1.68	27.72	1.99	23.03	1.65
	N	No	19.16		17.15											
	N	Yes	28.57	1.49	27.59	1.61	17.78	1.04	28.38	1.65	38.46	2.24	28.57	1.67	29.03	1.69
Any respiratory disorder	F	No	3.90		3.71											
	F	Yes	5.68	1.46	5.44	1.47	4.93	1.33	5.49	1.48	7.85	2.12	6.44	1.73	5.97	1.61
	M	No	3.21		3.13											
	M	Yes	4.28	1.34	3.95	1.26	3.14	1.00	5.04	1.61	3.83	1.22	3.47	1.11	2.92	0.93
	N	No	2.10		1.94											
	N	Yes	3.46	1.65	3.94	2.03	0.00	—	2.70	1.39	3.85	1.98	4.76	2.45	12.90	6.65
Any cardiovascular disorder	F	No	6.14		3.14											
	F	Yes	6.56	1.07	3.41	1.08	4.18	1.33	3.23	1.03	2.91	0.92	5.15	1.64	1.95	0.62
	M	No	6.35		3.10											
	M	Yes	8.57	1.35	5.06	1.63	4.89	1.58	5.13	1.65	2.73	0.88	4.46	1.44	6.71	2.16
	N	No	4.20		3.56											
	N	Yes	2.16	0.52	1.48	0.42	2.22	0.62	0.00	—	3.85	1.08	0.00	—	3.23	0.91
Any neurological disorder	F	No	0.60		0.61											
	F	Yes	1.40	2.32	1.35	2.20	1.12	1.82	1.45	2.35	0.00	—	1.72	2.80	1.83	2.98
	M	No	0.46		0.35											
	M	Yes	0.82	1.79	0.80	2.27	0.75	2.13	0.90	2.53	0.00	—	0.99	2.80	1.17	3.30
	N	No	0.52		0.65											
	N	Yes	1.73	3.30	1.48	2.28	0.00	—	1.35	2.09	0.00	—	0.00	—	6.45	9.97
Any ear—neck—throat disorder	F	No	0.62		0.67											
	F	Yes	0.90	1.46	0.96	1.44	0.83	1.24	0.99	1.48	1.16	1.74	1.72	2.57	0.97	1.46
	M	No	0.53		0.57											
	M	Yes	0.63	1.18	0.57	0.99	0.63	1.09	0.65	1.14	1.09	1.91	0.50	0.86	0.29	0.51
	N	No	1.31		1.62											
	N	Yes	2.16	1.65	2.46	1.52	2.22	1.37	2.70	1.67	0.00	—	4.76	2.94	3.23	1.99

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Any gastroenterological disorder	F	No	0.94		0.92											
	F	Yes	1.78	1.90	1.78	1.95	1.37	1.49	1.76	1.92	1.16	1.27	8.15	8.90	1.71	1.86
	M	No	0.94		0.94											
	M	Yes	1.50	1.59	1.47	1.58	1.76	1.88	1.79	1.91	1.64	1.75	0.50	0.53	1.17	1.25
	N	No	1.57		1.62											
	N	Yes	0.87	0.55	0.99	0.61	0.00	—	0.00	—	3.85	2.38	4.76	2.94	0.00	—
Any autoimmune disorder	F	No	1.17		1.00											
	F	Yes	2.30	1.96	2.01	2.02	1.37	1.37	2.29	2.30	2.33	2.34	1.72	1.72	2.68	2.69
	M	No	0.48		0.40											
	M	Yes	0.90	1.88	0.90	2.28	0.88	2.22	1.06	2.67	1.09	2.76	0.99	2.50	0.58	1.47
	N	No	0.52		0.32											
	N	Yes	2.16	4.12	2.46	7.61	0.00	—	4.05	12.53	0.00	—	0.00	—	6.45	19.94
Any dermatological disorder	F	No	0.28		0.29											
	F	Yes	0.58	2.12	0.63	2.16	0.37	1.28	0.72	2.48	0.58	2.00	1.72	5.90	0.61	2.09
	M	No	0.23		0.22											
	M	Yes	0.33	1.45	0.37	1.68	0.50	2.29	0.24	1.11	0.55	2.49	0.99	4.52	0.29	1.33
	N	No	0.26		0.00											
	N	Yes	1.30	4.95	1.48	—	0.00	—	2.70	—	0.00	—	0.00	—	3.23	—
Any hepatic disorder	F	No	0.24		0.22											
	F	Yes	0.39	1.61	0.33	1.53	0.25	1.14	0.36	1.66	0.29	1.34	0.43	1.98	0.37	1.68
	M	No	0.23		0.20											
	M	Yes	0.30	1.29	0.23	1.16	0.13	0.62	0.33	1.61	0.00	—	0.99	4.90	0.00	—
	N	No	0.26		0.32											
	N	Yes	0.43	1.65	0.49	1.52	0.00	—	1.35	4.18	0.00	—	0.00	—	0.00	—
Any renal disorder	F	No	0.42		0.40											
	F	Yes	0.37	0.88	0.39	0.98	0.29	0.72	0.43	1.08	0.29	0.72	0.00	—	0.73	1.82
	M	No	0.29		0.20											
	M	Yes	0.52	1.82	0.44	2.15	0.63	3.10	0.24	1.21	0.55	2.70	0.99	4.90	0.58	2.88
	N	No			0.00											
	N	Yes	2.16	—	2.46	—	6.67	—	1.35	—	3.85	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Any skeletal disorder	F	No	0.90		0.62											
	F	Yes	1.29	1.44	0.91	1.47	0.79	1.27	0.96	1.56	0.58	0.94	1.29	2.08	1.22	1.97
	M	No	0.68		0.46											
	M	Yes	0.63	0.93	0.57	1.25	0.63	1.38	0.57	1.25	1.09	2.40	0.50	1.09	0.58	1.28
	N	No	1.31		1.29											
	N	Yes	0.43	0.33	0.49	0.38	0.00	—	0.00	—	0.00	—	4.76	3.68	0.00	—
Other somatic conditions/disorder	F	No	1.66		1.22											
	F	Yes	2.59	1.56	2.34	1.92	1.86	1.53	2.75	2.26	3.20	2.63	1.29	1.06	1.95	1.60
	M	No	1.14		0.99											
	M	Yes	2.02	1.77	1.74	1.77	1.38	1.40	1.95	1.98	1.64	1.66	2.48	2.51	2.04	2.07
	N	No	2.10		2.59											
	N	Yes	3.90	1.86	3.45	1.33	4.44	1.72	2.70	1.04	3.85	1.49	4.76	1.84	0.00	—
Asthma	F	No	3.40		3.34											
	F	Yes	4.91	1.44	4.82	1.44	4.43	1.33	4.99	1.49	6.40	1.91	3.43	1.03	5.36	1.60
	M	No	2.76		2.76											
	M	Yes	3.68	1.34	3.55	1.29	3.01	1.09	4.72	1.71	3.28	1.19	1.49	0.54	2.33	0.85
	N	No	1.84		1.62											
	N	Yes	2.60	1.41	2.96	1.83	0.00	—	1.35	0.84	0.00	—	4.76	2.94	12.90	7.97
Bronchitis	F	No	0.32		0.25											
	F	Yes	0.34	1.08	0.28	1.14	0.21	0.83	0.19	0.77	0.58	2.34	2.58	10.35	0.24	0.98
	M	No	0.26		0.26											
	M	Yes	0.27	1.05	0.20	0.77	0.13	0.48	0.00	—	0.55	2.09	1.98	7.58	0.00	—
	N	No	0.26		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
COPD	F	No	0.16		0.11											
	F	Yes	0.35	2.28	0.27	2.56	0.29	2.74	0.26	2.50	0.29	2.75	0.43	4.05	0.24	2.30
	M	No	0.15		0.08											
	M	Yes	0.27	1.79	0.10	1.19	0.00	—	0.16	1.93	0.00	—	0.00	—	0.29	3.46
	N	No			0.00											
	N	Yes	0.43	—	0.49	—	0.00	—	1.35	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

Presence of somatic condition	Gender	History of mental disorder	Total study sample: All age groups %	Total study sample: All age groups RR	Total study sample: Age < 46 %	Total study sample: Age < 46 RR	In aged < 46, history of: Anxiety disorder %	Anxiety disorder RR	Depression %	Depression RR	Bipolar disorder %	Bipolar disorder RR	Psychosis %	Psychosis RR	Other mental disorder %	Other mental disorder RR
Hypertension	F	No	5.54		2.73											
	F	Yes	5.50	0.99	2.61	0.96	3.27	1.20	2.50	0.92	2.33	0.85	3.43	1.26	1.22	0.45
	M	No	5.60		2.85											
	M	Yes	7.72	1.38	4.52	1.59	4.39	1.54	4.48	1.57	2.73	0.96	3.96	1.39	6.12	2.15
	N	No	3.15		2.59											
	N	Yes	1.73	0.55	1.48	0.57	2.22	0.86	0.00	—	3.85	1.49	0.00	—	3.23	1.25
Hypotension	F	No	0.04		0.04											
	F	Yes	0.13	3.73	0.14	3.20	0.12	2.93	0.12	2.84	0.00	—	0.00	—	0.24	5.75
	M	No	0.02		0.00											
	M	Yes	0.03	1.37	0.03	—	0.00	—	0.08	—	0.00	—	0.00	—	0.00	—
	N	No	0.26		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Ischemic heart disease	F	No	0.13		0.08											
	F	Yes	0.19	1.45	0.12	1.45	0.17	1.95	0.10	1.14	0.29	3.43	0.43	5.07	0.00	—
	M	No	0.33		0.10											
	M	Yes	0.41	1.23	0.13	1.33	0.13	1.24	0.16	1.61	0.55	5.40	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Heart failure	F	No	0.03		0.01											
	F	Yes	0.10	3.43	0.02	4.65	0.00	—	0.02	4.55	0.00	—	0.43	81.07	0.00	—
	M	No	0.03		0.00											
	M	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Arhythmia	F	No	0.28		0.22											
	F	Yes	0.49	1.77	0.28	1.30	0.25	1.14	0.24	1.11	0.29	1.34	1.29	5.93	0.37	1.68
	M	No	0.17		0.05											
	M	Yes	0.22	1.26	0.17	3.31	0.38	7.44	0.00	—	0.00	—	0.50	9.79	0.29	5.77
	N	No	0.26		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Obesity	F	No	0.12		0.08											
	F	Yes	0.34	2.90	0.27	3.20	0.17	1.95	0.34	3.98	0.87	10.30	0.00	—	0.12	1.44
	M	No	0.09		0.10											
	M	Yes	0.41	4.74	0.30	2.98	0.50	4.96	0.41	4.02	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Dyslipidemia	F	No	0.14		0.08											
	F	Yes	0.28	1.99	0.15	1.86	0.04	0.52	0.14	1.82	0.29	3.66	0.00	—	0.37	4.60
	M	No	0.23		0.11											
	M	Yes	0.44	1.88	0.20	1.84	0.25	2.29	0.33	2.97	0.00	—	0.00	—	0.00	—
	N	No	0.26		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Diabetes	F	No	2.03		1.12											
	F	Yes	2.38	1.17	1.86	1.66	1.45	1.29	1.88	1.67	2.03	1.81	1.29	1.15	2.68	2.39
	M	No	2.70		1.33											
	M	Yes	2.89	1.07	1.71	1.28	1.00	0.75	2.03	1.53	2.19	1.64	2.97	2.23	1.46	1.09
	N	No	2.10		1.29											
	N	Yes	0.87	0.41	0.49	0.38	0.00	—	0.00	—	3.85	2.97	0.00	—	0.00	—
Parkinson's disease	F	No	0.02		0.01											
	F	Yes	0.05	3.00	0.01	2.32	0.00	—	0.00	—	0.00	—	0.00	—	0.12	23.01
	M	No	0.01		0.01											
	M	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Myasthenia gravis	F	No	0.03		0.02											
	F	Yes	0.03	1.03	0.02	1.55	0.04	2.61	0.02	1.52	0.00	—	0.00	—	0.00	—
	M	No	0.01		0.00											
	M	Yes	0.03	2.06	0.03	—	0.13	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Migraine	F	No	0.22		0.25											
	F	Yes	0.63	2.93	0.70	2.76	0.46	1.79	0.84	3.32	0.00	—	0.86	3.38	0.73	2.88
	M	No	0.15		0.13											
	M	Yes	0.30	2.06	0.27	1.99	0.25	1.86	0.24	1.81	0.00	—	0.50	3.67	0.58	4.32
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Epilepsy	F	No	0.10		0.10											
	F	Yes	0.21	2.03	0.21	2.08	0.21	2.06	0.12	1.20	0.00	—	0.86	8.53	0.49	4.84
	M	No	0.08		0.08											
	M	Yes	0.14	1.71	0.17	1.99	0.25	2.98	0.08	0.97	0.00	—	0.50	5.87	0.29	3.46
	N	No	0.26		0.32											
	N	Yes	0.43	1.65	0.49	1.52	0.00	—	1.35	4.18	0.00	—	0.00	—	0.00	—
Multiple sclerosis	F	No	0.12		0.11											
	F	Yes	0.22	1.90	0.21	1.88	0.21	1.86	0.26	2.38	0.00	—	0.00	—	0.12	1.10
	M	No	0.07		0.06											
	M	Yes	0.16	2.24	0.20	3.41	0.13	2.13	0.41	6.90	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Stroke	F	No	0.02		0.03											
	F	Yes	0.05	2.40	0.02	0.93	0.04	1.56	0.02	0.91	0.00	—	0.00	—	0.00	—
	M	No	0.04		0.03											
	M	Yes	0.05	1.37	0.03	1.33	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No	0.26		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Allergies	F	No	0.55		0.61											
	F	Yes	1.02	1.83	1.00	1.64	0.79	1.29	1.11	1.82	0.58	0.96	0.86	1.41	1.34	2.20
	M	No	0.44		0.46											
	M	Yes	0.63	1.43	0.67	1.45	1.00	2.17	0.57	1.23	0.55	1.18	0.00	—	0.87	1.89
	N	No	0.26		0.32											
	N	Yes	0.87	3.30	0.99	3.04	0.00	—	0.00	—	0.00	—	0.00	—	6.45	19.94

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Psoriasis	F	No	0.12		0.13											
	F	Yes	0.28	2.32	0.26	2.03	0.12	0.98	0.31	2.46	0.00	—	0.00	—	0.49	3.83
	M	No	0.09		0.09											
	M	Yes	0.16	1.76	0.17	1.81	0.00	—	0.24	2.63	0.55	5.90	0.50	5.34	0.00	—
	N	No	0.26		0.00											
	N	Yes	0.43	1.65	0.49	—	0.00	—	1.35	—	0.00	—	0.00	—	0.00	—
Rheumatoid arthritis	F	No	0.15		0.09											
	F	Yes	0.15	1.01	0.09	0.96	0.12	1.38	0.05	0.54	0.29	3.23	0.00	—	0.12	1.35
	M	No	0.07		0.07											
	M	Yes	0.11	1.49	0.13	1.99	0.00	—	0.33	4.83	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Autoimmune thyroiditis (Hashimoto)	F	No	0.42		0.43											
	F	Yes	0.97	2.29	0.91	2.12	0.66	1.54	1.06	2.47	1.16	2.71	0.43	1.00	1.10	2.56
	M	No	0.09		0.08											
	M	Yes	0.19	2.21	0.20	2.65	0.25	3.31	0.16	2.15	0.55	7.21	0.00	—	0.29	3.84
	N	No			0.00											
	N	Yes	0.43	—	0.49	—	0.00	—	0.00	—	0.00	—	0.00	—	3.23	—
Any thyroid disorder	F	No	2.40		2.13											
	F	Yes	4.16	1.74	3.51	1.64	3.39	1.59	3.64	1.70	2.91	1.36	1.29	0.60	4.63	2.17
	M	No	0.49		0.40											
	M	Yes	0.76	1.56	0.67	1.66	0.50	1.24	0.81	2.01	0.55	1.35	0.50	1.22	1.17	2.88
	N	No	0.79		0.32											
	N	Yes	2.60	3.30	2.46	7.61	2.22	6.87	1.35	4.18	7.69	23.77	0.00	—	3.23	9.97
Hypothyroidism	F	No	0.78		0.69											
	F	Yes	1.60	2.04	1.33	1.92	0.95	1.37	1.61	2.33	1.45	2.10	0.43	0.62	1.46	2.11
	M	No	0.17		0.13											
	M	Yes	0.27	1.58	0.23	1.74	0.25	1.86	0.16	1.21	0.55	4.05	0.50	3.67	0.29	2.16
	N	No	0.26		0.00											
	N	Yes	0.43	1.65	0.49	—	0.00	—	1.35	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Hyperthyroidism	F	No	0.89		0.80											
	F	Yes	1.72	1.94	1.53	1.90	1.90	2.37	1.30	1.62	0.87	1.08	0.86	1.07	2.31	2.88
	M	No	0.18		0.14											
	M	Yes	0.27	1.52	0.27	1.87	0.00	—	0.41	2.84	0.00	—	0.00	—	0.87	6.11
	N	No			0.00											
	N	Yes	1.30	—	1.48	—	2.22	—	0.00	—	3.85	—	0.00	—	3.23	—
Acne	F	No	0.02		0.03											
	F	Yes	0.01	0.48	0.01	0.46	0.00	—	0.02	0.91	0.00	—	0.00	—	0.00	—
	M	No	0.02		0.03											
	M	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Eczema	F	No			0.00											
	F	Yes	0.04	9.60	0.05	—	0.04	—	0.05	—	0.00	—	0.43	—	0.00	—
	M	No	0.01		0.01											
	M	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Coeliac disease	F	No	0.06		0.07											
	F	Yes	0.15	2.40	0.15	2.15	0.21	3.01	0.10	1.40	0.00	—	0.43	6.24	0.24	3.54
	M	No	0.03		0.03											
	M	Yes	0.03	1.03	0.03	1.33	0.00	—	0.00	—	0.55	21.62	0.00	—	0.00	—
	N	No			0.00											
	N	Yes	0.43	—	0.49	—	0.00	—	1.35	—	0.00	—	0.00	—	0.00	—
Cancer	F	No	0.46		0.22											
	F	Yes	0.56	1.20	0.22	1.02	0.29	1.33	0.17	0.78	0.00	—	0.43	1.98	0.37	1.68
	M	No	0.27		0.19											
	M	Yes	0.33	1.20	0.13	0.72	0.38	2.03	0.08	0.44	0.00	—	0.00	—	0.00	—
	N	No	0.79		0.65											
	N	Yes	0.87	1.10	0.99	1.52	0.00	—	1.35	2.09	3.85	5.94	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Fibromyalgia	F	No	0.02		0.01											
	F	Yes	0.24	1	0.16	15.11	0.12	11.73	0.19	18.20	0.00	—	0.43	40.54	0.12	11.50
	M	No	0.01		0.01											
	M	Yes	0.08	6.17	0.07	7.95	0.13	14.89	0.08	9.66	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Rhinitis/pharyx/sinusitis	F	No	0.23		0.25											
	F	Yes	0.29	1.24	0.26	1.04	0.21	0.83	0.36	1.45	0.00	—	0.00	—	0.12	0.49
	M	No	0.27		0.28											
	M	Yes	0.22	0.80	0.23	0.84	0.25	0.90	0.33	1.17	0.00	—	0.00	—	0.29	1.05
	N	No	0.52		0.65											
	N	Yes	0.87	1.65	0.99	1.52	0.00	—	2.70	4.18	0.00	—	0.00	—	0.00	—
Sinousitis	F	No	0.13		0.12											
	F	Yes	0.35	2.69	0.39	3.38	0.33	2.84	0.39	3.31	0.29	2.50	0.43	3.69	0.61	5.23
	M	No	0.12		0.13											
	M	Yes	0.27	2.28	0.27	1.99	0.25	1.86	0.24	1.81	1.09	8.11	0.50	3.67	0.00	—
	N	No			0.00											
	N	Yes	0.43	—	0.49	—	0.00	—	0.00	—	0.00	—	0.00	—	3.23	—
Tonsilitis	F	No	0.27		0.32											
	F	Yes	0.30	1.11	0.36	1.12	0.37	1.17	0.29	0.91	0.87	2.75	1.29	4.05	0.24	0.77
	M	No	0.17		0.19											
	M	Yes	0.14	0.82	0.07	0.35	0.13	0.65	0.08	0.42	0.00	—	0.00	—	0.00	—
	N	No	1.05		1.29											
	N	Yes	0.87	0.82	0.99	0.76	2.22	1.72	0.00	—	0.00	—	4.76	3.68	0.00	—
Anemia	F	No	0.16		0.15											
	F	Yes	0.30	1.91	0.36	2.41	0.46	3.07	0.26	1.79	0.29	1.96	0.43	2.90	0.61	4.11
	M	No	0.07		0.05											
	M	Yes	0.08	1.23	0.10	1.99	0.00	—	0.24	4.83	0.00	—	0.00	—	0.00	—
	N	No	0.52		0.32											
	N	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Gastritis/ulcer	F	No	0.73		0.71											
	F	Yes	1.29	1.78	1.32	1.84	1.12	1.56	1.16	1.62	0.87	1.22	6.44	9.01	1.58	2.22
	M	No	0.70		0.73											
	M	Yes	0.96	1.37	1.01	1.37	1.00	1.37	1.38	1.89	1.64	2.24	0.00	—	0.58	0.80
	N	No	1.31		1.29											
	N	Yes	0.43	0.33	0.49	0.38	0.00	—	0.00	—	3.85	2.97	0.00	—	0.00	—
Irritable bowel syndrome	F	No	0.04		0.04											
	F	Yes	0.21	4.80	0.20	5.31	0.04	1.12	0.31	8.45	0.00	—	0.00	—	0.12	3.29
	M	No	0.04		0.03											
	M	Yes	0.19	4.80	0.17	6.63	0.38	14.89	0.08	3.22	0.00	—	0.00	—	0.29	11.53
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Chron's disease	F	No	0.02		0.02											
	F	Yes	0.08	3.84	0.07	3.49	0.08	3.91	0.10	4.55	0.00	—	0.00	—	0.00	—
	M	No	0.01		0.02											
	M	Yes	0.08	6.17	0.07	3.98	0.00	—	0.16	9.66	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Colitis	F	No	0.15		0.15											
	F	Yes	0.28	1.83	0.25	1.66	0.12	0.84	0.26	1.79	0.29	1.96	1.72	11.58	0.12	0.82
	M	No	0.21		0.17											
	M	Yes	0.30	1.46	0.23	1.39	0.38	2.23	0.16	0.97	0.00	—	0.50	2.94	0.29	1.73
	N	No	0.26		0.32											
	N	Yes	0.43	1.65	0.49	1.52	0.00	—	0.00	—	0.00	—	4.76	14.71	0.00	—
Cholecystitis	F	No	0.09		0.08											
	F	Yes	0.13	1.46	0.12	1.55	0.17	2.08	0.07	0.91	0.29	3.66	0.00	—	0.24	3.07
	M	No	0.08		0.07											
	M	Yes	0.14	1.71	0.13	1.99	0.13	1.86	0.08	1.21	0.00	—	0.99	14.69	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

			Total study sample				In aged < 46, history of									
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
Presence of somatic condition	Gender	History of mental disorder	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
Hepatitis	F	No	0.11		0.11											
	F	Yes	0.15	1.42	0.15	1.39	0.00	—	0.24	2.27	0.00	—	0.43	4.05	0.12	1.15
	M	No	0.11		0.10											
	M	Yes	0.08	0.77	0.10	0.99	0.00	—	0.24	2.41	0.00	—	0.00	—	0.00	—
	N	No	0.26		0.32											
	N	Yes	0.43	1.65	0.49	1.52	0.00	—	1.35	4.18	0.00	—	0.00	—	0.00	—
Cirrhosis	F	No	0.03		0.02											
	F	Yes	0.03	1.03	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	M	No	0.01		0.02											
	M	Yes	0.03	2.06	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Any pancreatic disorder	F	No	0.16		0.15											
	F	Yes	0.11	0.72	0.12	0.80	0.04	0.27	0.12	0.78	0.00	—	0.00	—	0.37	2.38
	M	No	0.10		0.09											
	M	Yes	0.22	2.19	0.20	2.17	0.25	2.71	0.24	2.63	0.00	—	0.50	5.34	0.00	—
	N	No	0.26		0.32											
	N	Yes	0.43	1.65	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Gout	F	No	0.01		0.00											
	F	Yes	0.01	1.20	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	M	No	0.09		0.08											
	M	Yes	0.05	0.63	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Endometriosis	F	No	0.08		0.10											
	F	Yes	0.11	1.26	0.11	1.16	0.08	0.87	0.10	1.01	0.29	3.05	0.00	—	0.24	2.56
	M	No	0.01		0.00											
	M	Yes			0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—

Table 1. *Continued*

Presence of somatic condition	Gender	History of mental disorder	Total study sample: All age groups %	All age groups RR	Age < 46 %	Age < 46 RR	In aged < 46, history of: Anxiety disorder %	Anxiety disorder RR	Depression %	Depression RR	Bipolar disorder %	Bipolar disorder RR	Psychosis %	Psychosis RR	Other mental disorder %	Other mental disorder RR
HIV	F	No	0.04		0.05											
	F	Yes	0.04	0.96	0.05	1.03	0.04	0.87	0.02	0.51	0.29	6.10	0.00	—	0.00	—
	M	No	0.05		0.06											
	M	Yes	0.16	3.08	0.20	3.41	0.13	2.13	0.33	5.52	0.55	9.26	0.00	—	0.00	—
	N	No			0.00											
	N	Yes		—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Mean RR				1.87		2.03		2.16		2.49		3.22		5.39		3.46

Note: Of the 545 calculable RRs, 73 were below 1, 114 between 1 and 1.5 and the rest 358 were above 1.5.

Rates of somatic and mental disorders and multicomorbidity

Approximately 24.5% of the whole study sample reported that they had a history of at least one somatic disorder, and a similar 26.14% of any mental disorder. As a group, mental disorders were by far the most prevalent group of medical conditions, with cardiovascular disorders following with 6.41% (Table 2). Comorbidities of any somatic with any mental disorder were reported by 8.21% of the total study sample.

History of depression was the most frequently reported mental disorder (>12%) followed by anxiety (approximately 8%). History of nonaffective psychoses and bipolar disorders were reported by 1% each. An impressive >20% had a lifetime history of self-injury and >10% had attempted suicide in the past (Table 2).

A significant proportion of patients with a history of a somatic disorder, ranging roughly from one-third to almost two-thirds, were also suffering from a mental disorder, with the risk ratio (RR) of somatic patients to suffer also from a mental disorder being >1 in all cases. The highest RR was for neurologic (1.80) and autoimmune disorders (1.73), while in patients with five comorbid groups of medical conditions, the RR was as high as 2.30 (Table 2).

The age distribution of healthy subjects and patients with psychiatric disorders in the study sample (Table 3) suggests that patients with psychiatric disorders tend to be younger. In Figure 2, the age distribution relative to the percentage in the age group 21–25 years (standardized to 1 or 100%) is graphically shown. Ages above 35 are under-represented in the bipolar and psychotic groups (Figure 2).

The number of somatic disorders was a number produced by counting the groups of somatic disorders present in an individual, as well as diabetes, cancer, and HIV (see the list in Table 1). Thus this number is an underestimation of the number of individual medical conditions present; instead, it represents the number of body systems suffering. This number increases with age in all diagnostic groups, and it is consistently higher in the groups of patients with psychiatric disorders, with the highest values in bipolar and psychotic patients (Table 4). A graphic representation of the increase in the number of comorbid somatic disorders with increasing age in the different diagnostic groups is shown in Figure 3. Figure 3 suggests that already since a very young age (early 20s) the burden of somatic disorders appears in patients with psychiatric disorders, almost 15–20 years earlier in comparison to the general population, and this advancement is retained throughout the life span with only limited attenuation. Also, the contribution to the study sample by patients with psychosis collapses after the age of 55 (Figure 3, point C), by bipolar patients after the age of 60 (point D), and by depressive patients after the age of 65 (point E), and this under-representation could reflect either the development of severe disability or premature death.

A composite score reflecting the presence of hypertension, dyslipidemia, diabetes mellitus, and obesity (0–4) was created. Patients with psychiatric disorders had a slightly higher but significant metabolic score in comparison to the general population (0.09 ± 0.32 vs 0.08 ± 0.29, $t = -3.529$, df: 54824, $p < 0.001$).

Treatment of mental disorders

The majority of patients with mental disorders were not under any kind of treatment (59.44%). This was true mainly for anxiety and depression, whereas for the more severe disorders, the majority of

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Table 2. Prevalence of Somatic and Mental Disorders in the Study Sample

History	Prevalence in the total study sample (%)	Prevalence of mental health history (%) in specific somatic conditions/ disorders	RR for a comorbid mental disorder
Any somatic condition	24.47	33.56	1.35
Any respiratory disorder	4.06	34.04	1.37
Any cardiovascular disorder	6.41	28.56	1.15
Any neurological disorder	0.73	44.78	1.80
Any ear-neck-throat disorder	0.66	33.70	1.36
Any gastroenterological disorder	1.14	38.82	1.56
Any autoimmune disorder	1.18	43.03	1.73
Any dermatological disorder	0.33	42.02	1.69
Any hepatic disorder	0.27	35.33	1.42
Any renal disorder	0.39	29.58	1.19
Any skeletal disorder	0.90	32.38	1.30
Other somatic condition/disorder	1.73	37.24	1.50
Number of somatic conditions/disorders			
None	83.75	24.86	
One	14.32	32.00	1.29
Two	1.58	37.33	1.50
Three	0.29	41.40	1.67
Four	0.04	52.17	2.10
Five	0.01	57.14	2.30
Any mental disorder	26.14		
Anxiety	7.78		
Depression	12.66		
Bipolar disorder	1.17		
Psychosis	0.98		
Other mental disorder	2.72		
Self-harm	21.60		
Suicide attempt	10.69		

patients were under some kind of treatment (Table 5). Unfortunately, the majority of patients were not under treatment at all and from those under treatment, only a small minority was receiving treatment as recommended, for example, 7.62% of bipolar patients and 10.2% of psychotic patients were treated with psychotherapy alone, and respectively 16.8% and 7.24% with antidepressant plus psychotherapy and 15.55% and 11.5% with antidepressant monotherapy. Eventually, this mistreatment concerned the vast majority of patients under treatment in the bipolar (60.04% of 67.19%; ie, 9/10 of patients under any kind of treatment) and the psychotic groups (43.23% of 67.35%; ie, 2/3 of patients under any kind of treatment). It is not possible to identify the respective percentages in the other diagnostic groups but the lowest percentages are equally disappointing (Table 5).

The *t*-test concerning the relation of the use of specific treatment options (grouping variable any treatment option) in the patients with psychiatric disorders subsample only, and the metabolic composite score (tested variable), returned no significant effect for antipsychotics ($t = 1.138$, *df*: 40225, $p = 0.254$), antidepressants ($t = 1.079$, *df*: 40225, $p = 0.280$), or psychotherapy ($t = 1.762$, *df*: 40225, $p = 0.080$), either in monotherapy or in combination. The only significant effect concerned a general effect of the use of benzodiazepines (0.02 ± 0.15 vs 0.007 ± 0.08, $t = -9.618$, *df*: 40225, $p < 0.001$).

Patients with psychiatric disorders had a slightly higher but significant metabolic score in comparison to the general population (0.09 ± 0.32 vs 0.08 ± 0.29, $t = -3.529$, *df*: 54824, $p < 0.001$).

An interesting finding was that 1.65% of those who did not report any history of mental disorders were under psychotherapy, and 0.80% were taking benzodiazepines suggesting that they were suffering from some type of life stress or interpersonal difficulties.

Discussion

The current paper reports on the prevalence of mental and somatic disorders and multicomorbidity in a large convenient sample from 40 countries. The first question is how appropriate this study sample is for such a quasi-epidemiological study, and subsequently, how reliable and how valid are the rates that are reported. Since the data were obtained by self-reporting from a self-selected sample, the only way to assess validity is to compare the findings concerning a specific topic with already known answers on this topic.

Following this pathway, it seems that our reporting is quite in accord with the literature concerning the prevalence of major mental disorders, including anxiety,[21,22] depression,[23,24] bipolar disorder,[25–28] and psychosis,[29,30] as well as self-injury.[31–33] While the history of suicidal attempts was found to pass 10%, the rates reported in the literature vary between 2% and 5%,[34–40] however, the variability is great and it seems that selective retrieval of memories is involved. This is evident since studies in adolescents report rates around 20%,[41,42] while surveys in middle-aged individuals report much lower lifetime rates. Overall, the general pattern of mental disorder rates supports the validity of our study sample and the results of the current study.

On the other hand, the rates of somatic disorders reported by the current study appear to be much lower than those reported in the literature. One explanation could be that in our study sample, less than 6.5% were older than 60 years. However, even disorders with onset at an early age had very low rates. Migraine was found in less than 1% while in the literature the prevalence is reported to be approximately 10%.[43] Epilepsy was found in 0.1% while the literature suggests a prevalence of 0.7%.[44] The celiac disease rate was below 0.1% while the literature suggests a prevalence rate of 1%.[45] However, the mean number of co-existing somatic disorders is in accord with the literature.[46] If one looks at the percentages of specific disorders in the subsample of patients with any somatic disorder, then the picture is different with hypertension at 23.15% and diabetes at 9.53% which are in accord with data from electronic registries,[47] but other rates were still low, eg, ischaemic heart disease at 0.88% and migraine at 1.14%. A general comment is that registry studies appear to report similar rates to ours, while studies targeting specific disorders report significantly higher values, probably because they study in-depth, more

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Table 3. Percentages of Subjects of Diagnostic Groups in Age Groups and the Relative Contribution of Age Groups to the Population within Each Diagnostic Group in Comparison to the 21–25 Age Group (Standardized as Equal to 1)

	No history of mental disorder		History of any mental disorder		History of anxiety disorder		History of depression		History of bipolar disorder		History of psychosis		History of other mental disorders	
Age	%	Relatively	%	Relatively	%	Relatively	%	Relatively	%	Relatively	%	Relatively	%	Relatively
<21	9.83	0.51	9.13	0.46	7.66	0.42	7.85	0.39	18.35	0.69	19.29	0.74	11.62	0.74
21–25	19.32	1.00	19.75	1.00	18.19	1.00	20.14	1.00	26.59	1.00	25.97	1.00	15.65	1.00
26–30	14.30	0.74	16.23	0.82	15.49	0.85	16.92	0.84	15.09	0.57	11.50	0.44	16.32	1.04
31–35	13.55	0.70	14.27	0.72	14.11	0.78	14.60	0.73	12.44	0.47	12.43	0.48	14.17	0.91
36–40	10.69	0.55	11.04	0.56	11.32	0.62	10.86	0.54	7.93	0.30	9.28	0.36	13.90	0.89
41–45	8.65	0.45	8.49	0.43	9.59	0.53	8.20	0.41	5.60	0.21	6.12	0.24	8.60	0.55
46–50	7.10	0.37	6.66	0.34	7.55	0.41	6.63	0.33	6.38	0.24	6.49	0.25	5.71	0.36
51–55	5.41	0.28	5.09	0.26	5.53	0.30	5.23	0.26	2.02	0.08	3.15	0.12	5.64	0.36
56–60	4.51	0.23	4.15	0.21	4.83	0.27	4.29	0.21	2.02	0.08	2.23	0.09	3.76	0.24
61–65	3.23	0.17	2.86	0.14	3.26	0.18	2.97	0.15	2.02	0.08	1.48	0.06	2.35	0.15
66–70	1.85	0.10	1.50	0.08	1.59	0.09	1.45	0.07	1.40	0.05	1.30	0.05	1.61	0.10
71–75	0.82	0.04	0.54	0.03	0.52	0.03	0.65	0.03	0.16	0.01	0.56	0.02	0.27	0.02
>75	0.25	0.01	0.27	0.01	0.37	0.02	0.22	0.01	0.00	0.00	0.19	0.01	0.40	0.03

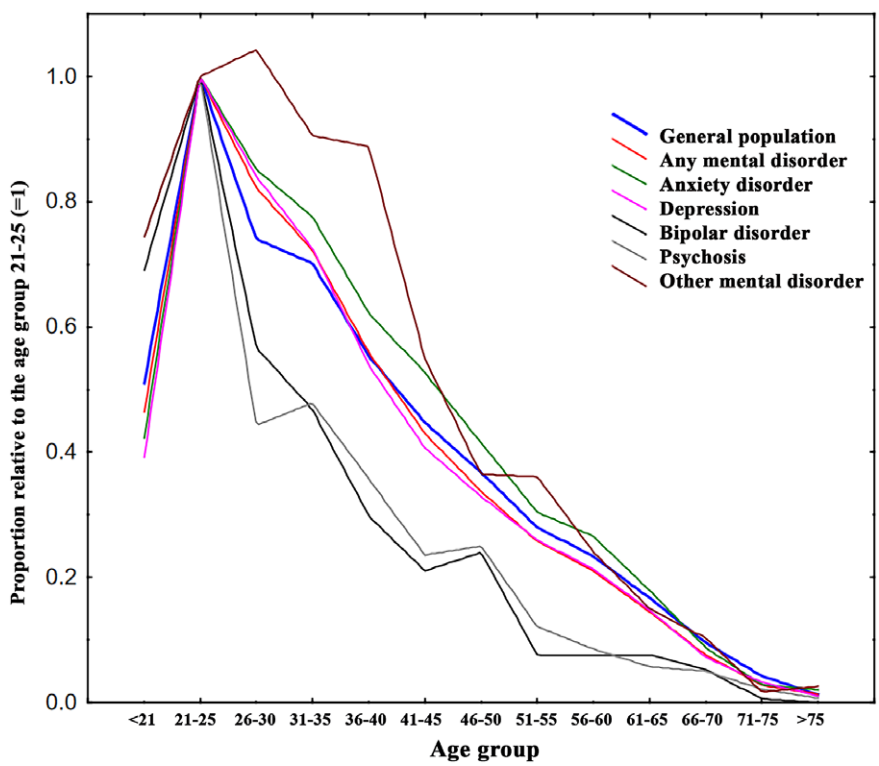

Figure 2. Contribution of age groups relative to the 21–25 years group which is used as reference (=1 or 100%). In the nonpatients with psychiatric disorders group, there is a decline in participation with age. A similar pattern is observed in patients with psychiatric disorders in general, but in the subgroups of bipolar and psychotic patients, this decline in participation occurs already after the age of 25, suggesting the presence of an early impairment resulting in a lack of participation in social activities. Premature death probably plays a role.

specific populations and they include the biases of studying more severely ill populations. Many of these in-depth studies report so high rates that one is difficult to believe, and eventually, their summary would imply that everybody suffers from something even at a very early age. On the other hand, it should be noted that in the current study, the registration of somatic disorders was based on self-reporting which means that there was no clinical or laboratory investigation of the subject. Thus, an additional explanation for these discrepancies is a combination of the lack of knowledge on underlying diseases by the person; for example,

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Table 4. Means and Standard Deviations of the Number of Somatic Disorders Present in Patients with Psychiatric Disorders in Comparison to the Rest of the Study Sample in Different Age Groups

	No history of mental disorder N = 40694			History of any mental disorder N = 14334 (26.14%)			History of anxiety disorder N = 4267 (7.78%)			History of depression N = 6943 (12.66%)			History of bipolar disorder N = 643 (1.17%)			History of psychosis N = 539 (0.98%)			History of other mental disorders N = 1489 (2.71%)		
		Number of somatic disorders			Number of somatic disorders			Number of somatic disorders			Number of somatic disorders			Number of somatic disorders			Number of somatic disorders			Number of somatic disorders	
Age	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
<21	3999	0.10	0.35	1309	0.16	0.44	327	0.14	0.43	545	0.16	0.43	118	0.19	0.48	104	0.19	0.56	173	0.14	0.39
21–25	7862	0.10	0.34	2831	0.16	0.42	776	0.14	0.39	1398	0.17	0.43	171	0.18	0.44	140	0.31	0.51	233	0.15	0.39
26–30	5820	0.11	0.35	2327	0.18	0.47	661	0.18	0.47	1175	0.17	0.48	97	0.19	0.44	62	0.26	0.54	243	0.23	0.51
31–35	5515	0.12	0.37	2046	0.20	0.47	602	0.18	0.45	1014	0.22	0.49	80	0.18	0.44	67	0.15	0.36	211	0.18	0.48
36–40	4352	0.16	0.43	1583	0.23	0.50	483	0.20	0.43	754	0.25	0.54	51	0.27	0.63	50	0.26	0.49	207	0.25	0.51
41–45	3518	0.23	1.92	1217	0.27	0.53	409	0.24	0.47	569	0.30	0.57	36	0.19	0.40	33	0.27	0.45	128	0.30	0.57
46–50	2890	0.23	0.48	955	0.32	0.60	322	0.29	0.54	460	0.36	0.63	41	0.12	0.51	35	0.31	0.47	85	0.34	0.66
51–55	2201	0.28	0.52	729	0.36	0.62	236	0.34	0.60	363	0.38	0.65	13	0.38	0.51	17	0.41	0.71	84	0.33	0.63
56–60	1835	0.32	0.56	595	0.46	0.67	206	0.50	0.72	298	0.43	0.64	13	0.54	0.88	12	0.58	0.51	56	0.54	0.63
61–65	1313	0.38	0.57	410	0.53	0.66	139	0.57	0.69	206	0.54	0.65	13	0.38	0.51	8	0.00	0.00	35	0.46	0.61
66–70	753	0.43	0.62	215	0.50	0.65	68	0.47	0.53	101	0.52	0.69	9	0.33	0.50	7	0.14	0.38	24	0.67	0.87
71–75	333	0.43	0.62	78	0.58	0.80	22	0.59	0.59	45	0.44	0.55	1	0.00	—	3	0.00	0.00	4	1.00	0.82
>75	101	0.65	0.74	39	0.77	1.11	16	0.94	1.34	15	0.47	0.92	0	—	—	1	1.00		6	1.00	1.10

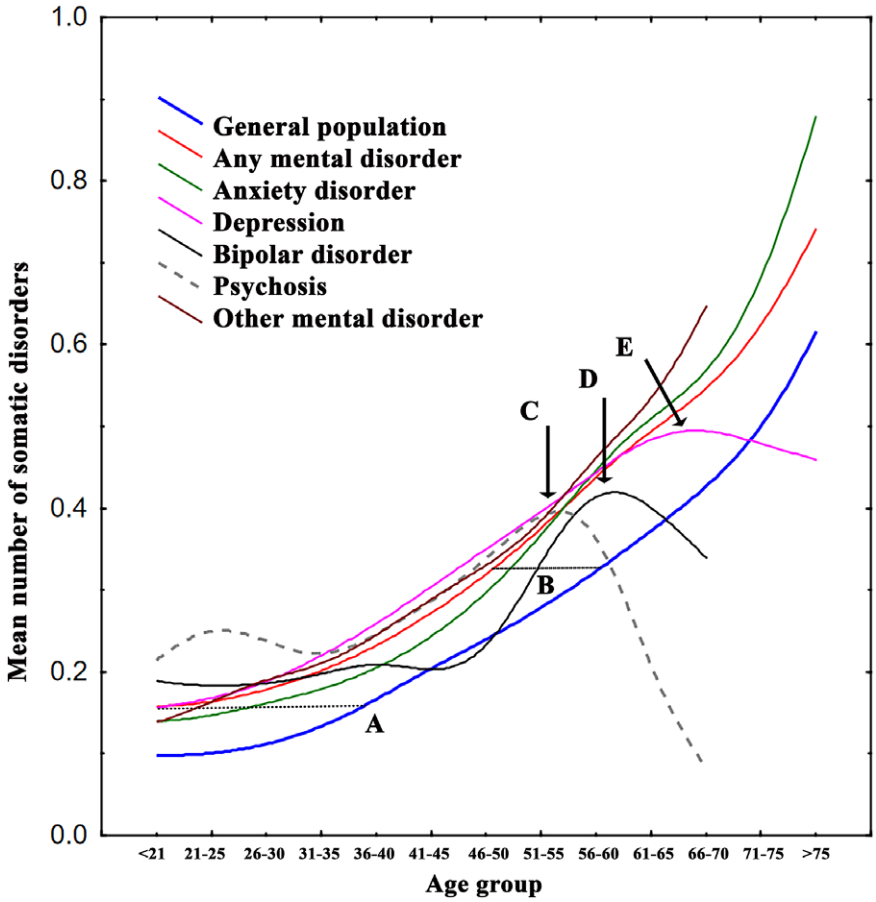

Figure 3. Plot of the number of somatic disorders (*y*-axis) versus age groups (*x*-axis). Patients with psychiatric disorders and controls manifest parallel lines with similar slopes, but patients with psychiatric disorders start from a higher baseline. This suggests that somatic comorbidity occurs approximately 15 years earlier and since the 20s for patients with psychiatric disorders (line A) and although this difference is attenuated in middle age, it is kept at the size of 10 years (line B). Psychotic (point C), bipolar (point D), and depressed patients (point E) are not able to keep up with the rest of the patients with psychiatric disorders' line and their lines collapse at the ages of 55, 56–60, and 65, respectively. This confirms the interpretation of disability accumulated with age and premature death.

asthma is not known in half of those suffering from it,[48,49] with the presence of a systematic bias in our study sample toward an overall more healthy sample.

Even after taking into consideration an under-reporting of somatic disorders, mental disorders emerge as the most prevalent group of medical conditions (lifetime prevalence >25%) and this is in accord with the literature.[50–55] Also in accord with the literature is the finding that comorbidity of any somatic with any mental disorder was found in 8.21% of the total study sample.[46] The presence of multiple somatic disorders increases dramatically the likelihood of the presence of a mental disorder[2,46,56] and this is again in accord with the literature, which however refers mostly to older persons.[57–59] In bipolar and psychotic patients, this multi-comorbidity increases dramatically the disability and maybe the chances for premature death. From a reverse point of view, depending on the somatic disorder, somatic patients suffer from a comorbid mental condition with rates varying from one to two-thirds (Table 2).

The visual inspection of the lines in Figures 2 and 3 suggests that the age distribution is more or less similar in the two major diagnostic groups (Figure 2) and the increase in the number of somatic disorders with increasing age manifests the same slope but it initiates from a higher baseline for patients with psychiatric disorders (Figure 3). The exceptions, however, are interesting, and they concern mainly patients with bipolar disorder and psychosis but also depressed patients, to a lesser, extend. Their absolute numbers in these diagnostic subgroups are not sufficient to affect the line of the whole group of patients with psychiatric disorders. In Figure 2, it is evident that while the participation is similar across all diagnostic groups for the age group 21–25, it sharply declines already after the age of 25 for bipolar and psychotic patients while the other diagnostic groups manifest a pattern similar to that of the normal population. In Figure 3, the lines for psychotic, bipolar, and depressed patients deviate from the bundle of lines of the subgroups of patients with psychiatric disorders, at different ages for each of these groups. While the rest of the lines are monotonous, the lines of these three groups have the shape of an upside-down U.

An interpretation could be that after the age of 55, only the very mild psychotic cases with low somatic comorbidity participated in the current study, while those that would keep the line monotonous "dropped out" of the study. The respected age is 60 for bipolar patients and 66–70 for patients with unipolar depression. This observation that depressed, bipolar, and psychotic patients with high somatic multicomorbidity did not participate in the study after a certain age, probably reflects the presence of a significant disability in these patients, or even premature death.[60–63] Another observation from Figure 3

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Table 5. Percentages of treatment options in the diagnostic subgroups of subjects with a mental health history

	History of				
Treatment option	Anxiety	Depression	bipolar	psychosis	Other
Any kind of treatment	33.58	44.61	67.19	67.35	30.69
Antipsychotics	1.62	3.28	28.15	36.18	1.07
Antipsychotic monotherapy	1.22[a]	1.27	7.31	20.04	0.6
Antidepressants	11.09	28.33	43.23	26.9	2.96
Antidepressant monotherapy	7.73	16.89	15.55[a]	11.50[a]	1.14
Benzodiazepines	9.89	10.18	19.28	16.33	7.79
Psychotherapy	16.01	18.38	27.68	21.89	22.63
Only psychotherapy treatment	12.89	10.4	7.62[a]	10.20[a]	20.15
Only medication treatment	17.58	26.23	39.5	45.45	8.06
No medication	79.31	65.79	40.44	42.86	89.46
One class of medications	18.84	27.26	36.39	40.82	9.47
Two classes of medications	1.8	6.29	15.24	10.39	0.87
Three classes of medications	0.05	0.65	7.93	5.94	0.2
Antipsychotic plus antidepressant	0.16	1.83	17.26	10.76	0.4
Antidepressant plus benzodiazepine	1.62	5.69	12.60[a]	8.72[a]	0.87
Antipsychotic plus psychotherapy	0.21	1.05	11.66	7.42	0.4
Antidepressant plus psychotherapy	2.16	7.17	16.80[a]	7.24[a]	1.61
Benzodiazepines plus psychotherapy	1.34	2.85	7.47[a]	5.57[a]	1.48
Treatment not as recommended	≥66.42[b]	≥57.71[b]	60.04	43.23	≥69.31[b]

Note: For anxiety, depression, and "other" one can not be certain whether not receiving any treatment at present represents a problem since some patients might not need treatment after a certain period of time and after the first episode of the disorder. However, this is not the case with bipolar disorder and psychosis, for whom one can definitely conclude on their treatment quality.
[a]Not recommended treatment option.
[b]Not under treatment.

and Table 4 is that patients with psychiatric disorders manifest somatic conditions several years ahead of controls; this advancement probably attenuates with passing age as controls tend to catch up, however, it never disappears, and it probably contributes to disability and premature death. At the age of 20, it is approximately 15 years and eventually, it is reduced to 10 years in middle age. This time advancement is identical to the years of premature death for patients with psychiatric disorders that are reported in the literature.[11,60–62,64–67]

The most impressive finding concerning the treatment of mental disorders was that the majority of bipolar and psychotic patients under treatment were receiving an unrecommended treatment option. The finding that the majority of patients were not under treatment at all was expected. However, the finding that above 90% of bipolar patients and 75% of patients with psychosis receive an inappropriate or they do not receive any treatment at all, was alarming, but not unexpected since similar reports can be found in the literature.[68] If these severe mental disorders, that have the most clear-cut treatment guidelines are treated so ineffectively, then probably other mental disorders with less robust guidelines or in the case of milder and not "classical" manifestations of mental disorders, the lack of treatment or false treatments is probably the standard.

The finding that neither antipsychotics nor antidepressants were related to the development of metabolic syndrome was also unexpected,[7–9] while the relationship of benzodiazepines to metabolic syndrome was a surprise, although warnings for their potential to produce such an effect do exist in the literature.[69–72] Also the finding that patients with psychiatric disorders have more frequent metabolic syndrome is in accord with the literature.[7]

The findings of the current study confirm previous reports on mental-somatic comorbidity and the problematic treatment of patients with psychiatric disorders. Thus, they point to the urgent need for better education and training of undergraduate medical students in the field of mental health. Physicians of almost every clinical specialty but also all those who have personal contact with patients will face high rates of behaviors due to the presence of mental disorders. Being able to understand and put behaviors in the correct clinical frame will not only improve the work of the physician and the professional environment, but it could also improve the general health of a large number of patients. Psychiatry should be upgraded in Medical Schools since not only it concern the numerically biggest group of medical patients that carry the biggest disability burden, but it seems that it is the field with the most trans-specialty and interdisciplinary value and application.

Additionally, our results point to the urgent need for better training of psychiatrists in the treatment of patients with psychiatric disorders, especially of the most severely ill. Training based on modern technocratic methods and ways of clinical work, which is more or less standard in the rest of medicine, seems to be an unmet need in psychiatry and it takes a toll on patients. Even if the results of the current study overestimate the problem, still there seems to

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be much room for improvement concerning the treatment and the outcome of patients with psychiatric disorders at an international level.

Conclusion

With the reservation concerning the quality of the study sample which is self-selected online, the current paper reports that mental disorders might be the most common among all medical disorders and their appearance is especially high in patients with somatic multicomorbidity. Depending on the somatic diagnosis, from one to two-thirds of somatic patients suffer from some mental disorder. Mental disorders themselves are more often accompanied by somatic multicomorbidity and maybe with a 10–20 years earlier age at onset. The more severe mental disorders are characterized by increased disability after mid-age and probably premature death. The grim picture is completed with the finding that the vast majority of these patients might not receive appropriate treatment according to standard recommendations, or, even worse, no treatment at all. The above point to the importance of teaching psychiatry and mental health in medical schools and also to the need for more technocratically oriented training of psychiatric residents and also during life-long education and training.

Strengths and limitations

The strengths of the current paper include the large number of persons who filled out the questionnaire and the large bulk of information obtained. However, important is that the results are reasonable, they make sense and they are straightforward. For example, psychosis is the first diagnostic group whose participation in the study collapses (Figure 3), followed by the bipolar and then by the depressive, while the participation of the anxious group is similar to that of the general population. Overall the findings fit well with the literature, they fill gaps and expose correlations.

The major limitation was that the data were obtained anonymously online through the self-selection of the responders, without any clinical or laboratory investigation. The utilization of "personal medical history" was a fair approximation for the morbidity of the study sample without the effect of the pandemic, but still, it is an approximation open to debate.

Author contribution. All authors contributed equally to the paper. K.N.F. and D.S. conceived and designed the study. The other authors participated in formulating the final protocol, designing and supervising the data collection, and creating the final dataset. K.N.F. and D.S. did the data analysis and wrote the first draft of the paper. All authors participated in interpreting the data and developing further stages and the final version of the paper.

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Competing interest. The authors declare that they have no competing interests.

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