

## Original Research

**Cite this article:** Fountoulakis KN, Karakatsoulis GN, Abraham S, Adorjan K, Ahmed HU, Alarcón RD, Arai K, Auwal SS, Berk M, Bjedov S, Bobes J, Bobes-Bascaran T, Bourgin-Duchesnay J, Bredicean CA, Bukelskis L, Burkadze A, Cabrera Abud II, Castilla-Puentes R, Cetkovich M, Colon-Rivera H, Corral R, Cortez-Vergara C, Crepin P, De Berardis D, Zamora Delgado S, Lucena DD, Sousa AD, Stefano RD, Dodd S, Priyanka Elek L, Elissa A, Erdelyi-Hamza B, Erzin G, Etchevers MJ, Falkai P, Farcas A, Fedotov I, Filatova V, Fountoulakis NK, Frankova I, Franza F, Frias P, Galako T, Garay CJ, Garcia-Álvarez L, García-Portilla MP, Gonda X, Gondek TM, Morera González D, Gould H, Grandinetti P, Grau A, Groudeva V, Hagin M, Harada T, Hasan TM, Azreen Hashim N, Hilbig J, Hossain S, Iakimova R, Ibrahim M, Iftene F, Ignatenko Y, Irarrazaval M, Ismail Z, Ismayilova J, Jakobs A, Jakovljević M, Jakšić N, Javed A, Kafali HY, Karia S, Kazakova O, Khalifa D, Khaustova O, Koh S, Kopishinskaia S, Kosenko K, Koupidis SA, Kovacs I, Kulig B, Lalljee A, Liewig J, Majid A, Malashonkova E, Malik K, Malik NI, Mammadzada G, Mandalia B, Marazziti D, Marčinko D, Martínez S, Matiekus E, Mejia G, Memon RS, Meza Martínez XE, Mickevičiūtė D, Milev R, Mohammed M, Molina-López A, Morozov P, Muhammad NS, Mustač F, Naor MS, Nassieb A, Navickas A, Okasha T, Pandova M, Panfil A-L, Panteleeva L, Papava I, Patsali ME, Pavlichenko A, Pejuskovic B, Pinto Da Costa M, Popkov M, Popovic D, Raduan NJN, Vargas Ramírez F, Rancans E, Razali S, Rebok F, Rewekant A, Ninoska Reyes Flores E, Rivera-Encinas MT, Saiz P, Sánchez de Carmona M, Saucedo Martínez D, Saw JA, Saygili G, Schneiderreit P, Shah B, Shirasaka T, Silagadze K, Sitanggang S, Skugarevsky O, Spikina A, Mahalingappa SS, Stoyanova M, Szczegieliński A, Tamasan SC, Tavormina G, Tavormina MGM, Theodorakis PN, Tohen M, Tsapakis EM, Tukhvatullina D, Ullah I, Vaidya R, Vega-Dienstmaier JM, Vrublevska J, Vukovic O, Vysotska O, Widiasih N, Yashikhina A, Prezerakos PE, and Smirnova D (2024). Somatic multicomorbidty 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). *CNS Spectrums* 29(2), 126–149. <https://doi.org/10.1017/S1092852924000026>

Received: 17 September 2023

Accepted: 12 December 2023

**Keywords:**

Epidemiology; multicomorbidty; disability; premature death; somatic-mental comorbidity

**Corresponding author:**

Gregory Karakatsoulis;  
Email: [gregkarakatsoulis@gmail.com](mailto:gregkarakatsoulis@gmail.com)

© The Author(s), 2024. Published by Cambridge University Press.



# Somatic multicomorbidty 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)

Konstantinos N. Fountoulakis<sup>1</sup> , Grigorios N. Karakatsoulis<sup>1</sup> , Seri Abraham<sup>2,3,4</sup>, Kristina Adorjan<sup>5</sup>, Helal Uddin Ahmed<sup>6</sup>, Renato D. Alarcón<sup>7,8</sup>, Kiyomi Arai<sup>9</sup>, Sani Salihu Auwal<sup>10,11</sup>, Michael Berk<sup>12,13</sup>, Sarah Bjedov<sup>14</sup>, Julio Bobes<sup>15,16,17</sup>, Teresa Bobes-Bascaran<sup>17,18,19</sup>, Julie Bourgin-Duchesnay<sup>20</sup>, Cristina Ana Bredicean<sup>21</sup>, Laurynas Bukelskis<sup>22</sup>, Akaki Burkadze<sup>23,24</sup>, Indira Indiana Cabrera Abud<sup>25</sup>, Ruby Castilla-Puentes<sup>26</sup> , Marcelo Cetkovich<sup>27,28</sup>, Hector Colon-Rivera<sup>29</sup>, Ricardo Corral<sup>30,31</sup>, Carla Cortez-Vergara<sup>32</sup>, Piirika Crepin<sup>33</sup>, Domenico De Berardis<sup>34,35,36</sup> , Sergio Zamora Delgado<sup>37</sup>, David De Lucena<sup>38</sup>, Avinash De Sousa<sup>39,40</sup>, Ramona Di Stefano<sup>41</sup>, Seetal Dodd<sup>12,13,42</sup>, Livia Priyanka Elek<sup>43</sup>, Anna Elissa<sup>44</sup>, Berta Erdelyi-Hamza<sup>43</sup>, Gamze Erzin<sup>45,46</sup>, Martin J. Etchevers<sup>47</sup>, Peter Falkai<sup>5</sup>, Adriana Farcas<sup>48</sup>, Ilya Fedotov<sup>49</sup>, Viktoriia Filatova<sup>50</sup>, Nikolaos K. Fountoulakis<sup>51</sup> , Iryna Frankova<sup>52</sup>, Francesco Franza<sup>53,54</sup>, Pedro Frias<sup>55</sup>, Tatiana Galako<sup>56</sup>, Cristian J. Garay<sup>47</sup>, Leticia Garcia-Álvarez<sup>17,19</sup>, Maria Paz García-Portilla<sup>15,17,57</sup>, Xenia Gonda<sup>43</sup>, Tomasz M. Gondek<sup>58</sup>, Daniela Morera González<sup>59</sup>, Hilary Gould<sup>60</sup>, Paolo Grandinetti<sup>34</sup>, Arturo Grau<sup>37,61</sup>, Violeta Groudeva<sup>62</sup>, Michal Hagin<sup>63</sup>, Takayuki Harada<sup>64</sup>, Tasdik M. Hasan<sup>65,66</sup>, Nurul Azreen Hashim<sup>67</sup>, Jan Hilbig<sup>22</sup>, Sahadat Hossain<sup>68</sup>, Rossitza Iakimova<sup>69</sup>, Mona Ibrahim<sup>70</sup>, Felicia Iftene<sup>71</sup>, Yulia Ignatenko<sup>72</sup>, Matias Irarrazaval<sup>73</sup>, Zaliha Ismail<sup>74</sup>, Jamila Ismayilova<sup>75</sup>, Asaf Jakobs<sup>76,77</sup>, Miro Jakovljević<sup>78</sup>, Nenad Jakšić<sup>14</sup>, Afzal Javed<sup>79,80,81</sup>, Helin Yilmaz Kafali<sup>82</sup>, Sagar Karia<sup>39</sup>, Olga Kazakova<sup>83</sup>, Doaa Khalifa<sup>70</sup>, Olena Khaustova<sup>52</sup>, Steve Koh<sup>60</sup>, Svetlana Kopishinskaia<sup>84,85</sup>, Korneliia Kosenko<sup>86</sup>, Sotirios A. Koupidis<sup>87</sup>, Illes Kovacs<sup>43</sup>, Barbara Kulig<sup>43</sup>, Alisha Lalljee<sup>40</sup>, Justine Liewig<sup>20</sup>, Abdul Majid<sup>88</sup>, Evgeniia Malashonkova<sup>20</sup>, Khamelia Malik<sup>44</sup>, Najma Iqbal Malik<sup>89</sup>, Gulay Mammadzada<sup>90</sup>, Bilvesh Mandalia<sup>40</sup>, Donatella Marazziti<sup>91,92,93</sup> , Darko Marčinko<sup>14,78</sup>, Stephanie Martínez<sup>60</sup>, Eimantas Matiekus<sup>22</sup>, Gabriela Mejia<sup>60</sup>, Roha Saeed Memon<sup>94</sup>, Xarah Elenne Meza Martínez<sup>95</sup>, Dalia Mickevičiūtė<sup>96</sup>, Roumen Milev<sup>71</sup>, Muftau Mohammed<sup>97</sup>, Alejandro Molina-López<sup>98</sup>, Petr Morozov<sup>99</sup>, Nuru Suleiman Muhammad<sup>100</sup>, Filip Mustač<sup>14</sup>, Mika S. Naor<sup>101</sup>, Amira Nassieb<sup>70</sup>, Alvydas Navickas<sup>22</sup>, Tarek Okasha<sup>70</sup>, Milena Pandova<sup>69</sup>, Anca-Livia Panfil<sup>102</sup>, Liliya Panteleeva<sup>103</sup>, Ion Papava<sup>21</sup>, Mikaella E. Patsali<sup>104,105</sup>, Alexey Pavlichenko<sup>72</sup>, Bojana Pejuskovic<sup>106,107</sup>, Mariana Pinto Da Costa<sup>108,109,110</sup>, Mikhail Popkov<sup>111</sup>, Dina Popovic<sup>112</sup>, Nor Jannah Nasution Raduan<sup>67</sup>, Francisca Vargas Ramirez<sup>37,61</sup>, Elmars Rancans<sup>113,114</sup>, Salmi Razali<sup>67</sup>, Federico Rebok<sup>115,116</sup>, Anna Rewekant<sup>117</sup>, Elena Ninoska Reyes Flores<sup>118</sup>, María Teresa Rivera-Encinas<sup>119</sup>, Pilar Saiz<sup>15,17,18</sup>, Manuel Sánchez de Carmona<sup>120</sup>, David Saucedo Martínez<sup>121</sup>, Jo Anne Saw<sup>67</sup>, Görkem Saygili<sup>122</sup>, Patricia Schneiderreit<sup>123</sup>, Bhumika Shah<sup>124</sup>, Tomohiro Shirasaka<sup>125</sup>, Ketevan Silagadze<sup>23</sup>, Satti Sitanggang<sup>126</sup>, Oleg Skugarevsky<sup>127</sup>, Anna Spikina<sup>128</sup>, Sridevi Sira Mahalingappa<sup>129</sup>, Maria Stoyanova<sup>69</sup>, Anna Szczegieliński<sup>130</sup>, Simona Claudia Tamasan<sup>102</sup>, Giuseppe Tavormina<sup>54,131,132</sup>, Maurilio Giuseppe Maria Tavormina<sup>54</sup>, Pavlos N. Theodorakis<sup>133</sup>, Mauricio Tohen<sup>134</sup>, Eva Maria Tsapakis<sup>135,136</sup> , Dina Tukhvatullina<sup>137</sup>, Irfan Ullah<sup>138</sup>, Ratnaraj Vaidya<sup>139</sup>, Johann M. Vega-Dienstmaier<sup>140</sup>, Jelena Vrublevska<sup>113,114,141</sup>, Olivera Vukovic<sup>106,142</sup>, Olga Vysotska<sup>143</sup>, Natalia Widiasih<sup>44</sup>, Anna Yashikhina<sup>84,144</sup>, Panagiotis E. Prezerakos<sup>145</sup> and Daria Smirnova<sup>84,144</sup> 

<sup>1</sup>3rd Department of Psychiatry, School of Medicine, Aristotle University of Thessaloniki Greece, Thessaloniki, Greece, <sup>2</sup>Pennine Care NHS Foundation Trust, Heywood, UK, <sup>3</sup>Manchester Metropolitan University, Manchester, UK, <sup>4</sup>Core Psychiatry Training, Health Education England North West, Manchester, UK, <sup>5</sup>Department of Psychiatry, Ludwig-Maximilians-University, Munich, Germany, <sup>6</sup>Child Adolescent and Family Psychiatry, National Institute of Mental Health, Dhaka, Bangladesh, <sup>7</sup>Section of Psychiatry and Mental Health, Universidad Peruana Cayetano Heredia, Facultad de Medicina Alberto Hurtado, Lima, Peru, <sup>8</sup>Department of Psychiatry and Psychology, Mayo Clinic School of Medicine, Rochester, MN, USA, <sup>9</sup>School of Medicine and Health Science, Institute of Health Science Shinshu University, Matsumoto, Japan, <sup>10</sup>Department of Psychiatry, Bayero University, Kano, Nigeria, <sup>11</sup>Aminu Kano Teaching Hospital, Kano, Nigeria, <sup>12</sup>IMPACT – The Institute for Mental and Physical Health and Clinical Translation, Deakin University, School of Medicine, Barwon Health, Geelong, Australia, <sup>13</sup>Orygen The National Centre of Excellence in Youth Mental Health, Centre for Youth Mental Health, Florey Institute for Neuroscience and Mental Health and the Department of Psychiatry, The University of Melbourne, Melbourne, Australia, <sup>14</sup>Department of Psychiatry and Psychological Medicine, University Hospital Centre Zagreb, Zagreb, Croatia, <sup>15</sup>Psychiatry Area, Department of Medicine, University of Oviedo, Oviedo, Spain, <sup>16</sup>Department of Psychiatry, Hospital Universitario Central de Asturias, Oviedo, Spain, <sup>17</sup>ISPA, INEUROPA, CIBERSAM, Oviedo, Spain, <sup>18</sup>Mental Health Center of La Corredoria, Oviedo, Spain, <sup>19</sup>Department of Psychology, University of Oviedo, Oviedo, Spain, <sup>20</sup>Division of Child and Adolescent Psychiatry, Department of Psychiatry, Groupe Hospitalier Nord Essonne, Orsay, France, <sup>21</sup>Department of Neuroscience, Discipline of Psychiatry, “Victor Babes” University of Medicine and Pharmacy, Timisoara, Romania, <sup>22</sup>Clinic of Psychiatry, Institute of Clinical Medicine, Medical Faculty, Vilnius University, Vilnius, Lithuania, <sup>23</sup>Mental Hub, Tbilisi, Georgia, <sup>24</sup>NGO Healthcare Research and Quality Agency, Tbilisi, Georgia, <sup>25</sup>Hospital San Juan de Dios Hospital, Guadalajara, Mexico, <sup>26</sup>Janssen Research and Development, Johnson & Johnson, American Society of Hispanic Psychiatry and WARMI Women Mental Health, Cincinnati, OH, USA, <sup>27</sup>Institute of Translational and Cognitive Neuroscience (INCYT), INECO Foundation, Favaloro University, Buenos Aires, Argentina, <sup>28</sup>National Scientific and Technical Research Council (CONICET), Buenos Aires, Argentina, <sup>29</sup>APM Board Certified in General Psychiatry and Neurology, Addiction Psychiatry, & Addiction Medicine, UPMC, DDAP, Philadelphia, PA, USA, <sup>30</sup>Department of Teaching and Research, Hospital Borda, Buenos Aires, Argentina, <sup>31</sup>University of Buenos Aires, Buenos Aires, Argentina, <sup>32</sup>Universidad Peruana Cayetano Heredia, Clínica AngloAmericana, Lima, Peru, <sup>33</sup>Sanitaire and Social Union for Accompaniment and Prevention, Center of Ambulatory Psychiatry of Narbonne and Lezigan, Narbonne, France, <sup>34</sup>Department of Mental Health, Psychiatric Service of Diagnosis and Treatment, Hospital “G. Mazzini”, ASL Teramo, Teramo, Italy, <sup>35</sup>School of Nursing, University of L’Aquila, Italy, <sup>36</sup>Department of Neuroscience and Imaging, School of Psychiatry, University of Chieti, Chieti, Italy, <sup>37</sup>Child and Adolescent Psychiatry Department, Hospital Luis Calvo Mackenna, Santiago, Chile, <sup>38</sup>Departamento de Fisiología e Farmacología, Universidade Federal do Ceará, Fortaleza, Ceará, Brazil, <sup>39</sup>Department of Psychiatry, Lokmanya Tilak Municipal Medical College, Mumbai, Maharashtra, India, <sup>40</sup>Desousa Foundation, Mumbai, Maharashtra, India, <sup>41</sup>Department of Biotechnological and Applied Clinical Sciences, Section of Psychiatry, University of L’Aquila, L’Aquila, Italy, <sup>42</sup>University Hospital Geelong, Barwon Health, Geelong, Victoria, Australia, <sup>43</sup>Department of Psychiatry and Psychotherapy, Semmelweis University, Budapest, Hungary, <sup>44</sup>Department of Psychiatry, Faculty of Medicine, Universitas Indonesia, Cipto Mangunkusumo National Referral Hospital, Jakarta, Indonesia, <sup>45</sup>Department of Psychiatry, Ankara Dişkapı Training and Research Hospital, Ankara, Turkey, <sup>46</sup>Department of Psychiatry and Neuropsychology, School for Mental Health and Neuroscience, Maastricht University Medical Center, Maastricht, The Netherlands, <sup>47</sup>Faculty of Psychology, University of Buenos Aires (UBA), Buenos Aires, Argentina, <sup>48</sup>Centre of Neuroscience, Queen’s University, Kingston, Ontario, Canada, <sup>49</sup>Department of Psychiatry and Narcology, Ryazan State Medical University n.a. Academician I.P. Pavlov, Ryazan, Russia, <sup>50</sup>State Budgetary Institution of the Rostov Region “Psychoneurological Dispensary”, Rostov-on-Don, Russia, <sup>51</sup>Faculty of Medicine, Medical University of Sofia, Sofia, Bulgaria, <sup>52</sup>Medical Psychology, Psychosomatic Medicine and Psychotherapy Department, Bogomolets National Medical University, Kyiv, Ukraine, <sup>53</sup>Villa dei Pini” Psychiatric Rehabilitation Center, Avellino, Italy, <sup>54</sup>Psychiatric Studies Centre, Provaglio d’Iseo, Italy, <sup>55</sup>Hospital Magalhães Lemos, Porto, Portugal, <sup>56</sup>Department of Psychiatry, Medical Psychology and Drug Abuse, Kyrgyz State Medical Academy, Bishkek, Kyrgyz Republic, <sup>57</sup>Mental Health Center of La Eria, Oviedo, Spain, <sup>58</sup>Specialty Training Section, Polish Psychiatric Association, Wrocław, Poland, <sup>59</sup>Instituto Nacional de Psiquiatría Ramón De La Fuente Muñiz, Mexico City, Mexico, <sup>60</sup>Department of Psychiatry, University of California San Diego, San Diego, USA, <sup>61</sup>Universidad Diego Portales, Santiago, Chile, <sup>62</sup>Department of Diagnostic Imaging, University Hospital Saint Ekaterina, Sofia, Bulgaria, <sup>63</sup>Forensic Psychiatry Unit, Abarbanel Mental Health Center, Bat Yam, Israel, <sup>64</sup>Faculty of Human Sciences, Education Bureau of the Laboratory Schools, University of Tsukuba, Tokyo, Japan, <sup>65</sup>Department of Primary Care and Mental Health, University of Liverpool, Liverpool, UK, <sup>66</sup>Public Health Foundation, Dhaka, Bangladesh, <sup>67</sup>Department of Psychiatry, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh, Selangor, Malaysia, <sup>68</sup>Department of Public Health and Informatics, Jahangirnagar University, Dhaka, Bangladesh, <sup>69</sup>Second Psychiatric Clinic, University Hospital for Active Treatment in Neurology and Psychiatry “Saint Naum”, Sofia, Bulgaria, <sup>70</sup>Okasha Institute of Psychiatry, Faculty of Medicine, Ain Shams University, Cairo, Egypt, <sup>71</sup>Department of Psychiatry, Queens University, Kingston, ON, Canada, <sup>72</sup>Education Center, Mental Health Clinic No. 1 named after N.A. Alexeev of Moscow Healthcare Department, Moscow, Russia, <sup>73</sup>Ministry of Health, Millenium Institute for Research in Depression and Personality, Santiago, Chile, <sup>74</sup>Department of Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh, Selangor, Malaysia, <sup>75</sup>National Mental Health Center of the Ministry of Health of the Republic of Azerbaijan, Baku, Azerbaijan, <sup>76</sup>Department of Psychiatry, Westchester Medical Center Health System, Valhalla, NY, USA, <sup>77</sup>New York Medical College, Valhalla, NY, USA, <sup>78</sup>School of Medicine, University of Zagreb, Zagreb, Croatia, <sup>79</sup>Institute of Applied Health Research, University of Birmingham, Birmingham, UK, <sup>80</sup>Warwick Medical School, University of Warwick, Coventry, UK, <sup>81</sup>Pakistan Psychiatric Research Centre, Fountain House, Lahore, Pakistan, <sup>82</sup>Department of Child Psychiatry, Ankara City Hospital, Ankara, Turkey, <sup>83</sup>Faculty of Medicine, Lund University, Malmö, Sweden, <sup>84</sup>International Centre for Education and Research in Neuropsychiatry (ICERN), Samara State Medical University, Samara, Russia, <sup>85</sup>Kirov State Medical University, Kirov, Russia, <sup>86</sup>Department of Psychiatry, Drug Abuse and Psychology, Odessa National Medical University, Odessa, Ukraine, <sup>87</sup>Occupational and Environmental Health Sector, Public Health Policy Department, School of Public Health, University of West Attica, Athens, Greece, <sup>88</sup>Department of Psychiatry, SKIMS Medical College, Srinagar, India, <sup>89</sup>Department of Psychology, University of Sargodha, Sargodha, Pakistan, <sup>90</sup>Department of Psychiatry, Azerbaijan Medical University, Baku, Azerbaijan, <sup>91</sup>Department of Clinical and Experimental Medicine, Section of Psychiatry, University of Pisa, Pisa, Italy, <sup>92</sup>Unicamillus, Saint Camillus International University of Health Sciences, Rome, Italy, <sup>93</sup>Brain Research Foundation onus, Lucca, Italy, <sup>94</sup>Dow Medical College, Dow University of Health Sciences, Karachi, Pakistan, <sup>95</sup>Postgraduate Program in Psychiatry, National Autonomous University of Honduras, Tegucigalpa, Honduras, <sup>96</sup>Private outpatient clinics “JSC InMedica Klinika”, Vilnius, Lithuania, <sup>97</sup>Department of Clinical Services, Federal Neuropsychiatric Hospital, Kaduna, Nigeria, <sup>98</sup>General Office for the Psychiatric Services of the Ministry of Health, Mexico City, Mexico, <sup>99</sup>Department of Postgraduate Education, Russian National Research Medical University n.a. N.I. Pirogov, Moscow, Russia, <sup>100</sup>Department of Community Medicine, Ahmadu Bello University Teaching Hospital, Zaria, Nigeria, <sup>101</sup>Sackler School of Medicine New York State American Program, Tel Aviv University, Tel Aviv-Yafo, Israel, <sup>102</sup>Compartment of Liaison Psychiatry, “Pius Brinzeu” County Emergency Clinical Hospital, Timisoara, Romania, <sup>103</sup>Department of Medical Psychology, Psychiatry and Psychotherapy, Kyrgyz-Russian Slavic University, Bishkek, Kyrgyz Republic, <sup>104</sup>School of Social Sciences, Hellenic Open University, Patras, Greece, <sup>105</sup>Department of Internal Medicine, Nicosia General Hospital, Nicosia, Cyprus, <sup>106</sup>Faculty of Medicine, University of Belgrade, Belgrade, Serbia, <sup>107</sup>Clinical Department for Crisis and Affective Disorders, Institute of Mental Health, Belgrade, Serbia, <sup>108</sup>South London and Maudsley NHS Foundation Trust, London, UK, <sup>109</sup>Institute of Psychiatry, Psychology and Neuroscience, King’s College London, London, UK, <sup>110</sup>Institute of Biomedical Sciences Abel Salazar, University of Porto, Porto, Portugal, <sup>111</sup>Department of the Introduction to Internal Medicine and Family Medicine, International Higher School of Medicine, Bishkek, Kyrgyz Republic, <sup>112</sup>Abarbanel Mental Health Center, Bat-Yam, Israel, <sup>113</sup>Department of Psychiatry and Narcology, Riga Stradins University, Riga, Latvia, <sup>114</sup>Riga Centre of Psychiatry and Narcology, Riga, Latvia, <sup>115</sup>Servicio de Emergencia, Acute inpatient Unit, Hospital Moyano, Buenos Aires, Argentina, <sup>116</sup>Argentine Institute of Clinical Psychiatry (IAPC), Buenos Aires, Argentina, <sup>117</sup>General Psychiatry Unit I, Greater Poland Neuropsychiatric Center, Kościan, Poland, <sup>118</sup>Department of Psychiatry, National Autonomous University of Honduras, Tegucigalpa, Honduras, <sup>119</sup>Centro de Investigación en Salud Pública, Facultad de Medicina, Universidad de San Martín de Porres, Instituto Nacional de Salud Mental “Honorio Delgado – Hideyo Noguchi”, Lima, Perú, <sup>120</sup>Faculty of Health Sciences, Anahuac University, Mexico City, Mexico, <sup>121</sup>Department of Psychiatry, Escuela Nacional de Medicina, TEC de Monterrey, Servicio de geriatría. Hospital Universitario

“José Eleuterio González” UANL, Monterrey, Nuevo León, Mexico, <sup>122</sup>Department of Cognitive Science and Artificial Intelligence, Tilburg University, Tilburg, The Netherlands, <sup>123</sup>Klinik für Allgemeine Psychiatrie und Psychotherapie Ost, Psychiatrische Institutsambulanz, Klinikum am Weissenhof, Weissenhof, Germany, <sup>124</sup>DY Patil Medical College, Navi Mumbai, Maharashtra, India, <sup>125</sup>Department of Psychiatry, Teine Keijinkai Medical Center, Sapporo, Japan, <sup>126</sup>Psychiatric Unit, Pambalah Batung General Hospital, South Kalimantan, Amuntai, Indonesia, <sup>127</sup>Department of Psychiatry and Medical Psychology, Belarusian State Medical University, Minsk, Belarus, <sup>128</sup>Saint Petersburg Psychoneurological Dispensary No. 2, Saint Petersburg, Russia, <sup>129</sup>Derbyshire Healthcare NHS Foundation Trust, The Liasion Team, Royal Derby Hospital, Derby, Derbyshire, UK, <sup>130</sup>Department of Psychiatric Rehabilitation, Department of Psychiatry and Psychotherapy, Faculty of Medical Sciences in Katowice, Medical University of Silesia, Poland, <sup>131</sup>European Depression Association and Italian Association on Depression, Brussels, Belgium, <sup>132</sup>Bedforshire Center for Mental Health Research, University of Cambridge, Cambridge, UK, <sup>133</sup>Health Policy, WHO Regional Office for Europe, Copenhagen, Denmark, <sup>134</sup>Department of Psychiatry and Behavioral Sciences, School of Medicine, University of New Mexico, Albuquerque, Nm, USA, <sup>135</sup>“Agios Charalambos” Mental Health Clinic, Heraklion, Crete, Greece, <sup>136</sup>1st Department of Academic Psychiatry, School of Medicine, Aristotle University of Thessaloniki, Greece, <sup>137</sup>Centre for Global Public Health, Institute of Population Health Sciences, Queen Mary University of London, London, UK, <sup>138</sup>Kabir Medical College, Gandhara University, Peshawar, Pakistan, <sup>139</sup>Faculty of Medical Sciences, Newcastle University, Newcastle upon Tyne, UK, <sup>140</sup>Facultad de Medicina Alberto Hurtado, Universidad Peruana Cayetano Heredia, Lima, Perú, <sup>141</sup>Institute of Public Health, Riga Stradins University, Riga, Latvia, <sup>142</sup>Department of Research and Education, Institute of Mental Health, Belgrade, Serbia, <sup>143</sup>Educational and Research Center – Ukrainian Family Medicine Training Center, Bogomolets National Medical University, Kyiv, Ukraine, <sup>144</sup>Department of Psychiatry, Narcology, Psychotherapy and Clinical Psychology, Samara State Medical University, Samara, Russia and <sup>145</sup>Department of Nursing, University of Peloponnese, Laboratory of Integrated Health Care, Tripoli, Greece

## 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 multicorbidity. Bipolar and psychotic patients and to a lesser extent depressives, manifested an earlier (15–20 years) manifestation of somatic multicorbidity, 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.<sup>1–3</sup> 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.<sup>4</sup>

It has been reported that approximately 50–90% of people with severe psychiatric disorders have at least one chronic medical illness<sup>5</sup> and the rates are even higher in those with comorbid substance-use disorders.<sup>6</sup> 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<sup>7</sup> and at a rate 2 to 3 times higher in schizophrenia and bipolar disorder in comparison to the general population,<sup>7,8</sup> with the use of atypical antipsychotics being an additional risk factor.<sup>9</sup> The rates seem to increase with the severity of mental disorders.<sup>10</sup> From a reverse angle, almost half of the general population suffers from a chronic somatic condition<sup>1</sup> and those persons with more somatic disorders tend to have more psychiatric disorders.<sup>2</sup>

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

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 multicorbidity 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.<sup>15–20</sup> The full protocol used is available in the web appendix of the first published COMET study.<sup>17</sup>

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





**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

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups			Age < 46			Depression			Bipolar disorder			Psychosis		
			%	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	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	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	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

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of										
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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	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	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	3.85	2.38	4.76	2.94	0.00	—	
	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	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	1.09	2.76	0.99	2.50	0.58	1.47	
Any autoimmune disorder	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	—	0.00	—	6.45	19.94	
	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	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	0.55	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	—	0.00	—	3.23	—	
	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	0.43	1.98	0.37	1.68	
Any hepatic disorder	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	—	0.00	—	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	—	0.00	—	
	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	0.29	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	0.55	2.70	0.99	4.90	0.58	2.88	
	N	No	0.00		0.00														
	N	Yes	2.16	—	2.46	—	6.67	—	1.35	—	3.85	—	3.85	—	0.00	—	0.00	—	

**Table 1. Continued**

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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	—	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		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						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder		
			%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	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	—	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		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	—	0.00	—	
	N	No	0.00		0.00												
	N	Yes	—	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	
Arrhythmia	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	—	0.00	—	



**Table 1.** *Continued*

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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		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	—	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	—	0.00	—	3.85	2.97	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	—	0.00	—	—
	N	No	0.00		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		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						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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	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	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	—	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

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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													
Rheumatoid arthritis	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	—	
Autoimmune thyroiditis (Hashimoto)	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													
Any thyroid disorder	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	0.00													
	N	Yes	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—
Hypothyroidism	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													
Other mental disorder	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	0.00													
	N	Yes	0.43	—	0.49	—	0.00	—	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													
Hypothyroidism	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	
Other mental disorder	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													
Other mental disorder	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

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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	—	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	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	—	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

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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		0.00												
	N	Yes	—	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00
Rhinitis/pharynx/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	—	0.00
Sinusitis	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		0.00												
	N	Yes	0.43	—	0.49	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00	—	0.00
Tonsillitis	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	—	0.00	—	0.00

Table 1. Continued

Presence of somatic condition	Gender	History of mental disorder	Total study sample						In aged < 46, history of														
			All age groups			Age < 46			Anxiety disorder			Depression			Bipolar disorder			Psychosis			Other mental disorder		
			%	RR	%	RR	%	RR	%	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	1.62	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	0.00	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	0.00	0.00	0.00	3.85	2.97	0.00	0.00	0.00	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	0.00	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	0.00	0.00	0.00	0.29	11.53						
	N	No	0.00		0.00																		
	N	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	0.00						
	M	No	0.01		0.02																		
	M	Yes	0.08	6.17	0.07	3.98	0.00	0.00	0.16	9.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
	N	No	0.00		0.00																		
	N	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	0.00	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.76	14.71	0.00	0.00	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	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00						
	N	No	0.00		0.00																		
	N	Yes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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						In aged < 46, history of								
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other 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		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		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	—	0.00	—	
	N	No	0.00		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						In aged < 46, history of							
			All age groups		Age < 46		Anxiety disorder		Depression		Bipolar disorder		Psychosis		Other mental disorder	
			%	RR	%	RR	%	RR	%	RR	%	RR	%	RR	%	RR
F	No		0.04	0.05												
	Yes		0.04	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												
	Yes		0.16	0.20	3.41	0.13	2.13	0.33	5.52	0.55	9.26	0.00	—	0.00	—	—
N	No		0.00	0.00												
	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 multimorbidity**

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

**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 ( $0.02 \pm 0.15$  vs  $0.007 \pm 0.08$ ,  $t = -9.618$ ,  $df: 40225$ ,  $p < 0.001$ ).

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

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

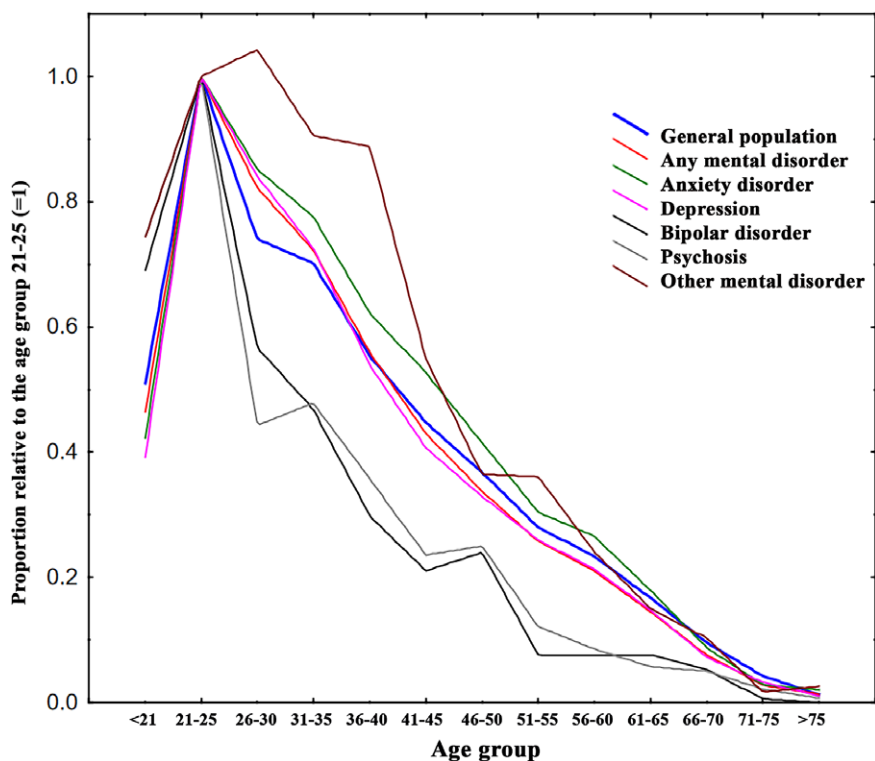
The current paper reports on the prevalence of mental and somatic disorders and multicomorbidity in a large convenient sample from 40 countries. The first question is how appropriate this study sample is for such a quasi-epidemiological study, and subsequently, how reliable and how valid are the rates 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,<sup>21,22</sup> depression,<sup>23,24</sup> bipolar disorder,<sup>25–28</sup> and psychosis,<sup>29,30</sup> as well as self-injury.<sup>31–33</sup> While the history of suicidal attempts was found to pass 10%, the rates reported in the literature vary between 2% and 5%,<sup>34–40</sup> 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%,<sup>41,42</sup> 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%.<sup>43</sup> Epilepsy was found in 0.1% while the literature suggests a prevalence of 0.7%.<sup>44</sup> The celiac disease rate was below 0.1% while the literature suggests a prevalence rate of 1%.<sup>45</sup> However, the mean number of co-existing somatic disorders is in accord with the literature.<sup>46</sup> 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,<sup>47</sup> 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

**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)

Age	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	
	%	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



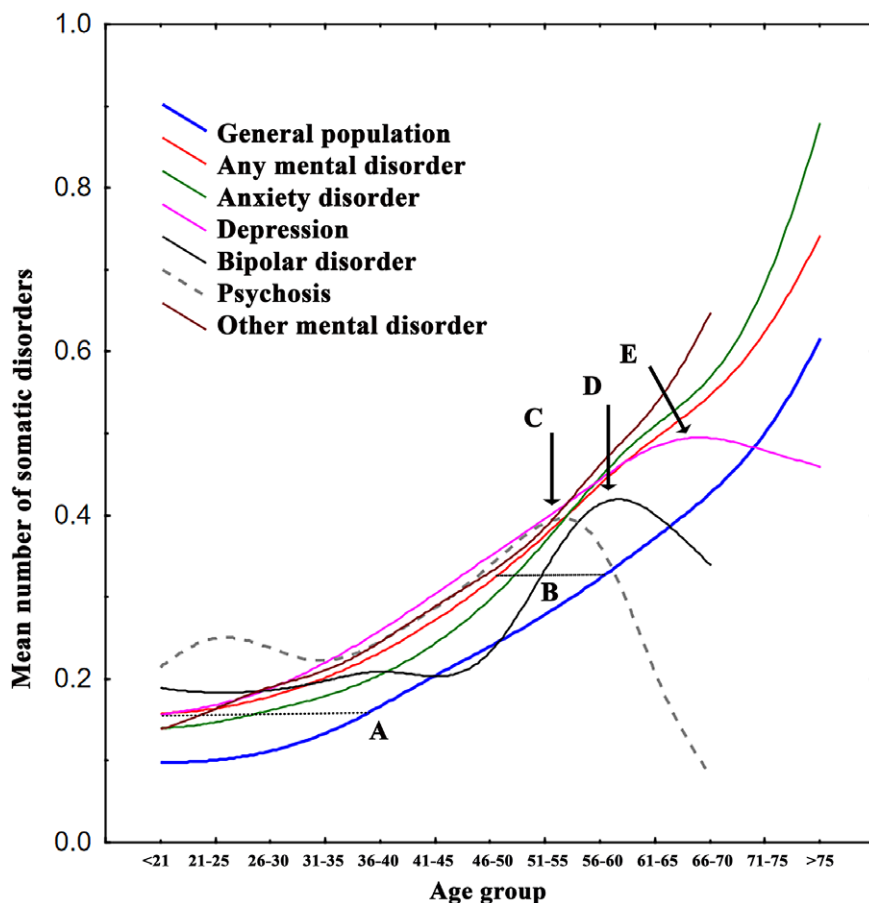
**Figure 2.** Contribution of age groups relative to the 21–25 years group which is used as reference (=1 or 100%). In the nonpatients with psychiatric disorders group, there is a decline in participation with age. A similar pattern is observed in patients with psychiatric disorders in general, but in 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,

**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

Age	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					
	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,<sup>48,49</sup> 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.<sup>50–55</sup> 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.<sup>46</sup> The presence of multiple somatic disorders increases dramatically the likelihood of the presence of a mental disorder<sup>2,46,56</sup> and this is again in accord with the literature, which however refers mostly to older persons.<sup>57–59</sup> In bipolar and psychotic patients, this multicorbidity 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 multicorbidity 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.<sup>60–63</sup> Another observation from Figure 3



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

Treatment option	History of				
	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 <sup>a</sup>	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 <sup>a</sup>	11.50 <sup>a</sup>	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 <sup>a</sup>	10.20 <sup>a</sup>	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 <sup>a</sup>	8.72 <sup>a</sup>	0.87
Antipsychotic plus psychotherapy	0.21	1.05	11.66	7.42	0.4
Antidepressant plus psychotherapy	2.16	7.17	16.80 <sup>a</sup>	7.24 <sup>a</sup>	1.61
Benzodiazepines plus psychotherapy	1.34	2.85	7.47 <sup>a</sup>	5.57 <sup>a</sup>	1.48
Treatment not as recommended	≥66.42 <sup>b</sup>	≥57.71 <sup>b</sup>	60.04	43.23	≥69.31 <sup>b</sup>

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.

<sup>a</sup>Not recommended treatment option.

<sup>b</sup>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.<sup>11,60–62,64–67</sup>

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.<sup>68</sup> 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,<sup>7–9</sup> 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.<sup>69–72</sup> Also the finding that patients with psychiatric disorders have more frequent metabolic syndrome is in accord with the literature.<sup>7</sup>

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

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.

**Disclosures.** Co-authors do not have anything to disclose.

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

## References

- Hoffman C, Rice D, Sung HY. Persons with chronic conditions. Their prevalence and costs. *JAMA*. 1996;**276**(18):1473–1479.
- Neeleman J, Ormel J, Bijl RV. The distribution of psychiatric and somatic III health: associations with personality and socioeconomic status. *Psychosom Med*. 2001;**63**(2):239–247. doi:10.1097/00006842-200103000-00007.
- Parks J, Svendsen D, Singer P, Foti ME, Mauer BJA. *Morbidity and Mortality in People with Serious Mental Illness*. National Association of State Mental Health Program Directors Medical Directors Council; 2006.
- Laursen TM, Munk-Olsen T, Agerbo E, Gasse C, Mortensen PB. Somatic hospital contacts, invasive cardiac procedures, and mortality from heart disease in patients with severe mental disorder. *Arch Gen Psychiatry*. 2009;**66**(7):713–720. doi:10.1001/archgenpsychiatry.2009.61.
- Gold KJ, Kilbourne AM, MJJofp V. Primary care of patients with serious mental illness: Your chance to make a difference: A primary care visit may lead to regular care of side effects and comorbidities, especially if you coordinate care. *J Fam Pract*. 2008;**57**(8):515–526.
- Batki SL, Meszaros ZS, Strutyński K, et al. Medical comorbidity in patients with schizophrenia and alcohol dependence. *Schizophr Res*. 2009;**107**(2–3): 139–146. doi:10.1016/j.schres.2008.10.016.
- Correll CU. Balancing efficacy and safety in treatment with antipsychotics. *CNS Spectr*. 2007;**12**(10 Suppl 17):12–20. doi:10.1017/s1092852900026298.
- Suppes T, McElroy SL, Hirschfeld R. Awareness of metabolic concerns and perceived impact of pharmacotherapy in patients with bipolar disorder: a survey of 500 US psychiatrists. *Psychopharmacol Bull*. 2007;**40**(2):22–37; quiz 38–40.
- Fenton WS, Chavez MR. Medication-induced weight gain and dyslipidemia in patients with schizophrenia. *Am J Psychiatry*. 2006;**163**(10): 1697–1704; quiz 1858–1859. doi:10.1176/ajp.2006.163.10.1697.
- Parekh AK, Barton MB. The challenge of multiple comorbidity for the US health care system. *JAMA*. 2010;**303**(13):1303–1304. doi:10.1001/jama.2010.381.
- Viron MJ, Stern TA. The impact of serious mental illness on health and healthcare. *Psychosomatics*. 2010;**51**(6):458–465. doi:10.1176/appi.psy.51.6.458.
- Lawrence D, Kisely S, Pais J. The epidemiology of excess mortality in people with mental illness. *Can J Psychiatry*. 2010;**55**(12):752–760. doi:10.1177/070674371005501202.
- Katon WJ. Epidemiology and treatment of depression in patients with chronic medical illness. *Dialog Clin Neurosci*. 2011;**13**(1):7–23. doi:10.31887/DCNS.2011.13.1/wkaton.
- Druss BG, Walker ER. Mental disorders and medical comorbidity. *Synth Proj Res Synth Rep*. 2011;(21):1–26.
- Fountoulakis KN, Apostolidou MK, Atsiova MB, et al. Self-reported changes in anxiety, depression and suicidality during the COVID-19 lockdown in Greece. *J Affect Disord*. 2021;**279**:624–629. doi:10.1016/j.jad.2020.10.061.
- Fountoulakis KN, Apostolidou MK, Atsiova MB, et al. Mental health and conspiracism in health care professionals during the spring 2020 COVID-19 lockdown in Greece. *Acta Neuropsychiatr*. 2022;**34**(3):132–147. doi:10.1017/neu.2021.38.
- Fountoulakis KN, Karakatsoulis G, Abraham S, et al. Results of the COVID-19 mental health international for the general population (COMET-G) study. *Eur Neuropsychopharmacol*. 2022;**54**:21–40. doi:10.1016/j.euro-neuro.2021.10.004
- Fountoulakis KN, Karakatsoulis GN, Abraham S, et al. The effect of different degrees of lockdown and self-identified gender on anxiety, depression and suicidality during the COVID-19 pandemic: Data from the international COMET-G study. *Psychiatry Res*. 2022;**315**:114702. doi:10.1016/j.psychres.2022.114702.
- K NF, G NK, Abraham S, et al. Results of the COVID-19 Mental Health International for the Health Professionals (COMET-HP) study: depression, suicidal tendencies and conspiracism. *Soc Psychiatry Psychiatr Epidemiol*. 2023;**58**:1–24. doi:10.1007/s00127-023-02438-8.
- Patsali ME, Mousa DV, Papadopoulou EVK, et al. University students' changes in mental health status and determinants of behavior during the COVID-19 lockdown in Greece. *Psychiatry Res*. 2020;**292**:113298. doi:10.1016/j.psychres.2020.113298.
- Bourdon KH, Rae DS, Locke BZ, Narrow WE, Regier DA. Estimating the prevalence of mental disorders in U.S. adults from the Epidemiologic Catchment Area Survey. *Public Health Rep*. 1992;**107**(6):663–668.
- Wittchen HU, Jacobi F. Size and burden of mental disorders in Europe—a critical review and appraisal of 27 studies. *Eur Neuropsychopharmacol*. 2005;**15**(4):357–376. doi:10.1016/j.euroneuro.2005.04.012.

23. Goodwin RD, Dierker LC, Wu M, Galea S, Hoven CW, Weinberger AH. Trends in U.S. depression prevalence from 2015 to 2020: the widening treatment gap. *Am J Prev Med.* 2022;**63**(5):726–733. doi:10.1016/j.amepre.2022.05.014.
24. Lim GY, Tam WW, Lu Y, Ho CS, Zhang MW, Ho RC. Prevalence of depression in the community from 30 countries between 1994 and 2014. *Sci Rep.* 2018;**8**(1):2861. doi:10.1038/s41598-018-21243-x.
25. Bebbington P, Ramana R. The epidemiology of bipolar affective disorder. *Soc Psychiatry Psychiatr Epidemiol.* 1995;**30**(6):279–292. doi:10.1007/BF00805795.
26. Pini S, de Queiroz V, Pagnin D, et al. Prevalence and burden of bipolar disorders in European countries. *Eur Neuropsychopharmacol.* 2005;**15**(4):425–434. doi:10.1016/j.euroneuro.2005.04.011.
27. Merikangas KR, Jin R, He JP, et al. Prevalence and correlates of bipolar spectrum disorder in the world mental health survey initiative. *Arch Gen Psychiatry.* 2011;**68**(3):241–251. doi:10.1001/archgenpsychiatry.2011.12.
28. Fountoulakis KN. Classification and Epidemiology. In: Fountoulakis KN, ed. *Bipolar Disorder.* Berlin, Heidelberg: Springer; 2015:341–360; Chapter 11.
29. Eaton WW. Update on the epidemiology of schizophrenia. *Epidemiol Rev.* 1991;**13**:320–328. doi:10.1093/oxfordjournals.epirev.a036075.
30. McGrath J, Saha S, Chant D, Welham J. Schizophrenia: a concise overview of incidence, prevalence, and mortality. *Epidemiol Rev.* 2008;**30**:67–76. doi:10.1093/epirev/mxn001.
31. Agle J, Xiao Y. Misinformation about COVID-19: evidence for differential latent profiles and a strong association with trust in science. *BMC Public Health.* 2021;**21**(1):89. doi:10.1186/s12889-020-10103-x.
32. Cipriano A, Cella S, Cotrufo P. Nonsuicidal self-injury: a systematic review. *Front Psychol.* 2017;**8**:1946. doi:10.3389/fpsyg.2017.01946.
33. Lucena NL, Rossi TA, Azevedo LMG, Pereira M. Self-injury prevalence in adolescents: a global systematic review and meta-analysis. *Child Youth Serv Rev.* 2022;**142**:106634. doi:10.1016/j.childyouth.2022.106634.
34. Fountoulakis KN, Grammatikopoulos IA, Koupidis SA, Siamouli M, Theodorakis PN. Health and the financial crisis in Greece. *Lancet.* 2012;**379**(9820):1001–1002. doi:10.1016/S0140-6736(12)60422-X.
35. Fairweather-Schmidt AK, Anstey KJ. Prevalence of suicidal behaviours in two Australian general population surveys: methodological considerations when comparing across studies. *Soc Psychiatry Psychiatr Epidemiol.* 2012;**47**(4):515–522. doi:10.1007/s00127-011-0369-5.
36. Borges G, Nock MK, Haro Abad JM, et al. Twelve-month prevalence of and risk factors for suicide attempts in the World Health Organization World Mental Health Surveys. *J Clin Psychiatry.* 2010;**71**(12):1617–1628. doi:10.4088/JCP.08m04967blu.
37. Borges G, Angst J, Nock MK, Ruscio AM, Walters EE, Kessler RC. A risk index for 12-month suicide attempts in the National Comorbidity Survey Replication (NCS-R). *Psychol Med.* 2006;**36**(12):1747–1757. doi:10.1017/S00323291706008786.
38. Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Arch Gen Psychiatry.* 1999;**56**(7):617–626. doi:10.1001/archpsyc.56.7.617
39. Nock MK, Borges G, Bromet EJ, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry.* 2008;**192**(2):98–105. doi:10.1192/bjp.bp.107.040113.
40. Schmidtke A, Bille-Brahe U, De Leo D, et al. Attempted suicide in Europe: rates, trends and sociodemographic characteristics of suicide attempters during the period 1989–1992. Results of the WHO/EURO Multicentre Study on Parasuicide. *Acta Psychiatr Scand.* 1996;**93**(5):327–338. doi:10.1111/j.1600-0447.1996.tb10656.x.
41. Liu X, Huang Y, Liu Y. Prevalence, distribution, and associated factors of suicide attempts in young adolescents: School-based data from 40 low-income and middle-income countries. *PLoS One.* 2018;**13** (12):e0207823 doi:10.1371/journal.pone.0207823.
42. Van Meter AR, Knowles EA, Mintz EH. Systematic review and meta-analysis: international prevalence of suicidal ideation and attempt in youth. *J Am Acad Child Adolesc Psychiatry.* 2022;**62**:973–986. doi:10.1016/j.jaac.2022.07.867.
43. Amiri P, Kazeminasab S, Nejadghaderi SA, et al. Migraine: a review on its history, global epidemiology, risk factors, and comorbidities. *Front Neurol.* 2021;**12**:800605 doi:10.3389/fneur.2021.800605.
44. Fiest KM, Sauro KM, Wiebe S, et al. Prevalence and incidence of epilepsy: A systematic review and meta-analysis of international studies. *Neurology.* 2017;**88**(3):296–303. doi:10.1212/WNL.0000000000003509.
45. Singh P, Arora A, Strand TA, et al. Global prevalence of celiac disease: systematic review and meta-analysis. *Clin Gastroenterol Hepatol.* 2018;**16** (6):823–836.e2. doi:10.1016/j.cgh.2017.06.037.
46. Bobo WV, Yawn BP, Sauver JL, Grossardt BR, Boyd CM, Rocca WA. Prevalence of combined somatic and mental health multimorbidity: patterns by age, sex, and race/ethnicity. *J Gerontol A.* 2016;**71**(11):1483–1491. doi:10.1093/geronb/glw032.
47. Wu LT, Zhu H, Ghitza UE. Multimorbidity of chronic diseases and substance use disorders and their association with hospitalization: Results from electronic health records data. *Drug Alcohol Depend.* 2018;**192**:316–323. doi:10.1016/j.drugalcdep.2018.08.013.
48. Nolte H, Nepper-Christensen S, Backer V. Unawareness and undertreatment of asthma and allergic rhinitis in a general population. *Respir Med.* 2006;**100**(2):354–362. doi:10.1016/j.rmed.2005.05.012.
49. de Marco R, Cerveri I, Bugiani M, Ferrari M, Verlato G. An undetected burden of asthma in Italy: the relationship between clinical and epidemiological diagnosis of asthma. *Eur Respir J.* 1998;**11**(3):599–605.
50. Collins PY, Patel V, Joestl SS, et al. Grand challenges in global mental health. *Nature.* 2011;**475**(7354):27–30. doi:10.1038/475027a.
51. Benyamina A, Blecha L, Reynaud M. Global burden of disease in young people aged 10–24 years. *Lancet.* 2012;**379**(9810):29. doi:10.1016/S0140-6736(12)60021-X.
52. Harhay MO, King CH. Global burden of disease in young people aged 10–24 years. *Lancet.* 2012;**379**(9810):27–28. doi:10.1016/S0140-6736(12)60019-1.
53. Gore FM, Bloem PJ, Patton GC, et al. Global burden of disease in young people aged 10–24 years: a systematic analysis. *Lancet.* 2011;**377**(9783):2093–2102. doi:10.1016/S0140-6736(11)60512-6.
54. O'Connor R, Sheehy N. *Understanding Suicidal Behaviour.* Wiley-Blackwell; 2000.
55. Bertolote JM, Fleischmann A. Suicide and psychiatric diagnosis: a worldwide perspective. *World Psychiatry.* 2002;**1**(3):181–185.
56. Ronaldson A, Arias de la Torre J, Prina M, et al. Associations between physical multimorbidity patterns and common mental health disorders in middle-aged adults: A prospective analysis using data from the UK Biobank. *Lancet Reg Health Eur.* 2021;**8**:100149. doi:10.1016/j.lanepe.2021.100149.
57. Yao SS, Cao GY, Han L, et al. Associations between somatic multimorbidity patterns and depression in a longitudinal cohort of middle-aged and older Chinese. *J Am Med Dir Assoc.* 2020;**21**(9):1282–1287.e2. doi:10.1016/j.jamda.2019.11.028.
58. Li H, Wang A, Gao Q, et al. Prevalence of somatic-mental multimorbidity and its prospective association with disability among older adults in China. *Aging (Albany NY).* 2020;**12**(8):7218–7231. doi:10.18632/aging.103070.
59. Galenkamp H, Braam AW, Huisman M, Deeg DJ. Somatic multimorbidity and self-rated health in the older population. *J Gerontol B Psychol Sci Soc Sci.* 2011;**66**(3):380–386. doi:10.1093/geronb/gbr032.
60. de Mooij LD, Kikkert M, Theunissen J, et al. Dying too soon: excess mortality in severe mental illness. *Front Psychiatry.* 2019;**10**:855. doi:10.3389/fpsyg.2019.00855.
61. Walker ER, McGee RE, Druss BG. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry.* 2015;**72**(4):334–341. doi:10.1001/jamapsychiatry.2014.2502.
62. Chesney E, Goodwin GM, Fazel S. Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry.* 2014;**13**(2):153–160. doi:10.1002/wps.20128.
63. Weyer N, Momen NC, Christensen MK, et al. Association of specific mental disorders with premature mortality in the danish population using alternative measurement methods. *JAMA Netw Open.* 2020;**3**(6):e206646. doi:10.1001/jamanetworkopen.2020.6646.

64. Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Prev Chronic Dis.* 2006;**3**(2):A42.
65. Dembling BP, Chen DT, Vachon L. Life expectancy and causes of death in a population treated for serious mental illness. *Psychiatr Serv.* 1999;**50**(8):1036–1042. doi:10.1176/ps.50.8.1036.
66. Tiihonen J, Lonnqvist J, Wahlbeck K, et al. 11-year follow-up of mortality in patients with schizophrenia: a population-based cohort study (FIN11 study). *Lancet.* 2009;**374**(9690):620–627. doi:10.1016/S0140-6736(09)60742-X.
67. Harris EC, Barraclough B. Excess mortality of mental disorder. *Br J Psychiatry.* 1998;**173**(1):11–53. doi:10.1192/bjp.173.1.11.
68. Fond G, Tinland A, Boucekine M, et al. Prescription of potentially inappropriate psychotropic drugs in homeless people with schizophrenia and bipolar disorders. Results from the French Housing First (FHF) program. *Prog Neuropsychopharmacol Biol Psychiatry.* 2019;**89**:84–89. doi:10.1016/j.pnpbp.2018.08.024.
69. Gramaglia E, Ramella Gigliardi V, Olivetti I, et al. Impact of short-term treatment with benzodiazepines and imidazopyridines on glucose metabolism in healthy subjects. *J Endocrinol Invest.* 2014;**37**(2):203–206. doi:10.1007/s40618-013-0016-y.
70. Gu XH, Kurose T, Kato S, et al. Suppressive effect of GABA on insulin secretion from the pancreatic beta-cells in the rat. *Life Sci.* 1993;**52**(8):687–694. doi:10.1016/0024-3205(93)90229-v.
71. Passariello N, Giugliano D, Torella R, Sgambato S, Coppola L, Frascolla N. A possible role of gamma-aminobutyric acid in the control of the endocrine pancreas. *J Clin Endocrinol Metab.* 1982;**54**(6):1145–1149. doi:10.1210/jcem-54-6-1145.
72. Chevassus H, Mourand I, Molinier N, Lacarelle B, Brun JF, Petit P. Assessment of single-dose benzodiazepines on insulin secretion, insulin sensitivity and glucose effectiveness in healthy volunteers: a double-blind, placebo-controlled, randomized cross-over trial [ISRCTN08745124]. *BMC Clin Pharmacol.* 2004;**4**:3. doi:10.1186/1472-6904-4-3.