

# The role of physical and mental health multimorbidity in suicidal ideation



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## ABSTRACT

**Background:** Previous research has focused on the separate roles of mental illness and physical health conditions in suicide risk, with relatively few studies investigating the importance of physical and psychiatric disorder co-occurrence. We aimed to investigate whether suicidal ideation might be influenced by physical and mental ill-health multimorbidity.

**Methods:** Data from the Adult Psychiatric Morbidity Survey of England were analysed. Participants who responded to the suicidal thoughts question were grouped into four distinct categories based on their health conditions (Common mental disorders (CMD) only, physical health conditions only, CMD/physical health multimorbidity and a control group with neither physical nor mental health conditions). Multinomial logistic regression analyses were conducted and odds ratios (OR) and 95% CIs are presented.

**Results:** In the fully adjusted model, both the multimorbidity and CMD-only groups were associated with higher levels of suicidal ideation relative to the control group.

**Limitations:** Secondary analyses of cross-sectional data.

**Conclusions:** Although multimorbidity was associated with suicidal thoughts, it does not appear to elevate risk beyond the independent effects of common mental disorders or physical health problems. Primary care and mental health clinicians should consider assessment of suicidal ideation among patients with multimorbid physical/mental health conditions.

## 1. Background

Suicide and its prevention are significant public health issues (World Health Organisation, WHO 2014). According to the WHO's World Suicide Report, the global age-standardised suicide rate for 2012 was 11.4 per 100,000 population, which translates into 804,000 suicide deaths annually worldwide (WHO, 2014). A significant body of work has focused on describing high-risk populations, such as clinical populations with mental illness and general populations whose members experience social stressors and adverse life events (Cavanagh et al., 1999; Fässberg et al., 2012; Foster, 2011; Gonda et al., 2012; Stack, 2014). A range of sociodemographic, psychological and clinical risk factors have also been identified (Hawton et al., 2003b; Mościcki, 1997; O'Connor, 2011; O'Connor and Nock, 2014; WHO, 2014). More recently, attention has focused on somatic illness and associated morbidities such as chronic pain as potential suicide risk factors (Braden and Sullivan, 2008; Pompili et al., 2014; Ratcliffe et al., 2008; Robson, 2010; Stenager et al., 1994; Tang and Crane, 2006; Qin et al., 2013). More specifically, pain-related physical conditions like

migraine and back pain have been associated with an increased risk of suicidal behaviours (Ilgen et al., 2013; Smith et al., 2004).

The influence of multiple mental illnesses on risk of suicide is of considerable interest from a global public health perspective. Several studies have reported that major depression, anxiety disorder and substance abuse are often found to co-occur with other psychiatric conditions within suicidal populations (Hawton et al., 2003a; Nock et al., 2010; Suominen et al., 1996). Such findings suggest an increased risk among people with specific multimorbid psychiatric diagnoses and highlight the need for more targeted support from mental health services (Andrews and Lewinsohn, 1992; Bronisch and Wittchen, 1994; Mościcki, 2001; Oquendo et al., 2005; Pawlak et al., 1999; Wunderlich et al., 1998). At the same time, physical health multimorbidity is also associated with an increased risk of suicidal behaviour (Druss and Pincus, 2000; Goodwin et al., 2003b). Indeed, several studies have reported that the co-occurrence of multiple physical health conditions, involving several organs or systems, may elevate risk of suicidal behaviour, even in the absence of mental illness (Scott et al., 2010; Qin et al., 2013).

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**Table 1**

Proportion with past year physical health conditions and current common mental disorders (CMDs) among APMS 2007 respondents.

Physical health conditions		Common mental disorders	
n (%) <sup>a</sup>		n (%)	
Allergies	757 (10.2%)	Epilepsy/fits	44 (0.6%)
Arthritis	1309 (17.7%)	Ear/hearing problems	43 (10.0%)
Asthma	679 (9.2%)	Infectious disease	39 (0.5%)
Bladder problems/incontinence	353 (4.8%)	Heart attack/angina	216 (2.9%)
Bone, back, joint and muscle problems	2047 (27.7%)	High blood pressure	1514 (20.5%)
Bowel/colon problems	455 (6.1%)	Liver problems	68 (0.9%)
Bronchitis/emphysema	216 (2.9%)	Migraine or frequent headaches	1019 (13.8%)
Cancer	116 (1.6%)	Skin problems	819 (11.1%)
Cataracts/eyesight problems	1280 (17.3%)	Stomach ulcer or digestive problems	522 (7.1%)
Dementia or Alzheimers	7 (0.1%)	Stroke	42 (0.6%)
Diabetes	386 (5.2%)		

<sup>a</sup> The number of conditions may not add up to that total number of the APMS sample (n=7389), as participants had one or more of the indexed conditions.

Furthermore, studies on suicide deaths of people with physical illness diagnoses appear to have an increased prevalence of mental disorders (Henriksson et al., 1995; Qin et al., 2014; Webb et al., 2012). Chronic illnesses like cancer, asthma, musculoskeletal and cardiovascular disease may play a role in the development of suicidal behaviours, varying as a function of the presence of subsequent mental disorder (Bolton et al., 2015; Webb et al., 2012). Perhaps unsurprisingly, numerous studies have found depression to be the most common psychiatric diagnosis among chronic physically ill patients, being associated with a higher suicide risk (Anguiano et al., 2012; Pompili et al., 2012, 2014; Webb et al., 2012).

Despite the growing evidence that both mental and physical disorders contribute to suicide risk, very few studies have investigated the extent to which their co-occurrence (multimorbidity) is associated with suicide risk (Goodwin et al., 2003a; Singhal et al., 2014; Qin et al., 2014; Webb et al., 2012). Most of the extant research has focused on comorbidity and suicide risk, with comorbidity defined as a further diagnosis which is secondary to an index condition (Blasco-Fontecilla et al., 2016; Kavalidou et al., 2016; Valderas et al., 2009). To address this gap in knowledge, we aimed to investigate the extent to which suicidal ideation varies as a function of multimorbidity where individuals have at least one physical health plus at least one mental health condition. We had also initially aimed to investigate the relationship between suicide attempts and multimorbidity but this was not possible given the relatively low number of suicide attempt cases in the present sample. We hypothesised that individuals with physical/mental health multimorbidity would have a higher risk of suicidal thoughts, compared to individuals with neither physical nor mental health conditions.

## 2. Methods

### 2.1. Setting and participants

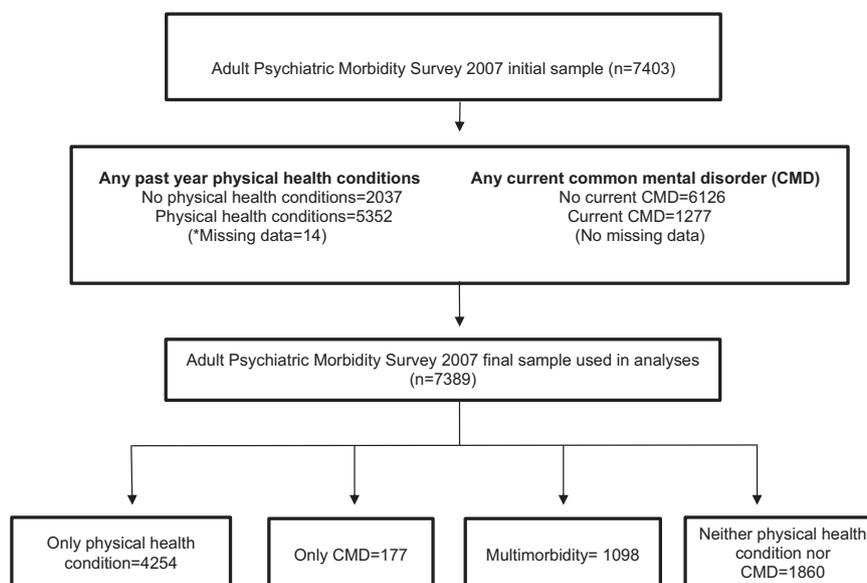
Secondary analyses of data from the Adult Psychiatric Morbidity Survey (APMS) 2007 of England were conducted. APMS 2007 is the third in a series of surveys administered in English households for adults, aged 16 and over. The survey's aim was to describe the prevalence of both treated and untreated mental illness based on self-reported information of 7403 participants. Population-based multiphase probability sampling was performed and both face-to-face and self-completion methodologies were employed. Both first and second phase interviews from the APMS were used for the data analysed in the current study. Full details of the methodology have been described elsewhere (McManus et al., 2009; National Centre for Social Research, 2011).

### 2.2. Measures

Mental health conditions, including prevalence of neurotic symptoms in the week prior to interview, were assessed through the revised Clinical Interview Schedule (CIS-R), a standardised interview that contains 14 sections each covering specific types of neurotic symptoms (McManus, 2009). Participants who met the criteria for a depressive episode, generalised anxiety disorder (GAD), mixed anxiety and depressive disorder (MAD), panic disorder, phobia, and obsessive compulsive disorder (OCD) were considered to have a 'common mental disorder' (CMD). With respect to health conditions, a show card of 22 health conditions was provided to participants. With the exception of "anxiety, depression or other mental health issue", all of the other conditions asked about were physical health conditions. If a positive response to a health condition was indicated, this was followed up with a question asking whether the condition had been experienced in the past year or lifetime. Given that the timeline for CMDs was current the time-frame used for physical health condition was past year. Physical health conditions experienced in the past year and current CMDs are presented in Table 1.

Items related to suicidal thoughts, suicide attempts and self-harm were assessed through the CIS-R. Participants were asked the following questions: "Have you ever thought of taking your life, even though you would not actually do it? "; "Have you ever made an attempt to take your life, by taking an overdose of tablets or in some other way? " and "Have you ever deliberately harmed yourself in any way but not with the intention of killing yourself? ". A positive response on these items was followed up with a further question on whether the thoughts/behaviours occurred during the past week, the past year or whether they were lifetime responses. No further question about the timing was asked for self-harming behaviours (i.e., cutting, burning); as a result, those behaviours were considered as lifetime occurrence. Based on the selection of past year physical health conditions and current CMD in the present study, only the items assessing past year suicidal thoughts (Yes/No replies) were used in our analyses. As noted above, although past year suicide attempts were assessed, due to the small number of suicide attempt cases, we could not be confident in the robustness of the findings, therefore the data are not presented here.

In order to investigate the extent to which the risk of suicidal thoughts varies as a function of physical and mental health multimorbidity, participants were grouped into four mutually exclusive categories: those with (1) one or more CMDs; (2) one or more physical health conditions; (3) both CMD and physical health conditions (multimorbidity) and; (4) neither physical health conditions nor CMD (controls). For the present study, multimorbidity was defined as the co-occurrence of at least two health conditions, at least one physical and one mental within the same person. The frequencies of participants as a function of physical and mental health conditions are



**Fig. 1.** Flowchart of the Adult Psychiatric Morbidity Survey 2007 sample. \*missing data include: No answer/refused, Don't know.

presented in Fig. 1.

High hazardous drinking, drug dependency and prescribed medication were also recorded in the current study. Hazardous drinking and alcohol dependency levels were assessed using the Alcohol Use Disorders Identification Test (AUDIT). For participants who had an AUDIT score of more than 10 (range 0–40), indicating hazardous drinking, the Severity of Alcohol Dependence Questionnaire (SADQ-C, with reference to drinking in the past 6 months) was administered in order to assess alcohol dependency. The scoring combination of AUDIT +10 and SADQ-C was selected for high hazardous drinking in the present study and was computed as a binomial variable (Yes/No). Drug use was also assessed via a computer-assisted self-completion interview (CASI). The computed past year drug dependency item (Yes/No) was selected for our analyses. Furthermore, APMS participants were questioned about different types of current prescribed psychiatric medication and the derived variable of assessing any current psychiatric medication (Yes/No) was used.

The participants were additionally asked about 18 negative life events including serious illness, death, abusive relationships, work problems, financial stress and homelessness. The experience of negative life events was reported for either lifetime (more than 6 months ago but since or before the age of 16 years) or for the past 6 months. The derived variable entitled the “presence of negative life events within the past 6 months” (Yes/No) was computed and used in the analyses.

Sociodemographic information regarding living conditions (de facto status), ethnic origin, employment status and deprivation index were computed as binomial variables. Standard sociodemographic characteristics per health condition group are presented in Table 2.

### 2.3. Statistical analyses

Descriptive statistics were used for the demographic characteristics of the four different physical/mental health condition groups (i.e., CMD only, physical health condition only, multimorbidity, neither physical health condition nor CMD). Multinomial logistic regression analyses were conducted to investigate the association between past year suicidal thoughts and multimorbidity. The reference category for the multinomial regressions was those with “neither physical health condition nor CMD” (group 4) and odds ratios (OR) and 95% CIs are reported. A series of multinomial logistic regression models was conducted adjusting for: a) sociodemographic characteristics and; b)

sociodemographic characteristics, negative life events, hazardous drinking, drug dependency and any prescribed psychiatric medication. The significance level was set at  $p < 0.05$  and the statistical analysis was performed with the Statistical Package for Social Sciences SPSS version 22.0 (SPSS Inc., Chicago, IL, USA).

## 3. Results

### 3.1. Sociodemographic characteristics of APMS participants with multimorbidity

Of the 1098 APMS participants with physical and common mental disorder multimorbidity, 67.9% were women (see Table 2). The majority of the multimorbidity group belonged to the most deprived category (87.3%), while 613 participants from the same health group were not currently employed. Similar to the other health groups, the majority of those with multimorbidity were White (ethnic group category) and had a high educational qualification. Regarding the responses to the suicidal ideation, 19.9% and 21.7% of those within the multimorbidity and CMD groups, respectively, reported past year suicidal thoughts.

#### 3.1.1. Unadjusted and adjusted analyses of the relationship between physical and mental health conditions and suicidal thoughts

Three separate multinomial regression analyses were performed for the different illness groupings and past year suicidal thoughts (Table 3). The unadjusted model showed that participants with CMDs only (OR, 30.038; 95% CI, 16.524–54.604,  $p < 0.001$ ), any physical health condition only (OR, 1.734; 95% CI, 1.015–2.961,  $p = 0.044$ ) and multimorbidity (OR, 26.857; 95% CI, 16.287–44.286,  $p < 0.001$ ) were more likely to experience suicidal thoughts compared to those with neither physical health condition nor CMD. A similar pattern of findings was found for suicidal thoughts adjusted for demographics (sex, age, living conditions, ethnic group, education qualifications, employment status, and deprivation index). After the adjustment for sociodemographics, negative life events, hazardous drinking, drug dependency and any prescribed medication, multimorbidity and CMDs were significantly associated with the suicidal thoughts assessment. In the same fully adjusted model physical health conditions did not have any association with suicidal thoughts.

**Table 2**

Sociodemographic characteristics of APMS participants as a function of multimorbidity, CMD only, physical health conditions only and neither physical nor CMD (n=7389).

	Multimorbidity	Common mental disorders only (CMD)	Physical health conditions only	Neither physical nor CMD
Characteristics <sup>a</sup>	<b>n=1098</b>	<b>n=177</b>	<b>n=4254</b>	<b>n=1860</b>
AgeM (SD)	48.73 (16.6)	36.90 (15.1)	55.62 (18.3)	43.58 (17.1)
Sexn (%)				
Male	353 (32.1)	66 (37.3)	1834 (43.1)	933 (50.2)
Female	745 (67.9)	111 (62.7)	2420 (56.9)	927 (49.8)
Living conditionsn (%)				
Living with someone	508 (46.3)	67 (37.9)	2475 (58.2)	1078 (58)
Not living with someone	590 (53.7)	110 (62.1)	1779 (41.8)	782 (42)
Ethnic groups n (%)				
White	993 (91.9)	144 (83.7)	4015 (94.8)	1642 (88.8)
Non white	88 (8.1)	28 (16.3)	221 (5.2)	208 (11.2)
Employment status n(%)				
Currently employed	485 (44.2)	95 (53.7)	2113 (49.7)	1265 (68)
Not currently employed	613 (55.8)	82 (46.3)	2141 (50.3)	595 (32)
Any higher qualifications n(%)				
Yes	720 (66.4)	129 (75.4)	2916 (68.9)	1462 (79.1)
No	365 (33.6)	42 (24.6)	1319 (31.1)	387 (20.9)
Index of Multiple Deprivationn (%)				
0.59- > 8.35 (least deprived)	139 (12.7)	22 (12.4)	889 (20.9)	366 (19.7)
8.35- > 86.36 (most deprived)]	959 (87.3)	155 (87.6)	3365 (79.1)	1494 (80.3)
Past year suicidal ideation n (%)				
Yes	217 (19.9)	38 (21.7)	67 (1.6)	17 (0.9)
No	875 (80.1)	137 (78.3)	4185 (98.4)	1841 (99.1)

<sup>a</sup> percent (%) is based on the omission of missing values

#### 4. Discussion

Overall, within a general population sample, we have identified that there may be an important role for mental and physical multimorbidity in suicidal thoughts. As previous studies of mental and physical ill-health co-occurrence have suggested an increased risk of suicidality, our current findings provide further evidence of the role of mental and physical health conditions in suicidal thoughts (Goodwin et al., 2003a; Qin et al., 2014; Ratcliffe et al., 2008). Multimorbidity was found to be significantly associated with suicidal thoughts, however it does not appear to confer a higher risk of suicidal thoughts (when compared to the control group) beyond the independent effects of CMD-only.

As hypothesised, the APMS participants with multimorbidity exhibited higher risks of suicidal thoughts compared to those with neither physical health nor CMD conditions and, as such, our results support some previous studies on the role of mental and physical illness in suicide risk (Qin et al., 2014, 2013; Ratcliffe et al., 2008; Webb et al., 2012). In a population-based study in Canada, Bolton and colleagues concluded that when mental illness was taken into account, cancer patients compared to patients with other chronic illness had an increased suicide risk 3 months following cancer diagnosis (Bolton et al., 2015). The same study found that asthma, chronic obstructive pulmonary disease (COPD) and multiple sclerosis are also associated with an increased risk of suicide (Bolton et al., 2015). This study

supports findings from an English study that has similarly suggested that certain diagnoses like cancer, osteoporosis and COPD are associated with a higher suicide risk, identifying depression as a strong confounder of increased suicide risk among physically ill populations (Webb et al., 2012). Although limited research has investigated the role of physical illness and suicide risk among populations with a pre-existing mental illness, a Danish study found that suicide risk was high when the onset of physical and mental illness occurred close in time, especially when the physical illness preceded the mental illness (Qin et al., 2014). The authors concluded that the timing of psychiatric diagnosis before or after a physical illness can differentiate the suicide risk (Qin et al., 2014).

Given the elevated risk of suicidal ideation among physical/mental multimorbid participants in our study, future research is required to investigate the transition from suicidal ideation to suicide attempts (Nock et al., 2008; O'Connor, 2011). Moreover, no research has focused on providing a detailed understanding of the factors associated with the selection of suicide attempt methods among this vulnerable population. However, multimorbid populations have been extensively studied in terms of the over-use of prescribed and non-prescribed medications (Hovstadius et al., 2010; Linnet et al., 2016; and Vyas et al., 2012). Indeed, in a study of suicide attempt patients who presented to hospital with self-poisoning, drug overdose using ones' own prescribed medication was common as was overdose via benzo-

**Table 3**

Multinomial regression analyses investigating the relationship of past year suicidal thoughts with physical and common mental health disorders among APMS 2007 participants.

	Unadjusted analyses		Adjusted analysis for demographics <sup>a</sup>	Fully adjusted analyses <sup>b</sup>
	n (%)	OR (95% CI)		
Neither physical nor CMD	17 (0.9)	1.00 (ref)	1.00 (ref)	1.00 (ref)
One or more CMD	38 (21.7)	<b>30.038</b> (16.524–54.604) <sup>*</sup>	<b>22.012</b> (11.901–40.716) <sup>*</sup>	<b>16.644</b> (8.881–31.193) <sup>*</sup>
One or more physical illness	67 (1.6)	<b>1.734</b> (1.015–2.961) <sup>**</sup>	<b>1.949</b> (1.134–3.348) <sup>**</sup>	1.496 (0.863–2.591)
Multimorbidity <sup>c</sup>	217 (19.9)	<b>26.857</b> (16.287–44.286) <sup>*</sup>	<b>24.053</b> (14.505–39.885) <sup>*</sup>	<b>15.632</b> (9.274–26.349) <sup>*</sup>

<sup>\*</sup> Significance of bold value is  $p < 0.001$ .<sup>\*\*</sup> Significance of bold value is  $p < 0.05$ <sup>a</sup> Adjusted for sociodemographic characteristics: sex, age, living conditions, ethnic group, any high educational qualification, employment status, deprivation index.<sup>b</sup> Adjusted for all covariates: sex, age, living conditions, ethnic group, any high educational qualification, employment status, deprivation index, negative life events, any prescribed psychiatric medication, high hazardous drinking, and drug dependency<sup>c</sup> One or more CMD and one or more physical illness in the same person.

diazepines and analgesics for either medical and/or psychiatric conditions (Gavrielatos et al., 2006).

Although polypharmacy is one mechanism by which multimorbidity may possibly increase risk of suicide risk, psychological mechanisms require exploration. For example, further studies should investigate the extent to which entrapment and acquired capability (O'Connor, 2011; Joiner, 2005) are elevated in multimorbid populations. While the prevalence of multimorbidity increases with age and a variety of studies focus on young and old age groups with co-occurring conditions, future studies should additionally explore the risk of suicidality in relation to the different multimorbid age groups (Barnett et al., 2012; McCloughen et al., 2012; Salive, 2013). In addition, as the survey was conducted before the global economic recession, the impact of austerity upon those with multimorbid conditions should be considered.

Consistent with previous research (Kamath et al., 2007; Kanwar et al., 2013; Rihmer et al., 2007; Weissman et al., 1989) those with common mental disorders (CMD) in the APMS survey were at elevated risk of suicidal thoughts compared to those with neither physical health nor CMD conditions. Although the presence of CMD had a persistent effect even when sociodemographic and clinical factors were controlled for, physical health conditions on the other hand were not associated with suicidal thoughts when all covariates were taken into account. It should be noted, however, that some of the physical conditions assessed in the APMS may not represent serious somatic conditions (that require ongoing medical treatment), and that their inclusion may have attenuated the relationship with suicidal ideation/behaviour.

#### 4.1. Strengths and limitations

The Adult Psychiatric Morbidity Survey 2007 is part of a series of surveys retaining the same methodological approach since 1993 and it is a unique dataset recording the prevalence of mental conditions in private households (McManus et al., 2016). Although this is a self-report survey, a strength of the APMS methodology is that it uses structured assessments and screening instruments based on diagnostic criteria, thereby rendering the survey comparable with other global mental health surveys (Kessler et al., 2009; McManus et al., 2016; Slade et al., 2009). Based on previous mental health surveys, 1 in 5 people experience a CMD within a 12 month period, which is not inconsistent with the APMS results, where about 1 in 6 people reported experiencing at least one CMD in the week prior to the survey (McManus et al., 2009; Slade et al., 2009; Steel et al., 2014). Further to that, exploring suicidal thoughts/behaviours in a survey like APMS provides a prevalence estimate of suicidality among the general population who may not be in contact with health care services.

A main limitation of the present study is that we have conducted secondary analyses of cross-sectional data. The study itself did not provide further information on the exact timing or nature of past year physical/mental conditions' diagnoses and suicidal ideation; therefore it was not possible to investigate the temporal relationship between the onset of physical/mental health conditions and suicidal thoughts. It is also worth noting that the presence of any of the physical conditions may have been over- or under-reported and that some of the conditions may not reflect serious illness requiring hospitalisation. However, we were unable to find any studies to compare the rates of past year physical conditions in other samples and therefore cannot comment directly on any under- or over-reporting. Furthermore, as we could not assess the severity of each condition we did not exclude any physical health condition when creating the physical health and multimorbidity groupings. Further studies should investigate the type and severity of physical conditions, as this could moderate the relationship between multimorbidity and suicidal ideation and behaviour.

Although CMD severity scores were used to classify individuals into diagnostic categories, future research should explore the severity of mental illness in the context of multimorbidity in more detail. A further limitation is that the suicidal thoughts item in the APMS was not based

on a specific suicide risk assessment scale but was measured through a clinical diagnostic instrument (CIS-R).

## 5. Conclusions

Studies on the risk of self-harm and suicide tend to focus on clinical populations with either primary psychiatric or physical health conditions, with fewer studies exploring the effect of mental/physical health multimorbidity within individuals. We report elevated risk of suicidal ideation among people who had co-occurring past year physical conditions and current common mental disorders, relative to individuals without these conditions. Although our findings indicate that multimorbidity is associated with suicidal thoughts it does not appear to confer additional risk beyond the independent effects of common mental disorders.

As suicide is a major public health issue and as multimorbidity within different age groups increases (Sauver et al., 2015), both primary care and mental health clinicians ought to focus on assessing thoughts of suicide among patients with multimorbid physical/mental conditions. Patient contact with general practitioners could act as an important and early intervention point for suicide risk assessments. Further research on the interaction between specific physical and mental conditions is needed to determine whether particular patterns of multimorbidity require targeted intervention. Future studies on a larger sample of suicide attempt cases should further investigate the association of physical/mental multimorbidity and the risk for suicide attempts.

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### Conflict of interest

The authors declare no conflict of interest.

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