The epidemiology of ICD-11 bodily distress disorder and DSM-5 somatic symptom disorder in new large-scale population surveys within the World Mental Health Survey Initiative

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Distressing somatic symptoms are common and disabling, but a lack of reliable classification of the underlying disorders has limited our understanding of the extent of their population burden. The new categories of bodily distress disorder (BDD) in the ICD-11 and somatic symptom disorder (SSD) in the DSM-5 were designed to address the fundamental weaknesses of previous conceptualizations, but have important differences in their criteria specifications. Three new large-scale population surveys within the World Mental Health (WMH) Survey Initiative, conducted in socially and culturally diverse settings, provide the opportunity to address questions regarding population prevalence, mental and physical health correlates, and associations with role impairment of BDD and SSD. WMH surveys were carried out in representative household samples of adults in Hong Kong, the Philippines, and Qatar (combined N=18,105 respondents). Multivariable regression analysis examined associations of BDD and SSD with socio-demographic variables, comorbid DSM-5 mental disorders, and chronic physical conditions. Role impairment was assessed by examining the mean number of health-related days out of role (DOR) in the 30 days before the interview, adjusting for socio-demographic variables and comorbidities. The point prevalence across the three settings was 2.0% for BDD, 3.5% for SSD, and 4.1% for either diagnosis. The point prevalence of BDD and especially of SSD was highest in Hong Kong, suggesting a role of cultural and social factors. Females were twice as likely as males to meet the criteria for either disorder. Prevalence increased with age. BDD and SSD were significantly associated with generalized anxiety, panic, post-traumatic stress, major depressive, and bipolar spectrum disorders, and associations were consistently stronger for BDD than SSD. More modest comorbidities were found with common chronic physical conditions (arthritis, asthma, diabetes mellitus, hypertension, and stomach or intestinal ulcer). BDD and SSD were both significantly associated with increased mean DOR after adjusting for comorbid mental disorders and chronic physical conditions, but the adjusted mean DOR was significantly higher in the BDD-only than in the SSD-only subsample (4.7 vs. 3.1, p<0.001). These findings attest to the high public health importance of BDD and SSD. Even though both are not highly prevalent in the community, their co-occurrence with common physical and mental disorders, and the fact that they are associated significantly with role impairment, provide strong reason for clinical attention.

Key words: Bodily distress disorder (BDD), somatic symptom disorder (SSD), World Mental Health Surveys, prevalence, psychiatric comorbidities, chronic physical conditions, days out of role (DOR), culture

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Even though distressing and burdensome somatic symptoms are common[1,2], their classification has been challenging[3,4]. For example, the category of "somatoform disorders" in both the ICD-10 and DSM-IV was criticized for being either too restrictive or too broad, and for lacking reliability[3,5,6]. One major consequence of these perceived shortcomings has been that somatoform disorders were excluded from most large-scale community epidemiological surveys of mental disorders[7]. Researchers conducting studies in health care settings have tended to use other conceptualizations of somatic distress[1,8]. As a result, we lack robust information about the community prevalence of these disorders, even though there is general agreement that persons experiencing burdensome somatic concerns commonly require health service attention, and that quantifying the extent of the population burden of these disorders would be important for policy planning purposes[2].

In response to the problems with the previous classification of these disorders, their defining characteristics underwent extensive revision in the ICD-11 and DSM-5[4,9-11]. Compared to ICD-10 and DSM-IV somatoform disorders, the bodily distress disorder (BDD) construct in the ICD-11 and the somatic symptom disorder (SSD) construct in the DSM-5 are substantially simplified, principally by subsuming several previous categories.

Broadly similar in their conceptualization, the two disorders are however not identical[12]. Both exclude the previous requirement that symptoms are "medically unexplained", given the demonstrated unreliability of this criterion[5], and require the presence of specific psychological and cognitive-behavioral features accompanying the distressing symptoms, such as excessive preoccupation, and anxiety about health or symptoms[13]. In persons with an "established medical condition that may be causing or contributing to the symptoms", the ICD-11 Clinical Descriptions and Diagnostic Requirements (CDDR)[11] request, for a diagnosis of BDD, "a degree of attention related to the symptoms (that) is clearly excessive in relation to the nature and severity of the medical condition".

Both systems require that symptoms are persistent, but they differ in the specified duration: for BDD, it is "several months (e.g. three months or more)", while it is "typically more than 6 months"

for SSD. For BDD, excessive attention to the symptoms can be demonstrated by "repeated contacts with health care providers" and its persistence "despite appropriate clinical examination and investigations or appropriate reassurance by health care providers". There is no requirement for clinical help-seeking for SSD.

The diagnosis of BDD also requires the presence of distress and "significant impairment in personal, family, social, educational, occupational or other important areas of functioning". For SSD, the specification is for distress or "significant disruption of daily life". Finally, while the diagnosis of BDD requires that "symptoms or the associated distress and preoccupation" are not better accounted for by another mental disorder, such as an anxiety or mood disorder, the diagnosis of SSD does not require such an exclusion.

A scoping review of studies that have examined the reliability, validity, and clinical utility of the SSD construct provides evidence for its considerable improvement over DSM-IV somatoform disorders[14], strengthened in particular by the inclusion of criteria specification of psychological symptoms[5]. We are aware of only one study reporting the performance of the BDD construct relative to ICD-10 somatoform disorders[15], which was conducted in the context of the development of the ICD-11, and indicated that the use of BDD criteria led to an improvement in clinicians' diagnostic accuracy, and in the clinical utility of the construct. The importance of exploring the epidemiological profiles of these new diagnostic constructs has been repeatedly highlighted[16].

This paper presents data from the World Mental Health (WMH) Survey Initiative on the prevalence and correlates of BDD and SSD. Although WMH surveys have been conducted in close to 30 countries at different times over the past three decades[17], BDD and SSD were only included in the three most recent surveys. These new surveys: a) provide data on the point prevalence of BDD and SSD in three culturally and socially diverse settings; b) allow examination of the associations of these disorders with other common mental disorders and chronic physical health conditions; and c) allow an exploration of the association of BDD and SSD with role impairment both in the presence and absence of comorbid mental and chronic physical disorders.

METHODS

Samples

The WMH Survey Initiative is a coordinated series of community epidemiologic surveys carried out in countries around the world using a consistent methodology in order to make cross-national comparisons of the prevalence and correlates of mental disorders[18-20]. This report uses data from the three most recent WMH surveys, each based on a general population household survey of respondents aged 18 or older.

Two of these surveys were carried out in jurisdictions classified as high-income by the World Bank: a 2022-2024 regional household survey of residents in the Hong Kong Special Administrative Region (SAR) of the People's Republic of China (N=3,053), and a 2019-2022 national phone survey of citizens and Arab expatriates in Qatar (N=5,195). The third survey was carried out in 2021-2022 with a national household sample of the Philippines, a country classified by the World Bank as middle-income (N=9,857).

In Hong Kong, households for the WMH survey were selected randomly from the FAMILY Cohort sample[21] (which is representative of all 18 districts in Hong Kong and has sample sizes proportionate to the population of each district) as well as from households in a supplemental sample of three new towns in the SAR[22].

The Philippines survey was based on a national area probability sample of households selected specifically for the WMH survey. The sample was recruited independently in each of the 17 regions of the country, with the number of respondents in each region selected to be proportional to population size[23].

The Qatar survey was based on a stratified random sample of telephone numbers selected from a national list. This exception to the general WMH area household sampling scheme was dictated by the fact that the survey was initiated shortly before the onset of the COVID-19 pandemic, and then shut down as soon as the lockdown order made it impossible to carry out in-person interviews. The survey was then re-designed for telephone administration, re-initiated in the summer of 2020, and completed in January 2022[24].

In Hong Kong, participants were recruited using a stratified random sampling method. In the Philippines, all eligible adult respondents in each sampled household were interviewed, with a weight used to adjust for differential response rates by household member age and sex. In Qatar, a post-stratification calibration weight was used to adjust the overall distribution of the sample to match the census distribution of the population on socio-demographics. The weighted (by sample size) average response rate across the three surveys was 51.6% using the American Association for Public Opinion Research RR1w definition[25].

At all survey sites, the local ethics or institutional review committees reviewed and approved the protocol to ensure protection of human subjects, in line with appropriate international and local guidelines.

Measures

The Composite International Diagnostic Interview, version 5.0 (CIDI 5.0)[26] was administered by lay interviewers who had undergone extensive standardized training and carried out a series of monitored practice interviews to confirm proficiency in administration. The interview was translated into local languages using a standardized translation, back-translation, and harmonization protocol[27]. Standardized remote quality control monitoring was performed using a field quality software linked to computerized interview schedules[28]. Supervisors also made follow-up assessments with probability subsamples of respondents to repeat certain key questions as checks of interviewer accuracy.

The socio-demographic variables considered in this study include sex, age (18-24, 25-39, 40-54, 55+ years), education (categorized into four levels based on the country-specific education

system)[29], marital status (categorized into three levels: married or cohabitating, previously married, and never married), family income (coded into quartiles of high, high-middle, low-middle, and low, using a country-specific coding schema[30]), and employment status (employed, self-employed, retired, disabled, student, homemaker, and other).

The assessment of SSD and BDD was limited to point prevalence at the time of interview. SSD and BDD were operationalized based on the definitions and criteria in DSM-5 and ICD-11 (see supplementary information). Even though the ICD-11 CDDR[11] specify that a diagnosis of BDD requires a determination that symptoms and their associated distress are not "better accounted for by another mental disorder", this criterion was not operationalized, because of our interest in exploring the associations of SSD and BDD with common mental disorders[31], and determining whether this criterion makes any meaningful difference to the conceptualization of these diagnostic constructs. Otherwise, the diagnostic algorithms were designed to capture the specific requirements of each of the constructs, with particular attention paid to their similarities and differences.

The presence of comorbid mental disorders was assessed by the CIDI 5.0. In this report, we focus on 12-month DSM-5 generalized anxiety disorder (GAD), panic disorder, post-traumatic stress disorder (PTSD), major depressive disorder, bipolar spectrum disorders (including bipolar I disorder, bipolar II disorder, and subthreshold bipolar disorder), and alcohol use disorder. DSM-5 organic exclusion rules were not applied in making these diagnoses, and diagnostic hierarchy rules were not applied other than between major depressive disorder and bipolar spectrum disorders.

Respondents were asked whether they ever seriously thought about suicide and, if so, whether they ever made a suicide attempt. Respondents who reported these lifetime experiences were then asked whether each of them occurred at any time in the past 12 months. Responses were coded yes/no without regard to frequency or intensity.

Chronic physical conditions were assessed by a standard checklist. Checklists of this type have been shown to yield more complete and accurate reports of disorder prevalence than estimates derived from responses to open-ended questions[32,33], and to have moderate to good concordance with medical records[34,35]. In this report, we explored the associations of BDD and SSD with common chronic physical conditions – arthritis, asthma, diabetes mellitus, hypertension, and stomach or intestinal ulcer – along with a summary measure of any other less common conditions.

Role impairment was assessed by a single item from the WMH Survey Initiative version of the WHO Disability Assessment Schedule (WMH WHODAS-II)[36] about days out of role (DOR) due to health problems. The question asked respondents how many days in the past 30 days they were "totally unable to work or carry out their usual daily activities" because of problems with either their physical health, mental health, or use of alcohol or drugs. Good concordance of these reports has been documented with payroll records of employed people[37,38] and prospective daily diary reports[39].

Analysis methods

As noted above, weights were applied to adjust for differences in within-household probabilities of selection and to calibrate the data to match census population distributions on socio-demographic and geographic variables. The Taylor series linearization method implemented in SAS 9.4[40] was used to adjust standard errors for the effects of these weights as well as of geographic clustering.

Cross-tabulations were used to estimate BDD and SSD point prevalence. We then applied univariable and multivariable regression models for the associations of BDD and SSD with socio-demographics, followed by parallel models controlling for socio-demographics that examined associations of comorbid 12-month mental disorders and chronic physical conditions with BDD and SSD. Finally, we explored the joint associations of BDD and SSD with role impairment adjusting for jurisdiction, socio-demographics, comorbid mental disorders, and comorbid physical conditions.

The adjustments were based on the stable balancing weight method[41]. This adjusts for differences in the distributions of covariates (in our case, jurisdiction, socio-demographics and comorbidities) across categories of a primary variable (in our case, a four-category variable for BDD-only, SSD-only, both, and neither) by weighting individual observations in a way that minimizes covariance imbalance across categories of the primary variable while minimizing variance in weights. Our assumption in doing this was that BDD and SSD would be associated significantly with role impairment, but that this association would become smaller once we adjusted for covariates. The other question was whether BDD and SSD would remain associated significantly with role impairment after this adjustment.

All regression models were applied using a logistic link function with robust standard error estimates in SAS 9.4[40]. Regression coefficients for models in which BDD and SSD were dichotomous outcomes were exponentiated to create odds ratios (ORs). Coefficients ±2 design-based standard errors were exponentiated to create design-based 95% confidence intervals (CIs). Significance of OR sets defining a single categorical variable was evaluated by Wald X^2 tests based on design-corrected coefficient variance-covariance matrices. The stable balancing weight adjustment was made using the R 'sbw' package[42]. Statistical significance was evaluated consistently using two-sided design-based 0.05-level tests.

RESULTS

Point prevalence

The point prevalence of BDD across the three settings was 2.0% (ranging from 1.2% in the Philippines to 3.5% in Hong Kong). The point prevalence of SSD was 3.5% (ranging from 2.4% in the Philippines to 7.2% in Hong Kong). The point prevalence of either diagnosis was 4.1% (ranging from 2.8% in the Philippines to 8.0% in Hong Kong) (see Table 1).

Table 1 Point prevalence of bodily distress disorder (BDD) and somatic symptom disorder (SSD)

	Total		Hong Kong		Philippines		Qatar	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)
BDD	2.0	(0.1)	3.5	(0.3)	1.2	(0.2)	3.3	(0.3)
SSD	3.5	(0.2)	7.2	(0.5)	2.4	(0.2)	3.2	(0.4)
Either	4.1	(0.2)	8.0	(0.5)	2.8	(0.2)	4.8	(0.4)
Both	1.4	(0.1)	2.7	(0.2)	0.9	(0.1)	1.7	(0.3)
BDD-only	0.6	(0.1)	0.8	(0.2)	0.3	(0.1)	1.6	(0.2)
SSD-only	2.1	(0.1)	4.5	(0.5)	1.6	(0.1)	1.5	(0.3)
X^2	127.4*		78.1*		82.9*		0.1	
OR (95% CI)	99.0**	(76.0-128.9)	67.9**	(42.0-110.0)	175.5**	(112.8-273.1)	68.6**	(40.4-116.5)

OR – odds ratio, SE – standard error, *significant difference between BDD and SSD at the 0.05 level, design-based X^2 test, **significant OR between the two disorders at the 0.05 level, two-sided design-based test

Point prevalence estimates for SSD were significantly higher than those for BDD in Hong Kong (X^2=78.1, p<0.001) and the Philippines (X^2=82.9, p<0.001), but not in Qatar (X^2=0.1, p=0.73). However, the two diagnoses were highly correlated: OR=99.0 (95% CI: 76.0-128.9) in the total sample (see Table 1).

Socio-demographic correlates

Respondent age was significantly and positively associated with odds of both BDD (X^2=13.4, p=0.004) and SSD (X^2=15.2, p=0.002), as well as with meeting criteria for either (X^2=17.0, p=0.001) or both (X^2=14.0, p=0.003) diagnoses. The ORs for respondents in the youngest age category (ages 18-24) were in the range from 0.2 to 0.5 relative to respondents in the oldest age category (ages 55+) (see Table 2).

Females had significantly higher point prevalence rates than males of either (X^2=22.6, p<0.001) as well as both disorders (X^2= 13.1, p<0.001), with ORs ranging between 1.7 and 2.2. Respondent education (X^2=3.1 to 4.3, p=0.38 to 0.23), marital status (X^2= 0.9 to 2.9, p=0.63 to 0.24), and family income (X^2=1.5 to 3.7, p=0.68 to 0.29) were not associated significantly with either disorder (see Table 2).

Associations with employment status were significant (X^2=22.3 to 40.6, p=0.001 to <0.001), due to extremely high ORs for the retired (7.5 to 9.9) and less consistently elevated ORs for the disabled (1.2 to 1.5) and for respondents in the residual category of "other" employment status (1.9 to 2.2), relative to the employed (see Table 2).

Comorbidity with mental disorders

The 12-month prevalence of anxiety and mood disorders was significantly associated with odds of both BDD and SSD in multivariable models, but with ORs consistently higher for BDD than SSD. Specifically, the ORs of the association with BDD and SSD were, respectively, 3.3 and 1.7 for GAD; 3.0 and 2.6 for panic disorder; 4.1 and 2.4 for PTSD; 7.8 and 4.4 for major depressive disorder; and 5.3 and 3.0 for bipolar spectrum disorders. Consistent with this observation, the ORs of these comorbid disorders with BDD-only (ORs: 2.4 to 9.2) were for the most part significantly larger than those with SSD-only (ORs: 1.5 to 3.3) (see Table 3).

Twelve-month suicide ideation was significantly associated with both BDD and SSD in multivariable models (OR=1.9, 95% CI: 1.0-3.6, and OR=2.9, 95% CI: 1.9-4.3, respectively), but ORs did not differ significantly in predicting BDD-only versus SSD-only. Alcohol use disorder was not significantly associated with either BDD or SSD in multivariable models, despite substantively elevated ORs (OR=2.5, 95% CI: 0.7-9.0 for BDD; OR=2.1, 95% CI: 0.8-5.5 for SSD). Suicide attempt was also not significantly associated with either BDD or SDD (see Table 3).

Comorbidity with chronic physical conditions

All the common chronic physical conditions considered here had elevated ORs in multivariable models predicting both BDD (ORs ranging from 1.4 to 3.5) and SSD (ORs ranging from 1.2 to 3.3). About half the ORs were significant. There was no consistent evidence for the ORs predicting BDD-only differing significantly from those predicting SSD-only, although stomach or intestinal ulcer was more strongly associated with BDD-only than SSD-only (OR: 4.0 vs. 1.5), whereas the reverse was true for asthma (OR: 0.6 vs. 2.0) (see Table 4).

Impairment

The mean DOR was significantly higher among respondents with BDD or SSD than those without in the total sample, both before weighting (5.5±12.4 vs. 1.4±5.0, X^2=15,550.1, p<0.001) and after stable balancing weights were used to adjust for differences in covariance distributions (3.9±13.0 vs. 1.5±4.0, X^2=3,229.6, p<0.001) (see Table 5).

The same general pattern held in the subsample of respondents who had none of the comorbid mental disorders or chronic

Table 2 Pooled multivariable associations of socio-demographic variables with bodily distress disorder (BDD) and somatic symptom disorder (SSD)

	BDD		SSD		Either		Both		BDD-only		SSD-only	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Age												
18-24	0.4	(0.2-0.9)	0.4	(0.2-0.7)	0.5	(0.3-0.8)	0.2	(0.1-0.6)	1.4	(0.4-4.2)	0.6	(0.3-1.2)
25-39	0.5	(0.3-0.7)	0.6	(0.4-0.8)	0.6	(0.4-0.8)	0.4	(0.3-0.7)	0.8	(0.4-1.7)	0.7	(0.4-1.1)
40-54	0.8	(0.5-1.2)	0.8	(0.6-1.2)	0.9	(0.7-1.2)	0.6	(0.4-1.1)	1.4	(0.7-2.9)	1.0	(0.7-1.6)
55+ (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
X^2		13.4*		15.2*		17.0*		14.0*		3.8		6.5
Sex												
Male (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
Female	2.2	(1.6-3.0)	1.7	(1.3-2.3)	1.9	(1.4-2.4)	2.1	(1.4-3.1)	2.5	(1.4-4.7)	1.6	(1.1-2.2)
X^2		22.9*		15.7*		22.6*		13.1*		8.7*		7.1*
Education												
Low	1.3	(0.9-2.1)	1.1	(0.7-1.5)	1.1	(0.8-1.6)	1.2	(0.7-2.1)	1.5	(0.7-3.2)	0.9	(0.6-1.5)
Low-middle	0.9	(0.6-1.4)	0.8	(0.6-1.2)	0.9	(0.6-1.2)	0.9	(0.6-1.4)	0.9	(0.4-1.7)	0.8	(0.5-1.3)
High-middle	1.1	(0.6-2.0)	0.8	(0.5-1.2)	1.0	(0.7-1.4)	0.7	(0.3-1.4)	2.2	(1.0-4.6)	0.8	(0.5-1.5)
High (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
X^2		3.1		3.8		3.3		4.3		7.4		1.4
Marital status												
Married/cohabitating (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
Never married	1.0	(0.7-1.6)	0.9	(0.6-1.2)	0.9	(0.7-1.2)	1.0	(0.6-1.6)	1.1	(0.6-2.1)	0.8	(0.5-1.3)
Previously married	0.7	(0.4-1.2)	0.9	(0.6-1.2)	0.9	(0.6-1.2)	0.6	(0.3-1.1)	1.0	(0.4-2.7)	1.1	(0.7-1.7)
X^2	2.1			1.3		0.9		2.9		0.1		0.9
Family income												
Low	1.3	(0.9-1.9)	1.2	(0.9-1.7)	1.2	(0.9-1.6)	1.4	(0.9-2.1)	1.1	(0.5-2.4)	1.1	(0.8-1.6)
Low-middle	1.4	(0.9-2.1)	1.1	(0.8-1.6)	1.2	(0.9-1.6)	1.2	(0.7-2.2)	1.6	(0.8-3.4)	1.0	(0.7-1.6)
High-middle	1.0	(0.6-1.7)	1.0	(0.7-1.5)	1.1	(0.8-1.5)	0.8	(0.4-1.6)	1.5	(0.7-3.3)	1.2	(0.8-1.8)
High (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
X^2		3.5		1.5		1.7		3.7		2.2		0.7
Employment												
Employed (ref.)	-	-	-	-	-	-	-	-	-	-	-	-
Self-employed	0.9	(0.5-1.4)	1.1	(0.8-1.5)	1.0	(0.8-1.5)	0.9	(0.5-1.6)	0.8	(0.4-1.9)	1.2	(0.7-1.9)
Retired	7.5	(2.3-24.7)	9.9	(4.0-24.7)	9.5	(4.0-22.4)	9.6	(2.4-39.1)	4.6	(1.0-20.7)	9.7	(3.2-29.0)
Disabled	1.2	(0.6-2.2)	1.5	(1.1-2.2)	1.5	(1.1-2.1)	1.2	(0.6-2.5)	1.0	(0.3-3.3)	1.8	(1.1-3.0)
Student	1.1	(0.4-3.2)	1.0	(0.3-2.9)	0.9	(0.4-2.1)	1.8	(0.4-8.1)	0.5	(0.1-1.6)	0.6	(0.1-2.9)
Homemaker	1.1	(0.8-1.7)	1.3	(0.9-1.8)	1.3	(0.9-1.7)	1.2	(0.7-2.0)	1.2	(0.5-2.7)	1.4	(0.9-2.1)
Other	1.9	(1.1-3.2)	2.1	(1.4-3.0)	2.0	(1.4-2.8)	2.2	(1.2-4.0)	1.4	(0.5-3.7)	2.0	(1.2-3.2)
X^2		22.3*		39.5*		40.6*		23.9*		9.7		35.7*

OR – odds ratio, *significant at the 0.05 level, two-sided design-based test

physical conditions considered here (1.9±5.0 vs. 1.0±3.8, X^2=857.3, p<0.001), as well as in the subsamples of those with both comorbid mental disorders and chronic physical conditions (11.7±16.2 vs. 4.0±7.7, X^2=4,374.5, p<0.001), only comorbid mental disorders (7.4±13.3 vs. 3.5±9.8, X^2=1,676.1, p<0.001), and only chronic physical conditions (4.7±9.7 vs. 1.7±5.7, X^2=1,584.1, p<0.001) (see Table 5).

Respondents in the BDD-only subsample had a significantly

Table 3 Pooled multivariable associations of bodily distress disorder (BDD) and somatic symptom disorder (SSD) with 12-month DSM-5 mental disorders and suicidal ideation/behavior

	BDD		SSD		Either		Both		BDD-only		SSD-only	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
GAD	3.3*	(1.4-7.7)	1.7	(0.8-3.7)	2.3*	(1.3-4.4)	3.1*	(1.1-9.3)	7.0*	(3.0-16.3)	1.5	(0.6-3.6)
Panic disorder	3.0*	(1.6-5.8)	2.6*	(1.1-5.8)	2.8*	(1.4-5.8)	3.0*	(1.4-6.7)	2.4*	(1.2-4.8)	2.4	(0.6-8.7)
PTSD	4.1*	(2.6-6.5)	2.4*	(1.7-3.5)	2.8*	(2.0-3.9)	4.2*	(2.3-7.7)	4.5*	(2.1-9.5)	1.6	(1.0-2.5)
Major depressive disorder	7.8*	(4.1-14.7)	4.4*	(2.3-8.4)	5.5*	(3.1-9.8)	8.0*	(3.5-18.2)	9.2*	(3.7-22.9)	3.3*	(1.4-7.6)
Bipolar spectrum disorders	5.3*	(2.5-11.4)	3.0*	(1.4-6.4)	3.2*	(1.7-6.1)	7.0*	(2.6-18.6)	3.8*	(1.5-9.2)	1.5	(0.5-4.8)
Alcohol use disorder	2.5	(0.7-9.0)	2.1	(0.8-5.5)	2.0	(0.8-5.1)	2.9	(0.8-11.4)	0.3	(0.1-1.3)	1.6	(0.5-5.8)
Suicidal ideation	1.9*	(1.0-3.6)	2.9*	(1.9-4.3)	2.9*	(2.0-4.1)	2.4*	(1.1-5.3)	2.0	(0.7-5.8)	3.5*	(2.2-5.6)
Suicide attempt	1.2	(0.3-5.5)	0.8	(0.2-2.5)	0.9	(0.3-2.8)	0.9	(0.2-4.4)	0.5	(0.0-5.8)	0.8	(0.2-3.1)

OR – odds ratio, GAD – generalized anxiety disorder, PTSD – post-traumatic stress disorder, *significant at the 0.05 level, two-sided design-based test

higher mean DOR than those in the SSD-only subsample, both before weighting (6.1±9.5 vs. 3.5±8.0, X^2=1,926.3, p<0.001) and after stable balancing weights were used to adjust for differences in covariate distributions (4.7±9.2 vs. 3.1±7.5, X^2=661.5, p<0.001).

The same general pattern was found among respondents who had none of the comorbid mental disorders or chronic physical conditions considered here (4.1±7.2 vs. 1.6±5.0, X^2=81.0, p<0.001) and those who had both comorbid mental disorders and chronic physical conditions (11.5±15.6 vs. 6.3±9.6, X^2=188.2, p<0.001). The mean DOR was also significantly higher in the BDD-only than the SSD-only subsample among respondents with only comorbid mental disorders (7.0±7.4 vs. 4.9±9.0, X^2=729.4, p<0.001), but the opposite was true among respondents with only chronic physical conditions (3.6±4.6 vs. 4.2±8.4, X^2=143.0, p<0.001) (see Table 5).

DISCUSSION

This is the first report providing population prevalence estimates for BDD and SSD derived from interviews using standardized diagnostic assessments. A few general population studies provided prevalence estimates of proxy diagnoses of SSD operationalized by either a combination of self-report questionnaires or unstructured clinical assessment, but none of those studies used standardized diagnostic interviews or operationalized full criterion sets[13]. We are aware of no previous prevalence studies of BDD in any setting.

The point prevalence across the three settings was 2.0% for BDD, 3.5% for SSD, and 4.1% for either diagnosis. Although the two diagnoses were highly correlated, prevalence estimates for SSD were significantly higher than those for BDD in two of the settings. There are at least two possible reasons for this observation. First, a diagnosis of BDD requires the presence of distress *and* impairment, while a diagnosis of SSD requires distress *or* impairment. Second, a diagnosis of BDD requires that somatic symptoms persist despite reassurance by a health care provider, whereas a diagnosis of SSD does not have this requirement. It is plausible that the first difference had the effect of restricting the diagnosis of BDD relative to SSD across sites, while the second difference may have had differential impact reflecting health service practice as well as culturally influenced patterns of health seeking in specific settings[43].

The prevalence of BDD and especially of SSD was highest in Hong Kong. Cross-cultural comparisons of the population occurrence of disorders of somatic distress using similar tools and comparable methodologically rigorous design as described here are uncommon. However, there is evidence from previous communi-

Table 4 Pooled multivariable associations of bodily distress disorder (BDD) and somatic symptom disorder (SSD) with common chronic physical conditions

	BDD		SSD		Either		Both		BDD-only		SSD-only	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Arthritis	2.9*	(1.5-5.6)	3.1*	(1.9-5.1)	2.9*	(1.8-4.7)	3.9*	(1.8-8.3)	1.5	(0.3-8.9)	2.6*	(1.4-4.8)
Asthma	2.4*	(1.4-4.3)	2.6*	(1.7-4.1)	2.3*	(1.5-3.5)	3.7*	(2.0-6.9)	0.6	(0.2-1.8)	2.0*	(1.0-3.8)
Diabetes mellitus	1.4	(0.8-2.5)	1.9*	(1.3-2.8)	1.8*	(1.2-2.7)	1.6	(0.8-3.2)	1.4	(0.5-3.5)	2.1*	(1.3-3.3)
Hypertension	1.5	(0.9-2.6)	1.4*	(1.0-2.1)	1.4	(1.0-2.0)	1.6	(0.8-2.9)	1.2	(0.4-3.6)	1.3	(0.8-2.0)
Ulcer	1.4	(0.6-3.3)	1.2	(0.7-2.0)	1.5	(0.9-2.4)	0.8	(0.3-2.1)	4.0*	(1.1-13.9)	1.5	(0.9-2.4)
Any other	3.5*	(2.4-5.2)	3.3	(2.5-4.3)	3.5*	(2.8-4.5)	3.4*	(2.1-5.6)	4.4*	(2.5-7.8)	3.2*	(2.2-4.7)

OR – odds ratio, ulcer – stomach or intestinal ulcer, *significant at the 0.05 level, two-sided design-based test

Table 5 Pooled associations of bodily distress disorder (BDD) and somatic symptom disorder (SSD) with mean number of health-related days out of role (DOR) in the 30 days before survey, unadjusted or adjusted based on stable balancing weights

	BDD-only		SSD-only		Both		Either		Neither		Total	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Total sample												
Unadjusted	6.1	(9.5)	3.5	(8.0)	8.4	(16.5)	5.5	(12.4)	1.4	(5.0)	1.6	(5.9)
Adjusted	4.7	(9.2)	3.1	(7.5)	3.1	(6.3)	3.9	(13.0)	1.5	(4.0)	1.6	(4.7)
Comorbidity subsamples												
No comorbidity	4.1	(7.2)	1.6	(5.0)	1.4	(2.9)	1.9	(5.0)	1.0	(3.8)	1.0	(3.8)
Both mental and physical	11.5	(15.6)	6.3	(9.6)	14.8	(18.0)	11.7	(16.2)	4.0	(7.7)	5.4	(10.2)
Only mental	7.0	(7.4)	4.9	(9.0)	10.5	(18.2)	7.4	(13.3)	3.5	(9.8)	3.8	(10.6)
Only physical	3.6	(4.6)	4.2	(8.4)	6.2	(12.5)	4.7	(9.7)	1.7	(5.7)	1.0	(6.5)

All the differences between respondents with either diagnosis vs. neither, and between those with BDD-only vs. SSD-only, were significant ($p<0.001$, two-sided design-based test)

ty-based studies that the experience of burdensome somatic symptoms is common in China in general and Hong Kong in particular[44], which may be regarded as a culturally determined expression of distress. Moreover, social factors – such as Hong Kong's status as one of the most densely populated cities globally, with its intensely fast-paced lifestyle and long working hours – may contribute to the high rates of reported somatic symptoms[2]. The higher prevalence rate of SSD compared to BDD in Hong Kong may be due to the criterion specification of the latter requiring "repeated contacts with health care providers". As stated earlier, this specification may lower the prevalence of BDD relative to SSD in settings where help-seeking for physical symptoms that accompany mental disorders is low. There is evidence to suggest that this is the case among Chinese people[45].

Our SSD point prevalence estimates are considerably lower than the mean "frequency" of 12.9% in previous reports of population-based studies[14]. However, the diagnosis of SSD in all those earlier studies was based on cut-off scores of screening questionnaires rather than direct interviews using standardized tools and diagnostic criteria. It has been repeatedly pointed out that screening questionnaires should not be used for the assessment of prevalence rates of mental health conditions[e.g., 46]. Indeed, the scoping review reporting the above "frequency" data repeatedly acknowledged that they were overestimates[14].

A major reason for discarding previous constructs of disorders of somatic distress as described in the DSM-IV was the implausible rarity of somatization disorder at one extreme of the spectrum and the extremely high rates of undifferentiated somatoform disorder at the other extreme. For example, two German population studies[47,48], with a total sample of 7,096 respondents, identified only one participant who met criteria for somatization disorder, while the lifetime prevalence of undifferentiated somatoform disorder was in the range between 9.1% and 19.7%. The point prevalence estimates of BDD and SSD in the current surveys are more plausible, and lend no support to the concern expressed by some critics that the new disorders are likely to be overinclusive and result in overdiagnosis[49,50]. Rather, as argued by others[51], it appears that the elimination of the criterion requiring that symptoms be medically unexplained and the inclusion of specific psychological symptoms in the criterion specifications have produced improvement over earlier conceptualizations of the conditions.

Striking patterns in our data are the higher prevalence of BDD and SSD among females, older individuals and retired people. The association with female gender is similar in magnitude to that observed in previous epidemiological studies on disorders of somatic distress[52]. However, unlike what has been reported in a few studies of DSM-IV defined somatic disorders[1], we did not observe an association of either BDD or SDD with low socio-economic status.

The associations of BDD and SSD with anxiety and mood disorders are consistent with what is commonly reported for somatoform disorders[31], reflecting the common observation of symptom overlap between these conditions, especially in primary care settings[53,54]. A large proportion of persons with chronic pain, a common symptom presentation of somatic distress, will meet the diagnostic criteria for anxiety or mood disorder[55]. The associations of BDD and SSD with suicidal ideation are also consistent with previous studies of disorders of somatic distress[56]. In general, there is similarity in the pattern of psychiatric comorbidity of BDD-only and SSD-only groups.

The pattern of comorbidity with common chronic physical conditions suggests that there is a meaningful but relatively modest increase in the prevalence of disorders of somatic distress, irrespective of whether defined as BDD or SSD, among persons with these physical conditions. This pattern suggests that the decision to eliminate the previous criterion requiring that symptoms are not medically explained has not led to implausibly high levels of comorbidity with these conditions.

There is a trend for people with SSD-only to have a significant association with more physical conditions than those with BDD-only. This may reflect the difference in the criterion specification. For BDD, there is a requirement for symptoms to persist "despite appropriate clinical examination and investigations or appropri-

ate reassurance by health care providers". SSD does not have such requirement. In the presence of physical health conditions, the requirement may limit the number of persons who receive the diagnosis of BDD. However, the difference is actually very modest. Moreover, SSD-only was more strongly associated with asthma than BDD-only, while BDD-only was more strongly associated with stomach and intestinal ulcer than SSD-only. So, our findings do not support the argument that the definition of SSD leads to mislabelling of persons with chronic physical conditions as having a mental disorder[50,57].

The presence of somatic distress (defined as either BDD or SSD) is associated with a significant decrement in role functioning even among persons with no co-occurring physical or mental disorder. The pattern of associations with role impairment would suggest that BDD-only is more impairing than SSD-only, although the picture is ambiguous across subgroups defined by the presence or absence of comorbid mental disorders and physical conditions. Nevertheless, it is clear that either disorder involves some role functioning difficulties for those experiencing it, and the common comorbidity with either physical or mental disorders increases the level of role impairment.

Some limitations of this study need to be noted. First, the weighted average response rate across the three surveys (51.6%) was relatively low, and it is possible that persons with very burdensome somatic symptoms were more likely to decline interviews. Second, surveys in Qatar were conducted by telephone, due to the COVID-19 pandemic, unlike the other two settings where survey interviews were conducted face-to-face. Third, in a cross-sectional design, no causality can be inferred regarding direction of association of the correlates. Finally, the measures of the correlates capture different time frames: 30 days for DOR, 12 months for mental disorders, and lifetime for chronic physical conditions, with the potential for lack of precision in the temporal associations.

In conclusion, this study provided a unique opportunity for the exploration of the profile and correlates of disorders of somatic distress in the community, using direct interviews of respondents conducted with a standardized questionnaire. In addition, we are able to present information relating to the differences and similarities between the relatively new diagnostic constructs of these disorders. Our findings suggest that disorders of somatic distress, defined as either SSD or BDD, occur in a considerable proportion of the population, and are associated with significant role impairment also after adjusting for comorbid mental disorders and chronic physical conditions. These findings suggest the need for focused public health attention to these distressing and burdensome conditions.

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