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Health anxiety and hypochondriasis in the light of DSM-5

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Background: In the DSM-5, the diagnosis of hypochondriasis was replaced by two new diagnositic entities: somatic symptom disorder (SSD) and illness anxiety disorder (IAD). Both diagnoses share high health anxiety as a common criterion, but additonal somatic symptoms are only required for SSD but not IAD. **Design:** Our aim was to provide empirical evidence for the validity of these new diagnoses using data from a case–control study of highly health-anxious (n = 96), depressed (n = 52), and healthy (n = 52) individuals. **Results:** The individuals originally diagnosed as DSM-IV hypochondriasis predominantly met criteria for SSD (74%) and rarely for IAD (26%). Individuals with SSD were more impaired, had more often comorbid panic and generalized anxiety disorders, and had more medical consultations as those with IAD. Yet, no significant differences were found between SSD and IAD with regard to levels of health anxiety, other hypochondriacial characteristics, illness behavior, somatic symptom attributions, and physical concerns, whereas both groups differed significantly from clinical and healthy controls in all of these variables. **Conclusion:** These results do not support the proposed splitting of health anxiety/hypochondriasis into two diagnoses. Further validation studies with larger samples and additional control groups are warranted to prove the validity of the new diagnoses.

Keywords: health anxiety; hypochondriasis; somatic symptom disorder; illness anxiety disorder; symptom attributions; anxiety sensitivity

Introduction

Health anxiety refers to inappropriate or excessive "fears and worries focused upon a perceived threat to one's own health" (Abramowitz & Braddock, 2008, p. 16). From a dimensional perspective (e.g., Ferguson, 2009), health anxiety represents a continuum ranging from an absence of health concerns to pathological health anxiety. Excessive and maladaptive health anxiety is a central feature of hypochondriasis, but is also often present in other somatoform disorders, anxiety disorders, and mood disorders. In contrast to the dimensional view of health anxiety, the diagnosis of hypochondriasis is categorical. In DSM-IV-TR (American Psychiatric Association [APA], 2000), hypochondriasis is defined as a nondelusional preoccupation with fears of having, or the idea that one has, a

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serious disease based on the misinterpretation of rather harmless and benign bodily symptoms. Additional diagnostic criteria are persistence of the preoccupation despite appropriate medical evaluation and reassurance, which causes clinically significant distress or functional disability, and duration of the disturbance of at least 6 months. Similar diagnostic criteria were used in the ICD-10 (World Health Organization [WHO], 1992).

This narrow categorical definition of hypochondriasis has been criticized as over-restrictive and arbitrary especially for health-anxious patients in primary care or community settings (Barsky, Wyshak, & Klerman, 1990; Creed & Barsky, 2004; Fink et al., 2004; Gureje, Üstün, & Simon, 1997). Furthermore, it has been shown that patients only fulfilling abridged criteria were not less impaired than those who met the full ICD-10 criteria (Gureje et al., 1997). Against this background, new empirically established criteria for hypochondriasis were proposed by Fink and colleagues (2004). In order to avoid stigmatization of these patients they suggested replacing the diagnostic label hypochondriasis by the term health anxiety, constituting the new diagnostic entity of health anxiety disorder (HAD). Diagnostic criteria for HAD include the symptom "obsessive rumination about illness" (i) and one or more of the following symptoms (ii): "worry or preoccupation with fears of harbouring an illness or with bodily functions," "suggestibility or autosuggestibility," "an unrealistic fear of being infected or contaminated," "an excessive fascination with medical information," and "fear of taking prescribed medication." These symptoms have to be present for most of the time for at least 2 weeks. The symptoms are not better or fully explained by a comorbid medical condition or by a different mental disorder. In addition, the criteria allow a separation of mild and severe cases of HAD. Only the severe cases are characterized by symptoms causing significant impairment or distress.

Since HAD is based exclusively on positive diagnostic criteria, it is less restrictive and therefore allows to identify more patients suffering from pathological health anxiety than the DSM-IV hypochondriasis criteria. In a large primary care sample, the prevalence of severe forms of HAD was 9.5 % versus 4.7 % when DSM-IV hypochondriasis criteria were applied (Fink et al., 2004). Mild HAD was present in 2.6 % of the patients. In a 2-year follow-up of this sample, only HAD in its severe form, but not in its mild form, had a negative impact on physical health and health care costs. In addition, only patients with severe HAD, but not those diagnosed according to DSM-IV hypochondriasis criteria, utilized significantly more overall health care than a comparison group of patients with a well-defined medical condition (Fink, Ornbol, & Christensen, 2010).

Other researchers suggested that hypochondriasis should be reclassified as an anxiety disorder (Olatunji, Deacon, & Abramowitz, 2009; Weck, Bleichhardt, Witthöft, & Hiller, 2011), because patients with hypochondriasis are characterized by a high comorbidity with anxiety disorders (Barsky, Barnett, & Cleary, 1995; Barsky, Wyshak, & Klerman, 1992; Fink et al., 2004; Lee, Lam, Kwok, & Leung, 2014) and share common symptoms and underlying psychological mechanisms (Olatunji et al., 2009; Warwick & Salkovskis, 1990). For example, hypochondriasis and generalized anxiety disorder (GAD) share illness worries as a common symptom, obsessive compulsive disorder (OCD) and hypochondriasis share safety behaviors (compulsive rituals, reassurance-seeking, and body checking behavior) as a behavioral mechanism to reduce anxiety and discomfort. Panic disorder (PD) and hypochondriasis are both characterized by a tendency to misinterpret benign bodily sensations as physically harmful.

This notion is additionally supported by previous research demonstrating that the physical concerns dimension of anxiety sensitivity is linked to body vigilance, panic attacks, PD, and health anxiety (Deacon & Abramowitz, 2006; Kemper, Lutz, Bahr, Ruddel, & Hock, 2012; Rector, Szacun-Shimizu, & Leybman, 2007; Taylor et al., 2007; Wheaton, Berman, Franklin, & Abramowitz, 2010; Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012). Anxiety sensitivity is a multidimensional construct which refers to the tendency to fear arousal-related body sensations because of their perceived threatening somatic, cognitive, or social consequences (Reiss & McNally, 1985; Taylor et al., 2007). Theoretically, this construct is seen as central to the development and maintenance of both anxiety disorders (Taylor, 1999) and hypochondriasis (Olatunji et al., 2009).

How has the nosological problem concerning the controversial diagnosis of hypochondriasis been addressed in DSM-5 (American Psychiatric Association, 2013)? The former diagnostic category of "somatoform disorders" is now referred to as "somatic symptom and related disorders." Within this section, somatic symptom disorder (SSD) represents the central diagnosis and subsumes the former diagnoses of somatization disorder, hypochondriasis, pain disorder, and undifferentiated somatoform disorder. SSD is defined by the existence of one or more distressing somatic symptoms (A criterion), which may or may not be associated with another medical condition. These symptoms are accompanied by maladaptive thoughts, feelings, or behaviors (B criteria). Because high levels of health anxiety are now part of the B criterion, the great majority of individuals previously diagnosed with hypochondriasis is now subsumed under the diagnosis of SSD. Only those presenting with high health anxiety but without somatic symptoms will receive the new DSM-5 diagnosis of "illness anxiety disorder" (IAD).

Recently, the new DSM-5 criteria for SSD and IAD have been critically evaluated by Rief and Martin (2014), because patients with hypochondriasis differ in many repects from patients with somatization disorder or patients with chronic pain conditions. Furthermore, patients with hypochondriasis have been found to have a better response to psychological interventions than patients with other somatoform disorders (Kleinstäuber, Witthöft, & Hiller, 2011; Olatunji et al., 2014). All of these aspects support the notion that pathological health anxiety (formerly termed hypochondriasis) should better be classified as a unique condition distinct from other diagnoses within the category of somatic symptom and related disorders (Rief & Martin, 2014). To empirically test and validate the new DSM-5 diagnoses SSD and IAD, studies are needed that demonstrate that health-anxious indviduals diagnosed as either SSD or IAD can be qualitatively distinguished on the basis of various validation criteria. These validation criteria should include cognitive characteristics (e.g., somatic causal symptom attribution and rumination about physcial symptoms or illnesses), affective characterisitics (e.g., health anxiety), and behavioral characteristics (e.g., avoidance behavior, checking behavior, and excessive reassurance-seeking behavior; Rief & Martin, 2014).

Aims of the study

The primary aim of the study was to investigate whether indivivuals with SSD can be discrimanted form those with IAD on the basis of relevant validation criteria (i.e., somatic symptoms, frequency of comorbid anxiety disorders, doctor shopping, functional impairments, level of health anxiety and other hypochondriacial traits, somatic symptom attributions, illness behavior, and anxiety sensitity, particularly physical concerns). Due to

the explorative nature of the study, no specific hypotheses were formulated. Finally, in order to demonstrate the discriminant validity and relative specificity of these criteria, we examined how well individuals with HAD and IAD can be distinguished from depressive and healthy controls. A depressive control group (DCG) was chosen because many patients with hypochondriasis suffer from comorbid depression (Escobar et al., 1998; Noyes et al., 1994), and the inclusion of this control group allows us to demonstrate that possible differences between individuals with hypochondriasis and healthy control participants are not merely attributable to higher levels of negative affect or increased symptoms of depression that are characteristic for both hypochondriasis and depressive disorders, but rather specific for severe health anxiety and the associated DSM-5 disorders SSD/IAD.

Method

Participants

Participants for this case–control study were recruited from a Cognitive Behavior Therapy outpatient unit specialized in the treatment of somatoform and affective disorders at the Central Institute of Mental Health (CIMH), Mannheim. The healthy participants were recruited by advertisements published in local newspapers and on the web page of the CIMH. Participants were recruited over a 48-month period, beginning in July 2008. We used a two-stage recruitment procedure (see Figure 1). First, potential participants (n = 483) completed a screening package of self-report measures, comprising the Whiteley-index (WI; Hiller & Rief, 2004; Pilowsky, 1967), Short Health Anxiety

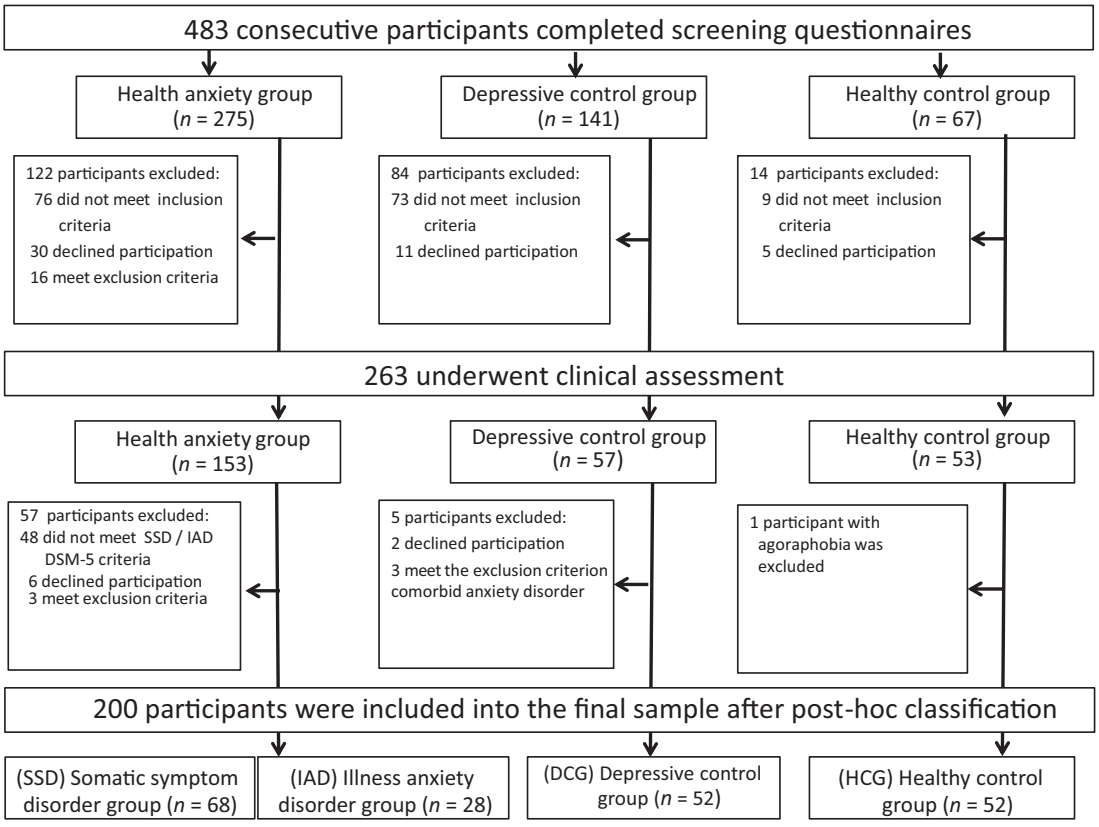

Figure 1. Study participant flowchart.

Inventory (SHAI; Salkovskis, Rimes, Warwick, & Clark, 2002), Patient Health Questionnaire depression (PHQ-9), somatic (PHQ-15), panic, and generalized anxiety (GAD-7) symptom scales (Kroenke, Spitzer, Williams, & Lowe, 2010), Alcohol Use Disorders Identification Test (Babor, de la Fuente, Saunders, & Grant, 1992), and a checklist for diseases and current medication.

Those who completed the screening questionnaires and met the group-specific screening-based inclusion criteria (see below; $n = 263$) were selected for comprehensive clinical interviews for mental disorders (Fink et al., 2004; First, Spitzer, Gibbon, & Williams, 1997). General exclusion criteria were: age below 18 and above 65 years, lifetime diagnoses of psychotic disorders, substance use disorders, organic brain disease or organic mental disorders, presence of a current somatic illness that could account for the hypochondriacal complaints, and inadequate knowledge of the German language.

Following this evaluation process, the data from both the clinical interviews and questionnaires assessing health anxiety (SHAI) and somatic symptoms (PHQ-15, SOMS) were used to operationalize all criteria required to diagnose a SSD or an IAD according to DSM-5 (see Table 1). After this post-hoc classification, a total of 200 participants who met the following group-specific inclusion and no exclusion criteria could be included for the final study sample:

(1) Somatic Symptom Disorder group (SSD; $n = 68$): For inclusion in the SSD group individuals had (i) to score above a predefined cut-off point in at least one of two health anxiety screenings (defined as a score ≥ 8 in the WI or a score ≥ 15 in the 14-item SHAI) and (ii) to fulfill combined interview and questionnaire-based research criteria for SSD according to DSM-5.
(2) Illness Anxiety Disorder group (IAD; $n = 28$): These individuals had to achieve (i) a positive screening result for health anxiety (WI-scores ≥ 8 or SHAI-scores ≥ 15) and (ii) to meet combined interview and questionnaire-based research criteria for IAD according to DSM-5.
(3) Depressive control group (DCG; $n = 52$): To be included in DCG participants had to meet the following criteria: (i) a negative screening result for health anxiety (WI-scores < 8 and SHAI-scores < 15), (ii) a positive screening result for depression (PHQ-9 score ≥ 10), (iii) no SSD, IAD, HAD, or DSM-IV hypochondriasis, and (iv) a current depressive episode or dysthymia. Exclusion criteria were comorbid PD, OCD, or GAD.
(4) Healthy control group (HCG; $n = 52$): The healthy participants had to meet the following criteria: negative screening results for (i) health anxiety (WI < 8 and SHAI < 15), (ii) depression (PHQ-9 < 10), (iii) no current DSM-IV diagnosis, and (iv) no SSD, IAD, HAD, or DSM-IV hypochondriasis. All participants met these criteria except two, who reported symptoms of mild to moderate severe animal phobias (spiders and mice).

A residual group of 48 participants with a positive screening result for health anxiety, but who neither met full criteria for SSD nor for IAD, was excluded from the study sample, because no meaningful conclusions could be drawn from this heterogeneous group. Four of these individuals met the criteria for a brief IAD and one for a brief SSD, but the majority ($n = 32$, 69.6 %) suffered from an anxiety disorder.

Table 1. Percentage of participants fulfilling DSM-5 diagnostic criteria for SSD or IAD.

DSM-5 criterion			SSD n = 68 %	IAD n = 28 %	DCG n = 52 %	HCG n = 52 %
SSD	IAD					
A	B	Multiple distressing somatic symptoms	100	0	19,2	0
B	–	Excessive thoughts, feelings, or behaviors related to somatic symptoms	100	100	9,6	0
B1[a]	–	Disproportionate and persistent thoughts about the seriousness of one's symptoms	98.5	96.4	9.6	0
B2[a]	C	Persistently high level of anxiety about health or symptoms	100	100	0	0
B3[a]	D	Excessive time and energy devoted to thesesymptoms or health concerns/excessive health-related behaviors or maladaptive avoidance	100	100	0	0
–	A	Preoccupation with having or acquiring a serious illness	95.6	100	0	0
C	E	Symptoms or health concerns have been present for at least 6 months	100	100	17.3	0
–	F	Symptoms are not better explained by another mental disorder	100	100	0	0
		All required DSM-5 criteria for the diagnosis of SSD or IAD are fulfilled	100	100	0	0

DSM, diagnostic and statistical manual of mental disorders; SSD, somatic symptom disorder; IAD, illness anxiety disorder; DCG, depression control group; HCG, healthy control group.

[a]At least one criterion has to be fulfilled, not all are required.

Measures

Structured clinical interview

During the clinical interviews, presence of SSD and IAD was not assessed, but classification on these variables was coded post-hoc. For all participants mental disorders were assessed with all sections of the Structured Interview for DSM-IV disorders (SCID; First et al., 1997). The SCID interview was expanded with additional items from the Schedules for Clinical Assessment in Neuropsychiatry (Wing et al., 1990) which allowed a HAD diagnosis according to the diagnostic criteria introduced by Fink et al. (2004). The diagnosis of HAD requires the presence of the A criterion (obsessive rumination about illness) and at least one additional B criterion (e.g., worry or preoccupation with fears of harboring an illness or with bodily functions) for most of the time for at least 2 weeks. The symptoms are not better or fully explained by a comorbid medical condition or by a different mental disorder. Each of the seven symptoms is rated as either "absent" (0) or "mild to modest preoccupation but no significant distress or impairment" (1), or "excessive preoccupation involving severe daily troubles or numerous consultations or self-medication" (2). Criteria for a severe HAD are met if both the A criterion and one or more of the B criteria are rated as causing significant impairment or distress (ratings of 2). All other cases are subsumed under the subtype mild HAD (Fink et al., 2004).

The level of global functioning was rated, based on the Global Assessment of Functioning Scale (GAF). Finally, to assess health care utilization, the participants were asked how many different doctors they had seen during the last 12 months for physical symptoms associated with health worries.

The clinical interviews were conducted by clinical psychologists. Although all six interviewers had extensive experience (2–10 years) in the use of the SCID at the beginning of the study, they received an additional 1-week training by a SCID and SCAN expert and were subsequently closely supervised by one of the senior researchers (JB). The interviewers were encouraged to use all available sources of information (patient, medical records, attending doctors) when interview results needed clarification, especially for the confirmation of the somatoform and health anxiety items. In some cases, it was necessary to contact the primary care physician or to consult medical experts from our psychiatric and psychosomatic outpatients units. Interrater reliabilities of the seven items (criteria A and B) of the Fink-interview were based on 30 videotaped interviews evaluated by a second blinded diagnostician. They were good to excellent, with intraclass correlation coefficients (ICCs) for the single symptom items ranging from .66 to .90 ($p <$ .001 for all items). Also, the interrater agreement on the absence (coded 0) or presence of a mild (coded 1) or severe (coded 2) health anxiety syndrome was good (kappa = .75; ICC = .89).

Self-report measures

In the selection phase, we used four scales of the well-validated PHQ (Kroenke et al., 2010) to assess somatoform symptoms (PHQ-15; $\alpha = .85$), depressive symptoms (PHQ-9; $\alpha = .91$), panic symptoms, and GAD symptoms (GAD-7; $\alpha = .77$), as well as the AUDIT ($\alpha = .72$; Babor et al., 1992) and one additional PHQ-item to assess problems with substance use.

Health anxiety was assessed with the WI and the SHAI. The WI is a widely used 14-item instrument with a dichotomous answer format (Hiller & Rief, 2004; Pilowsky, 1967)

and good reliability and validity (Hiller & Rief, 2004). According to factor analyses, the items can be assigned to three subscales: disease phobia, somatic symptoms, and disease conviction (e.g., Hiller, Rief, & Fichter, 2002). In the present study, Cronbach's α was .93 for the total score, .94 for disease phobia, .69 for disease conviction, and .82 for somatic symptoms.

The SHAI contains 14 items in multiple-choice format which probe the range of health anxiety irrespective of the physical health status (Salkovskis et al., 2002). The SHAI demonstrated good validity and reliability in prior studies (Alberts, Hadjistavropoulos, Jones, & Sharpe, 2013; Bailer et al., 2013) and showed high internal consistency (α = .97) in the present study. The optimal cut-off point for the German version of the 14-item WI is 8 for hypochondriacal individuals (Hiller et al., 2002). A cut-off point of 15 in the SHAI can be used to identify very health-anxious individuals (Rode, Salkovskis, Dowd, & Hanna, 2006).

In selection phase 2, the following questionnaires and symptom scales were administered after the clinical interviews.

Somatoform symptoms were covered with the Screening for Somatoform Symptoms (SOMS; Rief, Hiller, & Heuser, 1997). The SOMS lists 53 somatic symptoms relevant for the diagnosis of somatization disorder according to DSM-IV and ICD-10. All participants had to mark every symptom that had been present within the last 2 years that produced suffering but could not be attributed to a medical cause by a physician. Reported symptoms were added to yield a DSM-IV symptom total score.

The Multidimensional Inventory of Hypochondriacal Traits (MIHT; Longley, Watson, & Noyes, 2005) was used to examine the discriminant validity and the diagnostic specificity. The four MIHT subscales assess disease conviction (cognitive scale), reassurance-seeking (behavioral scale), somatic awareness (perceptual scale), and hypochondriacal worry (affective scale). Good reliability and validity both in the normal population and in clinical samples have been found for the original and the German version (Witthöft, Haaf, Rist, & Bailer, 2010; Witthöft, Weck, & Gropalis, 2014). Cronbach's α varied between .96 for the total score and .88–.95 for the subscales in this study.

The Scale for the Assessment of Illness Behaviour (SAIB; Rief, Ihle, & Pilger, 2003) was used to assess various aspects of illness behavior. Participants rate each of the 26 items on a 4-point Likert-type scale ranging from "never true" (score = 1) to "completely true" (score = 4). The SAIB yields a total score and five subscale scores: verification of diagnosis (5 items), expression of symptoms (6 items), need for medication/treatment (5 items), consequences of illness (5 items), and body scanning (4 items). Higher SAIB scores indicate higher illness behavior. Cronbach's α varied between .95 for the total score and .93–.79 for the five subscales.

Causal attributions of 13 common somatic symptoms were assessed using the Symptom Interpretation Questionnaire (SIQ; Robbins & Kirmayer, 1991). The SIQ yields 3 scores, representing somatic (SIQ-S), psychological (SIQ-P), and normalizing or external attributions (SIQ-N). The German version of the SIQ has demonstrated good reliability and adequate discriminant and predictive validity (Bailer, Rist, Witthöft, Paul, & Bayerl, 2005; Bailer, Witthöft, Bayerl, & Rist, 2006; Bailer, Witthöft, & Rist 2008). In the present sample, all subscales were internally consistent, with α = .93 for SIQ-S, α = .92 for SIQ-P, and α = .87 for SIQ-N.

Finally, anxiety sensitivity was assessed with the latest version of the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986). The ASI-3 is a brief, reliable, and valid 18-item measure with a robust hierarchical three factor structure assessing general anxiety sensitivity and the three dimensions of physical, cognitive, and social concerns. We used a well-validated German version of the ASI-3 (Kemper, Ziegler, & Taylor, 2009; Kemper et al., 2012). In the present sample, the coefficient α was .94 for ASI-3-Global, .95 for physical concerns, .87 for social concerns, and .86 for cognitive concerns.

Procedure

After being informed about the study and passing the screening procedures, eligible participants were invited to our outpatient unit. Informed consent was obtained, and predefined group-specific inclusion and exclusion criteria were applied. Participants completed the aforementioned standardized clinical interviews and questionnaires (duration 2–6 h). Subsequently, they were invited to take part in further investigations, which focused on various emotional, cognitive, and affective aspects of health anxiety. The study protocol was approved by the Medical Ethics Committee of the Medical Faculty Mannheim, Heidelberg University, Germany.

Post-hoc classification according to DSM-5

Data from the clinical interviews and the questionnaires assessing health anxiety (SHAI) and distressing somatic symptoms (SOMS, PHQ-15) were used for a post-hoc classification of all participants according to the DSM-5 criteria for SSD and IAD. As shown in Table 1, 68 individuals met the full SSD criteria and 28 the IAD criteria. The A criterion of SSD (i.e., the existence of at least one distressing somatic symptom) allows a broad variety of clinical conditions to be diagnosed in this category, bearing the risk of overinclusion. Therefore, in this study, the SSD A criterion was only coded as present if an individual reported more than one current distressing somatic symptom in the PHQ-15 (defined as total scores ≥ 10) and additionally met the criteria of the Somatic Symptom Index SSI-3/5, defined as at least three unexplained somatic complaints in men and five in women during the last 2 years, based on the DSM-IV symptom list of the SOMS (Rief, Hessel, & Brähler, 2001). The SSD B2 criterion was defined by extreme scores on the SHAI (scores ≥ 15) and/or WI (scores ≥ 8). All other criteria were carefully checked using the available interview data.

Statistical analyses

All data were analyzed with IBM SPSS Statistics Desktop (IBM, Armonk, NY, USA) for windows Version 20.0. Missing values were below 1% for each scale and instrument. Mean values were therefore computed for each instrument based on the existing number of items. Groups were compared using analysis of variance (ANOVA), analysis of covariance (ANCOVA), and a multivariate analysis of covariance (MANCOVA) for continuous variables, followed by post-hoc comparisons between specific groups adjusted for multiple comparisons. The Kruskal–Wallis test and the Mann–Whitney U test were used for nonparametric data. For categorical variables, the χ^2 test was used. Multiple

linear regression analyses were performed to predict continuous criterion variables. The variance inflation factor (VIF) was calculated to test for multicollinearity among the predictor variables and was within normal ranges for all predictors (VIF = 1.07–1.80).

Power analysis

Since our study aimed at detecting possible large and clinical meaningful effect sizes between groups, a minimum sample size of $n = 26$ per group was considered sufficient (given an alpha level of .05 and a power of 80%) to detect significant between-group differences (e.g., Faul, Erdfelder, Lang, & Buchner, 2007).

Results

Group characteristics

Table 2 presents sociodemographic and psychopathological characteristics of the participants. The four groups did not significantly differ with respect to age and gender. Differences found between the depressive and the HCG and SSD/IAD are in line with the predefined selection criteria. The central comparisons between the SSD and the IAD group revealed that participants with SSD significantly differed from those with IAD by lower education, higher somatic symptom scores, lower GAF scores, higher rates of PD and GAD, and a higher number of doctor visits for health anxiety-related physical symptoms. No significant differences were found with regard to levels of health anxiety, disease phobia and disease conviction, and rates of DSM-IV hypochondriasis. Thus, the separation of individuals with severe health anxiety into SSD and IAD seems to go along with differences in illness behavior (doctor shopping), comorbid anxiety disorders (PD/GAD), and consequences of the disorder (functional impairments).

Overlap between diagnostic entities

In accordance with estimated prevalence rates reported in the DSM-5, 74.1 % (43/58) of our participants originally diagnosed with DSM-IV hypochondriasis are now subsumed under the diagnosis of SSD, and the 15 remaining individuals (25.9 %) as having IAD. A similar overlap was found between the diagnosis of HAD according to Fink et al. (2004) and the new DSM-5 entities: 62.1 % (18/29) of the individuals with a mild and 75.9 % (41/54) of those with a severe subtype of HAD met the criteria for SSD, whereas only 37.9 % (11/29) of the mild and 24.1 % (13/54) of the severe HAD cases met additional criteria for IAD. Finally, we found a strong overlap between severe HAD and DSM-IV hypochondriasis: 87.3 % (48/55) of the severe cases but only 30.3 % (10/33) of the mild cases met additional criteria for DSM-IV hypochondriasis.

Prediction of doctor shopping and impairments

A series of multiple linear regression analyses were performed to predict doctor shopping and functional impairments in the total sample by the diagnosis of SSD and IAD, controlling for the effects of education and comorbid anxiety disorders (PD/GAD). The number of different doctors visited within the last 12 months because of health anxiety-related somatic symptoms was associated more strongly with the diagnosis of SSD

Table 2. Sample characteristics by group.

Variable	1. SSD group (n = 68)	2. IAD group (n = 28)	3. Depression group (n = 52)	4. Healthy group (n = 52)	ANOVA/ χ^2 test		Significant group differences[b]
					F/χ^2	p	
Age in years ($M \pm SD$)	42.8 ± 12.3	46.8 ± 11.0	42.7 ± 11.6	42.1 ± 12.9	1.0	.390	–
Gender (% female)	69.1	57.1	55.8	59.6	2.7	.442	–
Education (% ≥ 12 years)	50.0	85.7	59.6	69.2	12.2	.007	2 > 1,3; 4 > 1
Whiteley-index (WI) total score ($M \pm SD$)	10.9 ± 1.8	9.5 ± 1.7	2.0 ± 1.5	0.7 ± 0.9	674.6	<.001	1 > 2 > 3 > 4
WI subscale somatic symptoms ($M \pm SD$)	2.5 ± 0.8	1.5 ± 1.0	0.5 ± 0.8	0.2 ± 0.1	247.8	<.001	1 > 2 > 3 > 4
WI subscale disease phobia ($M \pm SD$)	5.5 ± 0.6	5.5 ± 0.6	0.7 ± 0.8	0.3 ± 0.6	995.6	<.001	1,2 > 3 > 4
WI subscale disease conviction ($M \pm SD$)	2.2 ± 1.2	2.0 ± 1.0	0.5 ± 0.6	0.2 ± 0.1	118.9	<.001	1,2 > 3 > 4
Health anxiety (SHAI; $M \pm SD$)	29.3 ± 4.9	28.0 ± 5.4	9.0 ± 3.6	5.8 ± 2.8	451.1	<.001	1,2 > 3 > 4
Depressive symptoms (PHQ-9; $M \pm SD$)	11.6 ± 4.9	9.2 ± 5.7	17.3 ± 3.9	1.7 ± 2.0	247.9	<.001	3 > 1,2 > 4
Somatic symptoms (PHQ-15; $M \pm SD$)	16.0 ± 4.3	11.0 ± 5.2	10.4 ± 3.8	2.9 ± 2.3	174.5	<.001	1 > 2,3 > 4
Somatoform symptoms (SOMS; $M \pm SD$)	8.8 ± 4.2	3.3 ± 3.3	1.6 ± 2.0	0.4 ± 1.2	86.0	<.001	1 > 2,3,4; 2 > 4
Global functioning (GAF; $M \pm SD$)	64.4 ± 11.4	70.0 ± 9.8	60.6 ± 9.6	94.1 ± 6.7	191.5	<.001	3,1 < 2 < 4

Table 2 (*Continued*)

Variable	1. SSD group (n = 68)	2. IAD group (n = 28)	3. Depression group (n = 52)	4. Healthy group (n = 52)	ANOVA/ χ^2 test		Significant group differences[b]
					F/χ^2	p	
Number doctors consulted ($M \pm SD$)	4.9 ± 3.5	2.7 ± 2.0	0.1 ± 0.3	0 ± 0	86.1[a]	<.001	1 > 2 > 3,4
Current DSM-IV diagnosis					*1 vs. 2*		*1 vs. 2*
Hypochondriasis	63.2	53.6	0	0	0.8	.379	–
Somatization disorder	2.9	0	0	0	0.8	.359	–
Pain disorder	11.8	0	0	0	3.6	.058	–
Undifferentiated somatoform disorder	7.4	0	0	0	2.2	.141	–
Major depression	25.0	14.3	90.4	0	1.3	.248	–
Dysthymia	11.8	3.6	38.5	0	1.9	.211	–
Generalized anxiety disorder	16.2	0	0	0	5.1	.024	1 > 2
Panic disorder	51.5	14.3	0	0	11.4	.001	1 > 2
Agoraphobia	1.5	0	0	0	0.4	.519	–
Social phobia	16.2	3.6	25.0	0	2.9	.090	–
Specific phobia	19.1	7.1	13.5	3.8	2.2	.142	–
Obsessive compulsive disorder	11.8	7.1	0	0	0.5	.500	–
Posttraumatic stress disorder	4.4	0	0	0	1.3	.259	–
Bulimia nervosa	0	3.6	3.8	0	2.6	.117	–

SSD, somatic symptom disorder; IAD, illness anxiety disorder.
[a]Kruskal–Wallis Test.
[b]Pairwise comparisons, the group difference is significant at the .05 level.

(β = .68, p < .001) than with IAD (β = .28, p < .001). No significant association was found between education, panic disorder, or GAD and the number of doctor visits. The total model with all predictors accounted for 51 % of the variance (adjusted R^2 = .51, p < .001). Poor global functioning (GAF score) was significantly associated with the diagnosis panic disorder (β = .28, p < .001) and the diagnosis SSD (β = .19, p = .030). No other significant association was found. The total model accounted for 16 % of the variance (adjusted R^2 = .16, p < .001).

Differences in psychological features

Group means, standard deviations, ANCOVA F-values, and results of Bonferroni-adjusted pairwise post-hoc mean comparisons are summarized in Table 3. In addition, mean differences with confidence intervals (CIs) for the comparison of the SSD with the IAD group are presented in Table 4.

Hypochondriacal traits

The four groups differed significantly on all MIHT scales. The SSD and IAD groups scored significantly higher on the MIHT global scale than both the depression and the healthy group, which did not differ significantly from each other. In regard to between-group differences on the four MIHT subscales, a MANCOVA (using panic disorder as a covariate) revealed a significant multivariate group effect (Wilks Lambda: $F_{(12,\ 508)}$ = 32.10, p < .001), and subsequent ANCOVAs followed by pairwise post-hoc comparisons indicated that the SSD and the IAD group did not differ significantly from each other, but both scored significantly higher on each MIHT subscale than the depression and the healthy group. Furthermore, the depression group scored significantly higher on the cognitive subscale than the healthy group.

Illness behavior

With regard to group differences on the five SAIB subscales, a MANCOVA revealed a significant multivariate group effect (Wilks Lambda: $F_{(15,\ 528)}$ = 22.19, p < .001). Subsequent ANCOVAs followed by pairwise post-hoc comparisons indicated that the SSD and the IAD group did not differ significantly from each other, but both scored significantly higher on each SAIB subscale and the SAIB total scale than the two control groups. Furthermore, the depression group scored significantly higher on the consequences of illness subscale than the healthy group.

Symptom attribution

With regard to group differences on the three SIQ scales, a MANCOVA revealed a significant multivariate group effect (Wilks Lambda: $F_{(9,\ 470)}$ = 22.27, p < .001). Pairwise post-hoc comparisons indicated that the SSD and the IAD group made more somatic and fewer normalizing attributions than the nonhealth-anxious control groups. No significant differences were found between SSD and IAD, and between depressive and healthy controls. Furthermore, the SSD group reported more psychological attributions than the

Table 3. Estimated marginal means (standard errors) of the four diagnostic groups on questionnaires assessing psychological features typically associated with severe health anxiety and multiple somatic symptoms.

Variable	1. SSD group (n = 68)	2. IAD group (n = 28)	3. Depression group (n = 52)	4. Healthy group (n = 52)	ANCOVA[a] F	ANCOVA[a] p	Significant group differences[b]
MIHT							
Total score	112.7 (2.1)	111.3 (2.9)	68.6 (2.2)	69.0 (2.2)	99.2	<.001	1,2 > 3,4
Cognitive subscale	23.0 (0.7)	22.5 (0.9)	14.3 (0.7)	11.3 (0.7)	57.3	<.001	1,2 > 3 > 4
Behavioral subscale	25.9 (0.8)	26.2 (1.1)	17.4 (0.9)	19.9 (0.9)	20.2	<.001	1,2 > 3,4
Perceptual subscale	34.6 (0.8)	33.6 (1.0)	23.8 (0.8)	24.4 (0.8)	44.6	<.001	1,2 > 3,4
Affective subscale	29.2 (0.6)	29.0 (0.8)	13.1 (0.6)	13.5 (0.6)	179.8	<.001	1,2 > 3,4
SAIB							
Total score	64.2 (1.3)	60.9 (1.8)	39.6 (1.4)	38.1 (1.4)	81.1	<.001	1,2 > 3,4
Verification of diagnosis subscale	12.3 (0.3)	10.8 (0.5)	6.9 (0.4)	6.7 (0.4)	50.1	<.001	1,2 > 3,4
Expression of symptoms subscale	13.0 (0.4)	13.1 (0.6)	9.9 (0.4)	9.9 (0.4)	13.7	<.001	1,2 > 3,4
Medication/treatment subscale	13.1 (0.4)	11.7 (0.6)	8.0 (0.4)	8.0 (0.4)	29.7	<.001	1,2 > 3,4
Consequences of illness subscale	12.6 (0.4)	12.6 (0.5)	8.7 (0.4)	7.2 (0.4)	41.2	<.001	1,2 > 3 > 4
Scanning subscale	13.2 (0.3)	12.7 (0.4)	6.0 (0.3)	6.3 (0.3)	141.9	<.001	1,2 > 3,4
SIQ							
Somatic attribution subscale	19.7 (1.0)	17.8 (1.3)	7.8 (1.0)	6.5 (1.0)	36.6	<.001	1,2 > 3,4
Psychological attribution subscale	24.1 (1.0)	19.2 (1.3)	20.7 (1.0)	9.8 (1.0)	34.9	<.001	1 > 2 > 4;3 > 4
Neutral attribution subscale	17.9 (1.1)	18.2 (1.4)	23.0 (1.1)	23.7 (1.1)	6.3	<.001	4,3 > 2,1
ASI-3							
Total score	37.7 (1.6)	35.6 (2.2)	26.4 (1.7)	13.9 (1.7)	36.1	<.001	1,2 > 3 > 4
Physical concerns subscale	15.8 (0.6)	14.9 (0.8)	5.9 (0.7)	4.1 (0.7)	69.1	<.001	1,2 > 3,4
Cognitive concerns subscale	9.6 (0.6)	8.5 (0.9)	9.1 (0.7)	2.9 (0.7)	22.9	<.001	1,2,3 > 4
Social concerns subscale	12.2 (0.7)	12.2 (1.0)	11.4 (0.8)	6.9 (0.8)	10.5	<.001	1,2,3 > 4

SSD, somatic symptom disorder; IAD, illness anxiety disorder; MIHT, multidimensional Inventory of Hypochondriacal Traits; SAIB, Scale for the Assessment of Illness Behaviour; SIQ, Symptom Interpretation Questionnaire; ASI-3, anxiety sensitivity index 3.

[a]Using comorbid panic disorder as a covariate. [b]Pairwise comparisons, the mean difference is significant at the .05 level.

Table 4. Post-hoc pairwise comparisons based on estimated marginal means of the SSD and IAD group.

Variable	Mean difference (SSD-IAD)	Standard error	Significance[a]	95% Confidence interval for difference[a]	
				Lower bound	Upper bound
MIHT					
Total score	1.4	3.7	1.000	–8.3	11.2
Cognitive subscale	0.5	1.2	1.000	–2.5	3.6
Behavioral subscale	–0.3	1.4	1.000	–4.1	3.5
Perceptual subscale	1.0	1.3	1.000	–2.4	4.4
Affective subscale	0.2	1.0	1.000	–2.4	2.9
SAIB					
Total score	3.3	2.3	0.878	–2.7	9.2
Verification of diagnosis subscale	1.5	0.6	0.062	–0.1	3.1
Expression of symptoms subscale	–0.1	0.7	1.000	–2.0	1.8
Medication/treatment subscale	1.4	0.7	0.280	–0.5	3.3
Consequences of illness subscale	0.0	0.6	1.000	–1.6	1.5
Scanning subscale	0.5	0.5	1.000	–0.8	1.8
SIQ					
Somatic attribution subscale	1.9	1.7	1.000	–2.5	6.3
Psychological attribution subscale	4.9	1.7	0.026	0.4	9.4
Neutral attribution subscale	–0.3	1.8	1.000	–5.1	4.4
ASI-3					
Total score	2.1	2.8	1.000	–5.3	9.4
Physical concerns subscale	0.9	1.1	1.000	–2.0	3.7
Cognitive concerns subscale	1.1	1.1	1.000	–1.7	4.0
Social concerns subscale	0.0	1.3	1.000	–3.3	3.4

SSD, somatic symptom disorder; IAD, illness anxiety disorder; MIHT, multidimensional inventory of Hypochondriacal Traits; SAIB, Scale for the Assessment of Illness Behaviour; SIQ, Symptom Interpretation Questionnaire; ASI-3, anxiety sensitivity index 3.
[a]Bonferroni adjusted for multiple comparisons.

IAD group, and all clinical groups had more psychological attributions than the healthy group, whereas the depression group did not differ from the SSD and IAD group.

Anxiety sensitivity

A MANCOVA on the three ASI-3 subscales revealed a significant multivariate group effect (Wilks Lambda: $F_{(9,\ 470)} = 25.95$, $p < .001$). Pairwise post-hoc comparisons indicated that the individuals with SSD and IAD had significantly higher scores on the physical concerns subscale than the individuals in both control groups. No other significant differences emerged on this subscale. With regard to ASI-3 subscales cognitive concerns and social concerns, all clinical groups reached significantly higher anxiety levels than the healthy group, but no significant differences were found between the clinical groups. With regard to the ASI-3 total scale, the SSD and IAD group scored significantly higher than both control groups, and the depression group scored significantly higher than the healthy group.

Discussion

Over the last decade, the nosology of pathological health anxiety, formerly termed "hypochondriasis," has been the subject of considerable controversy. To solve this issue and to revise the former section of "somatoform disorders," the authors of the DSM-5 implemented rather radical changes: a new major diagnosis was designed, termed SSD, which subsumes several former somatoform disorders (e.g., somatization disorder, pain disorder, and hypochondriasis), and includes patients with medically explained symptoms. In addition, the new diagnosis of IAD was created for individuals with pathological health anxiety without the experience of distressing somatic symptoms. As a consequence of creating SSD and IAD, the former diagnosis of hypochondriasis was split into two diagnoses: individuals with high health anxiety now receive the diagnosis SSD if they suffer from an additional somatic symptom, or the diagnosis of IAD, if they do not experience distressing somatic symptoms. This nosological change, however, appears rather contradictory and incompatible with former diagnostic concepts and current cognitive-behavioral models of hypochondriasis and health anxiety (Abramowitz & Braddock, 2008; Warwick & Salkovskis, 1990).

In the present study, a poly-diagnostic approach was chosen to examine the diagnostic overlap between the different concepts of pathological health anxiety and the new DSM-5 diagnoses SSD and IAD. Furthermore, we investigated the validity of the new diagnostic entities SSD and IAD, comparing both groups with each other in regard to various validation criteria. We found a strong overlap between DSM-IV hypochondriasis and SSD: individuals originally diagnosed as DSM-IV hypochondriasis and then reclassified according to DSM-5 were predominantly summarized under the diagnosis SSD (74 %) and rarely met the criteria for IAD (26 %). Interestingly, a similar pattern of overlap was found between the severe subtype of HAD and SSD (76 %). Even individuals originally diagnosed as mild cases of HAD predominantly met parallel criteria of SSD (62 %). Thus, individuals primarily suffering from high levels of health anxiety will most likely receive the diagnosis of SSD rather than IAD according to DSM-5. This appears theoretically and nominally misleading and will neither improve the clarity of diagnoses nor the clinical care for this group of patients.

Furthermore, we found little empirical support for the distinction of high health-anxious individuals into two diagnostic groups. The few significant group differences observed between SSD and IAD suggest *quantitative* rather than *qualitative* differences between the two groups, i.e., SSD appears as the more severe disorder, going along with a higher number of somatic symptoms, higher rates of comorbid PD and GAD, higher number of multiple physicians consulted for health worries, and more functional impairments.

In DSM-5, psychological and behavioral features were included to increase the validity of the diagnosis and to justify the classification as a mental disorder. These features are summarized under the SSD B criterion, which includes three single but correlated criteria. Thus, we examined if SSD and IAD differed significantly on any of the measures used to assess cognitive, affective, and behavioral validation criteria. Our findings showed that the two groups did not differ significantly in any of these criteria.

Concurrently, all measures used to assess these validation criteria showed good discriminant validity and relative specificity for individuals with high health anxiety as a whole. The groups with high health anxiety (SSD and IAD) scored significantly higher on all MIHT scales (assessing various hypochondriacial traits), all SAIB scales (assessing various aspects of illness behavior), the SIQ somatic symptom attribution scale, and the ASI-3 physical concerns scale compared to the nonhealth-anxious clinical and HCG. This pattern of results supports the notion that patients who suffer primarily from pathological health anxiety should be treated as a unique diagnostic group (Rief & Martin, 2014). However, we cannot infer from these comparisons that patients with high health anxiety should better be classified as an anxiety disorder or that they are indeed distinct from those who primarily suffer from other subtypes of SSD (e.g., mono- and polysymptomatic subtypes with either medically unexplained or medically explained symptoms defined by Rief and Martin, 2014), because we did not include these diagnostic groups as additional control groups in the present study. This will be an important challenge for further research.

The present study has several strengths, including the use of a comprehensive clinical interview for mental disorders, the reclassification of hypochondriasis according to strictly operationalized DSM-5 criteria, the inclusion of both clinical and healthy control participants who did not meet diagnostic criteria for health anxiety or hypochondriasis, the recruitment of a sufficiently large number of health-anxious participants to examine the overlap between different sets of diagnostic criteria for health anxiety, the assessment of a wide variety of validation criteria, and the statistical control of the impact of comorbid panic disorder on the various validation measures.

However, several limitations of the study are also apparent. First and most importantly, it has to be acknowledged that the clinical interviews did not explicitly include the DSM-5 criteria but that conjoint information collected during the interviews and self-reports of the participants were used to post-hoc classify our participants into the SSD and IAD group. Second, the generalizability of the findings is limited by the selection criteria of the study. Especially our screening procedure that focused on pathological levels of health anxiety in the WI and SHAI as a first inclusion criterion might have artificially increased similarities between the SSD and the IAD group. In particular, we cannot rule out the possibility that the IAD might be characterized by lower levels of health anxiety compared to the SSD. Future studies should therefore compare people with the diagnosis of SSD and IAD without adding additional selection criteria as

implied by the screening procedure used in this study. Moreover, in the depression group, comorbid somatoform disorders and some anxiety disorders were excluded in order to reduce diagnostic overlap between the comparison groups. Hence, we cannot rule out the possibility that our findings are biased by this selection strategy. Third, the choice of comparison groups limits the claim of specificity for the various validation criteria. Including, for example, panic disorder as another comparison group would have allowed to directly compare health-anxious participants to panic disorder participants. Fourth, the comparatively small sample size, particularly regarding the IAD group, constitutes another major limitation of our study and leads to very large confidence intervals (Table 4) that may obscure the detection of significant group differences. Larger samples are needed in future studies to detect possible small to medium between-group differences.

In sum, our results suggest that it is still an open question if SSD and IAD indeed represent distinct forms of hypochondriasis, in particular with regard to levels of health anxiety and other associated psychological features supporting the diagnoses. Hence, further studies are needed to prove the validity of the new DSM-5 diagnoses. Meanwhile, we suggest that patients with pathological health anxiety should be treated as belonging to a unique disorder, allowing the usage of the powerful psychological intervention programs which have been developed and carefully evaluated for patients with hypochondriasis/health anxiety (Olatunji et al., 2014).

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