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Journal of Psychosomatic Research

Suicidality in Somatic Symptom and Related Disorders: A Systematic Review

--Manuscript Draft--

Manuscript Number:	JPSYCHORES_2020_404R1
Article Type:	Review Article
Keywords:	somatic symptom disorders; somatoform disorders, conversion disorder, hypochondriasis, illness anxiety disorder, functional disorder, suicide, suicidal ideation, suicide attempts
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Abstract:	<p>Objective : We sought to determine the frequency of and risk factors for suicide outcomes in somatic symptom and related disorders and whether any risk was independent of co-occurring mental disorders.</p> <p>Methods: We conducted a systematic review of studies on completed suicide, suicide attempts, and suicidal ideation in those with somatic symptom disorders published prior to September 22, 2020 and indexed in PubMed, MEDLINE, PsycARTICLES, PsycINFO, or EMBASE according to PRISMA guidelines.</p> <p>Results: Our search yielded 33 articles with significant heterogeneity in study design, sample selection, and assessment for suicide or risk factors. While suicide deaths have not been adequately studied, somatic symptom and related disorders are associated with increased risk for suicidal ideation and suicide attempts, with estimates ranging from 24-34% of participants who endorsed current active suicidal ideation and 13-67% of participants who endorsed a prior suicide attempt. The risk appeared independent of co-occurring mental disorders. Identified risk factors for suicide attempts in samples with somatic symptom and related disorders include scores on measures of anger, alexithymia, alcohol use, past hospitalizations, dissociation, and emotional abuse.</p> <p>Conclusion: Although the literature is sparse, there exists evidence for an association, even independent of other mental disorders, between somatic symptom and related disorders and suicide outcomes. Practice guidelines for the management of these disorders should incorporate recommendations for the assessment and management of suicide risk. Future study is necessary to more fully elucidate potential unique risk factors for those suffering from these complex disorders.</p>
Response to Reviewers:	



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Hospital** | **L'Hôpital
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September 28, 2020

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Cédric Lemogne, MD, PhD
Associate Editor
Journal of Psychosomatic Research

Dear Professor Lemogne,

Please consider our revised submission of “Suicidality in Somatic Symptom and Related Disorders: A Systemic Review” in *Journal of Psychosomatic Research*. We appreciated the thoughtful feedback of the reviewers, which helped produce an improved manuscript for resubmission. We apologize for the delays in this revision. We conducted a repeated literature review based on the feedback of the reviewers and added a quality assessment. The first author also lost an immediate family member and I had an international move. We have detailed our responses to the reviewers in an item-by-item fashion to facilitate re-review.

The systematic review protocol was registered with the PROSPERO international prospective register of systematic reviews (#CRD42020147738). This paper presents a comprehensive overview of the existing literature on suicide outcomes in somatic symptom and related disorders, identifying a clear elevated risk for suicidal ideation and suicide attempts in these diagnostic groups with a possible exception for hypochondriasis. We identify an important gap in studies of completed suicide and a failure of practice guidelines to discuss the role of suicide risk assessment in the care of these patients.

A preliminary version of this work was presented at the 2019 International College of Psychosomatic Medicine conference in Florence, Italy. The manuscript contains original material, which has not been previously published and is not under consideration for publication elsewhere. Each author has approved submission of this manuscript.

As Editor of the journal, I will recuse myself of any decision-making role in this submission and defer entirely to your judgement of its merits. Please note that I anticipate a position change and relocation to the University of Ottawa before this paper is ultimately accepted for publication. Given the pandemic-related complications in this relocation, I will defer any update of my affiliations until the move is complete.

Thank you for your time and any consideration.

Sincerely,

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Item-by-Item Response to Review

Associate Editor

Comment 0.1. The two reviewers have judged that the manuscript has some merits but have also raised some points that should be addressed before it can be further considered for publication.

While revising the manuscript please pay attention to the following points:

Please format highlights to the character limits specified in the Journal of Psychosomatic Research Instructions for Authors (max of 85 characters, including spaces)

Response 0.1. We are grateful for the time of the expert reviewers and associate editor in providing feedback on this manuscript. We have now formatted all highlights to the stringent 85 character limit. The highlights read as follows:

- Research on suicide completions in somatic symptom and related disorders is limited.
- Current suicidal ideation is more frequent in somatic symptom and related disorders.
- Prior suicide attempts are reported in 23-67% of those with somatic symptom disorders.
- Co-occurring mental disorders do not fully explain the frequency of suicide outcomes.
- Suicide risk assessment is neglected in relevant practice guidelines.

Comment 0.2. Please be sure to include all tables and figures in your revised submission since I could not find them. Since the two reviewers commented upon the tables, I guess that these tables were possibly lost during the migration of your submission from the Evise system to the EM system. I apologize for that.

Response 0.2. Our original submission had only one figure. The reviewers have provided some valuable suggestions for tables in the resubmission, which will be included and detailed where relevant. A total of three tables were added which cover the 33 studies included in this review:

Table 1: Suicide deaths, 4 studies

Table 2: Suicide attempts, 18 studies

Table 3: Suicidal ideation or estimated risk, 16 studies (5 also included in Table 2=11 new studies)

Comment 0.3. The last sentence p4 reads as follows: "In summary, cross-sectional studies have shown higher prevalence of past suicide attempts with conversion disorder and more frequent past suicide attempts with somatoform disorder." Please clarify whether or not "higher prevalence of past SA" has a different meaning than "more frequent past SA" as the two phrasings in the same sentence raises some doubt. Also, in this sentence, is "conversion" considered as a "somatoform disorder"?

Response 0.3. On closer inspection, this sentence proved to be problematic for all of the reasons above. It also was idiosyncratically selective in referencing. We have simplified the sentence and moved it from its own paragraph to the final sentence of the last paragraph with the following:

"In summary, cross-sectional studies have shown a high prevalence of past suicide attempts with somatic symptom disorders."

Comment 0.4. Regarding the comparison of SA prevalence in patients with primary somatoform disorder vs those with primary mood disorders, please consider that patients with somatoform are not primarily encountered in psychiatric settings, compared to other mental disorders. Therefore, the seemingly higher prevalence of past SA in these patients may be explained by the fact that suicidal tendencies may be more likely to explain referral to psychiatric care whereas patients with primary mood disorders may be more likely to be referred to psychiatric for other reasons. Whether or not these findings were obtained in psychiatric settings specifically should thus be mentioned in the main text and discussed if appropriate. For instance, it could be stated that the study by Wiborg et al. highlighted in the first paragraph of the discussion was conducted in primary care.

Response 0.4. We agree that the clinical setting sampled is important to communicate. We now make this more clear in the tables and text as follows:

“Kämpfer and colleagues found similar results assessing suicidality in patients with somatoform disorder [in a German outpatient psychosomatic clinic](#)¹⁶”

“Ettinger and colleagues investigated depression and suicidality in patients with non-epileptic seizures [diagnosed in their epilepsy center](#) through...”

“Another cross-sectional study by Ozturk and colleagues [in Istanbul, Turkey](#) investigated somatization as a predictor of suicidal ideation in patients [from a specialized](#) dissociative disorders [program](#)³⁶.”

We have also added the following statement to the discussion:

“Several studies were conducted in psychiatric settings, rather than general medical settings where patients with somatic symptom and related disorders are often seen, and the resultant selection bias may inflate estimates of suicide outcomes for these settings, where other co-occurring mental disorders may be more likely.”

In reviewing these studies, it is also clear that our prior wording of “disorders” was misleading as many studies focused on those with symptoms only, which may or may not represent disorders. There is also variability in how SI was defined. We have updated our discussion to be more accurate in reporting studies focused on disorders with attention to how SI was assessed with the following:

“The prevalence of suicidal ideation in [clinical samples of those](#) with somatic symptom and related disorders [is high](#), with estimates ranging from [24-34%](#) of [patients with current or recent active suicidal ideation](#)^{16,35} and [26-39%](#) with suicidal ideation in their lifetime.^{10,28}”

Comment 0.5. Finally, the authors may want to further discuss or temper their conclusion that somatoform disorders may be an “independent” risk factors for suicidal ideation and suicide attempts since a general psychopathology factor, which is shared by most mental disorders, may underlie suicidal thoughts and behaviors to a greater extent than any specific mental disorder (Hoertel et al. Mol Psychiatry 2015). So the results highlighted in the review suggest that the risk is independent of other mental disorders, especially mood disorders, but could nonetheless be associated with the same core vulnerability than any other mental disorder.

Response 0.5. This is indeed a conceptually very important point. We have added the following sentence to the relevant discussion:

“It has been suggested that a general psychopathology factor, which is shared by most mental disorders, may underlie risk for suicidal behavior [52]. While the literature suggests that somatic symptom disorders are a risk factor independent of mood/anxiety disorders, further research is needed to explore any underlying factors that may be relevant.”

Reviewer 1

Comment 1.1. Overall it seems to me that the article is instructive and well written, and that it may serve as a first step for very insightful research on the topic of suicide and somatic symptom and related disorders. Nevertheless, I believe there could be some improvement. My main concerns are twofold. I also have some minor worries.

Response 1.1. Thank you for the feedback and the constructive and prioritized comments to guide our revision.

Comment 1.2. My first main concern relates to how to posit results of the work presented in this article. This article really is a first and preliminary step. It is a review of the literature about the fundamental topic of somatic symptom and related disorders. It is not a meta analysis. Being its methodology purely

descriptive and the literature on the topic sparse and heterogamous, conclusions of the present article are to be taken with caution. Authors do emphasize those limitations in the text of the article. It seems to me that they could be more underlined in the abstract and the conclusion.

Response 1.2. In re-reading our abstract, we agree that the limitations outlined in the article were not well captured in the abstract. We have subsequently dropped the word “compelling” from “compelling evidence” in the abstract/conclusion. Our abstract/results already references the heterogeneity of studies and inadequate study of suicide deaths (which we reworded from completed suicide). We now open the abstract/conclusion with:

“Although the literature is sparse,”

We also dropped the statement that clinicians should assess risk although kept the less prescriptive statement that practice guidelines should incorporate recommendations:

~~“Clinicians should assess suicide risk in patients with somatic symptom and related disorders.”~~

Comment 1.3. My second main concern is about the database search of articles. I wonder why search items are not the same across the different databases. For example, “Illness Anxiety Disorder” was searched in all databases but Pubmed and embase. I also wonder why authors did not include searches about specific functional somatic syndroms such as fibromyalgia, the irritable bowel syndrome, etc. Likewise, other wordings such as PNES and hysteria are discussed in the results although they were not part of the initial search. It is not clear how the corresponding articles were identified, and why those terms were not included in the initial database search. Finally, it is not very clear to me why more than 300 studies mentioning the selected keys words were excluded. Upon which exact criteria were those studies excluded of the analysis when reading their abstracts although they popped up during the search process?

Response 1.3. In our initial meetings, we found it challenging to demarcate the margins for this review. Inclusion of syndromes like chronic pain, fibromyalgia, and irritable bowel syndrome were considered. We instead elected to stick with DSM-IV and DSM-5 based disorders and their nosological predecessors to maintain some focus. One of the senior authors wanted to include chronic pain, but the rest of the authors preferred to maintain a clearer focus. We have added the following to our discussion:

“The focus of our review is on DSM-5 based somatic symptom disorders and their predecessors. Our findings may not generalize to other functional somatic syndromes or disorders associated with pain.”

We have expanded our methods to better detail the inclusion/exclusion criteria for studies:

“To be included, studies had to involve a somatic symptom or related disorder or symptoms of such a disorder and its associations with or prevalence of a suicide-related measure (e.g., suicide deaths, suicide attempts, suicidal ideation, estimated suicide risk).”

We have also updated our search across all databases to include “Illness Anxiety Disorder” in the PubMed and Embase search terms. The search is up to date through September

“The search was limited to journal articles, English language, and studies published up to September 22, 2020.”

With regard to better articulating the reason for including/excluding studies, we have updated Figure 1 to better describe the reason studies were excluded. In the process of doing so, we better refined our list and dropped those studies that didn’t include any associations (including prevalence estimates) between somatic symptoms disorders and suicide outcomes. The updated Figure 1 includes now 33 studies.

Comment 1.4.a-d. My other worries are more secondary:

Comment 1.4.a. - p1. This formulation sounds a bit uncanny to me: “including that above and beyond that attributable to co-occurring mood and anxiety disorders.”

Response 1.4.a.: We replaced the phrase “above and beyond” with “not” as follows:

“One aim of this paper is to review the research regarding somatic symptom and related disorders to determine the frequency of suicidal ideation, suicide attempts, and completed suicide, including that **not** attributable to co-occurring mood and anxiety disorders.”

Comment 1.4.b. - p2. Authors should say a word about Briquet's syndrome and how it relates to somatic symptom disorder.

Response 1.4.b. We appreciate the reminder that the term Briquet's syndrome is antiquated and have concisely communicated its relation to more contemporary terminology with the following:

“Briquet's syndrome is a diagnostic predecessor and highly concordant with DSM-III-defined somatization disorder¹⁵.”

Comment 1.4.c. - p6. repetition: “children of parents with somatization disorder have been found to have been found to have”

Response 1.4.c. We have deleted the repeated phrase and replaced “have been found to have been found to have” simply with “have.”

Comment 1.4.d. - p14. Another limitation may be discussed here. Treatments such as anti-depressive drugs and benzodiazepines may also influence suicide ideations, and they are poorly informed across reviewed studies.

Response 1.4.d. We have added the following sentence to our discussion of limitations:

“The role of medications on risk has also been ignored in the literature to date.”

Reviewer 2

Comment 2.1. This is an interesting and timely review of literature on the association between somatic symptom disorders and suicidal behaviors and thoughts. The methodology is adequate. Overall, this study suggests an association between somatic symptom disorders (except hypochondriasis) and suicide attempts and suicidal ideation, while there is insufficient data for an association with suicide completion.

Response 2.1. We appreciate this summary of the paper, which well captures our main findings.

Comment 2.2. The manuscript is well written although the description of individual studies is daunting as usual in this kind of qualitative reviews. I have had no access to Table 1 mentioned page 7.

Response 2.2. We have eliminated the errant reference to Table 1. In response to Comment 2.3, we have instead added three tables that summarize the selected studies. We are hopeful that these summaries make the review less daunting. In the process of updating our search, we have also eliminated studies that measured somatic symptom and related disorders as well as some suicide outcome, but did not report on their association. This has reduced unnecessary chatter. We have also reduced several places where percentages were reported with decimal places from smaller studies that decreased readability and overestimated precision. We hope these changes improve the overall readability of this review.

Comment 2.3. My main comment would be to add 3 tables (for suicide completion, suicide attempt, suicidal ideation) summarizing the 40 studies with the main variables including (but not limited to) N, measures, location, patients (outpatients, inpatients), results, and quality of article based, for instance, on the Newcastle-Ottawa scale. A sub-classification of each table could be based on the independent variable, i.e. suicidal behavior or somatic symptom disorder. This could be put in Sup material and would facilitate a brief overview of results.

Response 2.3. In creating the table, it became clear that we should more stringently apply our exclusion criteria as there were several studies discussed that assessed somatic symptom and related disorders and some suicide outcome, yet failed to report the association between the two. These studies have been eliminated, which allows us to better focus the manuscript. We have organized the selected studies into three new tables in the manuscript:

Table 1: Suicide deaths

Table 2: Suicide attempts

Table 3: Suicidal ideation or estimated risk.

Comment 2.4.a-b. Minor comments:

Comment 2.4.a. - Introduction, first paragraph: please replace DSM-V by DSM-5.

Response 2.4.a. Thank you for this correction, which we have made in the first paragraph of the introduction. We have also verified that DSM-5 is abbreviated properly in all other uses through out.

Comment 2.4.b. - Introduction: please mention any potential previous review on the topic and what the present manuscript adds.

Response 2.4.b. Surprisingly, we did not come across any prior systematic reviews on this topic. In line with Comment 1.3, we did find a systematic review on the prevalence of suicidal behavior in patients with chronic abdominal pain and irritable bowel syndrome by Spiegel B et al. 2007. Given the difficulty of proving the absence of something, we decided to avoid being so bold as to say we are the first systematic review of the topic although are open to doing so at the direction of the reviewers and associate editor.

Highlights

Research on suicide completions in somatic symptom and related disorders is limited.

Current suicidal ideation is more frequent in somatic symptom and related disorders.

Prior suicide attempts are reported in 23-67% of those with somatic symptom disorders.

Co-occurring mental disorders do not fully explain the frequency of suicide outcomes.

Suicide risk assessment is neglected in relevant practice guidelines.

Abstract: 250
Word Count: 5,477
References: 53
Figures: 1
Tables: 3
+ Appendix

Suicidality in Somatic Symptom and Related Disorders: A Systematic Review

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KEYWORDS: Somatic symptom disorders; somatoform disorders, conversion disorder, hypochondriasis, illness anxiety disorder, functional disorder, suicide, suicidal ideation, suicide attempts

Abstract

Objective: We sought to determine the frequency of and risk factors for suicide outcomes in somatic symptom and related disorders and whether any risk was independent of co-occurring mental disorders.

Methods: We conducted a systematic review of studies on completed suicide, suicide attempts, and suicidal ideation in those with somatic symptom disorders published prior to September 22, 2020 and indexed in PubMed, MEDLINE, PsycARTICLES, PsycINFO, or EMBASE according to PRISMA guidelines.

Results: Our search yielded 33 articles with significant heterogeneity in study design, sample selection, and assessment for suicide or risk factors. While suicide deaths have not been adequately studied, somatic symptom and related disorders are associated with increased risk for suicidal ideation and suicide attempts, with estimates ranging from 24-34% of participants who endorsed current active suicidal ideation and 13-67% of participants who endorsed a prior suicide attempt. The risk appeared independent of co-occurring mental disorders. Identified risk factors for suicide attempts in samples with somatic symptom and related disorders include scores on measures of anger, alexithymia, alcohol use, past hospitalizations, dissociation, and emotional abuse.

Conclusion: Although the literature is sparse, there exists evidence for an association, even independent of other mental disorders, between somatic symptom and related disorders and suicide outcomes.

Practice guidelines for the management of these disorders should incorporate recommendations for the assessment and management of suicide risk. Future study is necessary to more fully elucidate potential unique risk factors for those suffering from these complex disorders.

INTRODUCTION

Somatic symptom and related disorders present to almost every medical specialty yet can be difficult to identify. In the DSM-5, these include somatic symptom disorder, conversion disorder, illness anxiety disorder, and factitious disorder [1]. Patients with these disorders have increased contact time with primary care providers, and this can be frustrating for both providers and patients, as patients' symptoms do not have an identifiable etiology [2]. The prevalence of somatic symptom and related disorders is estimated to be 5-7% [3] of the general population and approximately 17% of the primary care population [4].

Recent practice guidelines for somatic symptom and related disorders focus on establishing the diagnosis, building a therapeutic relationship with the patient, psychosocial assessment, management in general medical settings, and psychological treatment [3, 5-7]. Only half of those identified address screening for suicidal ideation [5, 7] and none discuss suicide risk assessment. More attention is paid to the potentially harmful effects of ordering unnecessary tests, especially those that might be dangerous or costly [3, 6, 7]. In two guidelines specifically focused on the management of children and adolescents with somatic symptom and related disorders, no mention of screening or assessment for suicide risk is made [6, 8].

Suicide risk assessment is an essential aspect in the practice of mental disorders, although relatively little attention has been paid to this risk in somatic symptom disorders. Suicide accounts for 1.4% of premature deaths worldwide, and patients are often screened for symptoms of suicide when diagnosed with illnesses such as anxiety and depression [9]. Certain groups are considered high risk, such as those with chronic medical illnesses and those with mental illnesses, such as depression and anxiety [9].

Patients with mood disorders tend to have comorbid somatic symptom and related disorders and vice versa. Those with mood disorders are well-known to be at an elevated risk for suicide attempts, and the presence of somatic symptom and related disorders seems to further elevate risk [10, 11]. This may be

because comorbid somatic symptom and related disorders tend to be associated with more severe illness burden, which is associated with greater prevalence of suicidality. It may also be an additive effect of having two independent risk factors, a somatic symptom disorder, and a mood or anxiety disorder, present simultaneously. If somatic symptom disorders enhance the risk of patients already at elevated risk, then these conditions should be treated as independent risk factors.

One aim of this paper is to review the research regarding somatic symptom and related disorders to determine the frequency of suicidal ideation, suicide attempts, and completed suicide, including that **not** attributable to co-occurring mood and anxiety disorders. A second aim is to then assess risk factors for suicide that have been identified as relevant in somatic symptom disorders.

METHODS

A protocol was registered with PROSPERO international prospective register of systematic reviews (#CRD42020147738). This review was conducted and reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

Search Strategy

Six electronic databases were searched: PubMed, MEDLINE, PsycARTICLES, PsycINFO, EMBASE, and **SCOPUS**. In view of the fact that with the introduction of the DSM-5 in 2013 the diagnostic terminology changed from “somatization disorder” and “somatoform disorders” to “somatic symptom disorder”[12], the **DSM-IV terminology** was **also** integrated into the search and the results are reported accordingly. The following search terms were used with MESH headings as relevant: suicide, somatoform disorders, conversion disorders, hypochondriasis, and Munchausen Syndrome. **Additional terms** functional disorder **and illness anxiety disorder were also** used (**Appendix**). To maintain focus, pain was included only in the context of a somatoform pain disorder. The search was limited to journal articles, English language, and studies published up to **September 22, 2020**. Reference lists of included studies were examined to identify any additional studies for inclusion. **To be included, studies had to involve a somatic symptom or related disorder or symptoms of such a disorder and its associations with or**

prevalence of a suicide-related measure (e.g., suicide deaths, suicide attempts, suicidal ideation, estimated suicide risk).

Search results were pooled, with duplicates removed. Titles and abstracts were screened before analyzing full texts to determine eligibility. The screening process was undertaken by two independent reviewers (MET and JP). The data were extracted and collated independently into spreadsheets and compared. Any disagreements were resolved in discussion with a third senior reviewer (JGF) when required.

The quality of articles was assessed using the Newcastle-Ottawa Quality Assessment scale. For cross-sectional studies, we utilized the adaptation of the Newcastle-Ottawa Quality Assessment scales of Modesti et al. [13]. For the purposes of this systematic review, quality assessment was based on a somatic symptom or related disorder or related construct as the exposure, a suicide related measure as the outcome, and the association of the two. Wherein this exposure and outcome of interest were secondarily reported, our assessment of quality could potentially be lower than what might be assessed for the study's primary hypothesis. This was done to assess the quality of available evidence for the purpose of this review.

RESULTS

The initial search identified 1204 articles. After pooling searches and removing duplicates, titles and abstracts were screened, revealing 624 potentially relevant studies. After review of full-texts to assess eligibility, 33 studies were identified as eligible for review (**Figure 1**).

Somatic Symptom and Related Disorders and Completed Suicide

There is a striking paucity of research estimating risk of suicide deaths in those with somatic symptom disorders. The identified studies are summarized in **Table 1**. In the first mortality study identified in our systematic review, Eli Robins and colleagues reviewed the 134 deaths by suicide in St. Louis between May 1956 and May 1957. For 119 of these cases, they conducted interviews with close friends and relatives and reviewed (general and mental) hospital, social service, and police records. In

their review, they found only one death as involving hysteria (conversion reaction) in a case where the suicide was primarily associated with drug addiction [14]. Stenback and colleagues studied 57 completed suicides that occurred in mental hospitals in Helsinki between 1952 and 1963 [15]. They found no instances of hypochondria, defined as an unfounded fear of having a disease, in these cases. They did mention that two of those who completed suicide made frequent complaints about somatic symptoms, which were believed to be done to obtain emotional support and contact of staff rather than an unfounded fear of having a disease. Surprisingly, in the half century that has followed, there has been a striking absence of adequately powered studies to directly assess mortality by suicide.

Two studies were inconclusive due to limitations in study design. Coryell and colleagues performed a 42-year follow-up of 70 women diagnosed with Briquet's syndrome via chart review from hospital admissions between 1925 and 1950 at the University of Iowa [16]. They found no excess mortality when compared to the age- and sex-matched Iowa population. The study was underpowered for inferences on suicide with only 1 of 30 patients with Briquet's syndrome and available death certificates dying of suicide, which was significantly less frequent than matched patients with major depression. Briquet's syndrome is a diagnostic predecessor and highly concordant with DSM-III-defined somatization disorder [17]. Pasi and colleagues examined risk factors among 25 individuals who completed suicide in India between 2008 and 2011[18]. They interviewed first degree (primary) and other relatives and found a higher frequency of somatoform disorders among first degree family members of suicide completers compared to other relatives (25% vs. 18%).

Somatic Symptom and Related Disorders and Suicide Attempts

Those studies that looked at suicide attempts as an outcome are summarized in **Table 2**. In a representative sample of 6,022 participants of the Korean Epidemiologic Catchment Area study, Subin Park and colleagues assessed the association between various mental disorders and a history of suicide attempt, stratified by the current suicide risk as estimated by the relevant Mini International Neuropsychiatric Interview. Somatoform disorders were associated with suicide attempts in each risk category: high aOR 6.04, 95% CI 1.94-18.81, moderate aOR 2.80, 95% CI 1.02-7.63, low aOR 11.75,

95% CI 3.88-35.60. With regard to the marked low association in the low risk category, the authors speculated that those with somatoform disorder may attempt suicide with a desire to relieve the distress related to physical concerns and hopelessness that it will not improve more so than a desire to die [19]. With only 30 low risk attempters in the sample and the wide confidence intervals the variation in aOR point estimates should not be overinterpreted and the key finding is a consistent association between somatoform disorders and suicide attempts in an epidemiologic sample.

In a cross-sectional study, Kämpfer and colleagues investigated the link between somatic symptom and related disorders and suicide attempts by examining 155 outpatients diagnosed with somatoform disorders to assess if risk of suicide attempts was associated with difficulty identifying and describing emotions as well as intensely experiencing and expressing anger [20]. Patients were diagnosed using the Structured Clinical Interview for DSM-IV-axis I and -axis II as well as the ICD-10 criteria for somatoform disorder. After completing multiple screening tools, scales, and inventories, patients were divided into two groups based on absence or presence of lifetime suicide attempts. From their sample, 20 patients (13%) had prior lifetime suicide attempts. Those with a history of suicide attempts had greater alexithymia, psychological distress, deficits in coping mechanisms, and anger. The authors hypothesized patients with somatoform disorders are used to describing external bodily symptoms, leaving them inexperienced at identifying inward processes. As a result, distressing emotions are not adequately identified or communicated, and anger is experienced more intensely.

Some studies have investigated suicide attempts in specific somatic symptom related disorders. Carter investigated risk factors among 226 patients admitted to an inpatient facility in Ashford Hospital following suicide attempts via self-poisoning through chart review of personal patients [21]. Eighty of these patients were teenage girls, and 48 were diagnosed with hysteria – an antiquated term that encompassed those with somatic symptom disorders who experienced physical symptoms without a medical etiology. Another cross-sectional study investigated patient characteristics among 30 participants who attempted self-immolation in Iran compared to 15 patients from a burn unit using the Minnesota Multiphasic Personality Inventory questionnaire [22]. The group that attempted self-immolation

displayed higher levels of hysteria, depression, hypochondriasis, and psychopathic deviation than a control group matched on age, gender, and place of residence.

Other researchers have investigated suicide attempts in the setting of conversion disorder. In a cross-sectional study, D'Alessio and colleagues investigated psychiatric disorders in 43 patients with psychogenic non-epileptic seizures (PNES) with and without comorbid epilepsy [23]. Twenty-four patients solely had the diagnosis of PNES while 19 patients had other comorbidities. Patients underwent psychiatric interviews using DSM-IV instruments to determine the presence of other comorbid psychiatric disorders. Patients only diagnosed with PNES had many comorbidities, including conversion disorder (83%), malingering (4%), and somatoform disorders (37.5%). A history of suicide attempts was endorsed by 23% of the sample and did not differ between those with pure PNES and those who also had comorbid epilepsy.

Associations between somatic symptom related disorders and suicide attempts have been reported in varied regions. In another cross-sectional study, 1,073 patients from a Turkish outpatient psychiatric clinic were examined to assess risk factors for suicide attempts [10]. Suicide attempts were reported by 198 patients, and 31 (15.7%) of these patients reported somatoform disorders, which was not significantly higher than 14.6% with somatoform disorders in the control sample without suicidal ideation or attempts, although it is worth noting that the vast majority of these clinic patients carried other psychiatric diagnoses associated with suicide. Somatoform disorder was the third most frequently diagnosed mental disorder in those with history of suicide attempts, behind depression and anxiety [10]. A cross-sectional study by Güleç and colleagues examined 100 consecutive patients with conversion disorder admitted to the psychiatry clinic following an evaluation by neurology and found a high frequency of prior suicide attempts in those who completed the survey (33/94=35%), while a history of suicide attempts was absent in the very healthy control group of hospital employees and their relatives without any past psychiatric or neurological history [24]. This very high frequency of past suicide attempts is supported by even higher estimates by Rechlin and colleagues in Germany [25]. They evaluated 18 patients with a definitive diagnosis of pseudoseizures who met DSM-III-R criteria for conversion disorder on structured interview.

Twelve of the 18 (67%) patients had attempted suicide at least once and psychiatric comorbidities such as personality disorders (83%), substance use disorders (39%), eating disorders (39%), and major depression (28%) were common. In summary, cross-sectional studies have shown a high prevalence of past suicide attempts with somatic symptom disorders.

Somatic Symptom and Related Disorders as Independent Risk Factors for Suicide Attempts in Mood Disorders

Tomasson and Coryell examined the medical records of patients with somatization disorder and conversion disorder at University of Iowa Hospitals and Clinic [26]. They found that 51% of patients with somatization disorder had attempted suicide at least once, while only 16% of patients with conversion disorder had. Patients with somatization disorder also had significantly greater prevalence of depression (48%) compared to those with conversion disorder (18%). Other variables may confound the results, as the prevalence of divorce was twice as high in the somatization disorder group as the conversion disorder group.

Chioqueta and colleagues investigated suicide risk in psychiatry outpatients by conducting a cross-sectional study on 120 psychiatric outpatients [27]. Twenty-nine patients met diagnostic criteria for somatization disorder. Eight of the 29 (28%) reported prior suicide attempts compared to 10 of the 91 (11%) patients without somatization disorder, a significantly larger proportion. This significant difference persisted when adjusting for both comorbid MDD and personality disorders.

These results are similar to those of Morrison and Herbstein, who contrasted 54 women with somatization disorder and secondary affective disorder with 29 patients with primary affective disorder (unipolar or bipolar) [28]. Prior suicide attempts were significantly more common in the patients with somatization disorder compared to those with a primary affective disorder (65% vs. 31%, $p=.003$). They were also more likely to have had multiple attempts (41% vs. 3%, $p=.0001$) although there were no differences between groups in the likelihood of a prior attempt being deemed serious.

Park and colleagues examined the association between lifetime suicide attempts and somatic pain (as assessed by the Korea Composite International Diagnostic Interview) using data from the Korean

Epidemiologic Catchment Area Replication study [29]. Those with multiple somatic pain and comorbid MDD had statistically significantly higher prevalence of lifetime suicide attempts (aOR=14.78; 95% CI, 10.08 to 21.67) than those with neither somatic pain or MDD. Those with multiple somatic pain symptoms without MDD also had statistically significantly higher prevalence of lifetime suicide attempts (aOR=3.67; 95% CI, 2.63 to 5.14), though not as high as those with both somatic pain and MDD. Similar findings were seen in those with single somatic pain, both with (aOR=8.27; 95% CI, 5.16 to 13.25) and without comorbid MDD (aOR=1.83; 95% CI, 1.31 to 2.58).

In a retrospective chart review, Craven and colleagues investigated suicidality among patients with factitious HIV infection at Boston University [30]. Patients with factitious HIV infection had a statistically significant higher suicide attempt prevalence (42.8%) than those with actual HIV (7.1%). Slightly more than half of patients with factitious HIV had chronic depression, but the authors did not indicate how many of the patients with chronic depression had attempted suicide compared to those with only the factitious disorder. Ettinger and colleagues investigated depression and suicidality in patients with non-epileptic seizures [diagnosed in their epilepsy center](#) through a telephone-based structured questionnaire, finding 29 of 56 patients (52%) had depression and 11 of 56 (20%) had attempted suicide [31]. As with the previously discussed studies, the authors did not indicate how much overlap existed between these groups.

While most of the prior research focused on adults, Krishnakumar and Geeta conducted a retrospective study to investigate depression in children in India under the age of 12 compared to an age and sex-matched control group [32]. They found 7 of 45 children with depression had prior suicide attempts. These children also had increased prevalence of conversion disorder (9%) compared to controls, though the authors did not present inferential statistics. Asselmann and colleagues also investigated children and young adults with mental disorders [33]. They used data from the Early Developmental Stages of Psychopathology Study, a 10-year prospective-longitudinal study of children and adolescents in Dresden. The presence of somatoform disorders predicted later-life eating disorders and suicide attempts (OR=5.62) as well as unfavorable educational, occupational, and interpersonal functional outcomes. The

authors questioned whether participants limited their work or stress load due to their physical symptoms, which may have contributed to these poorer social outcomes and provided additional stressors contributing to suicide attempts. Interestingly, children of parents with somatization disorder have more psychiatric hospitalizations, suicide attempts, unexplained symptoms, and hospitalizations in general than other children [34].

Stenback and Blumenthal hypothesized that patients with hypochondriasis would have lower prevalence of suicide attempts, which they tested using a cross-sectional study of 80 male patients with chronic alcoholism and 280 random psychiatric patients, 58 of which had hypochondriasis [35]. A lower frequency of suicide attempts was found in patients with hypochondriasis (7%) as compared to patients without hypochondriasis (14%), but this difference was not significant. [Scores on the hypochondriasis item of the Hamilton Depression Rating Scale were lower for those with a history of suicide attempts compared to those without in a sample of 60 outpatients with major depression in India \[36\].](#)

In summary, cross-sectional and case control studies have shown more frequent past suicide attempts with multiple somatic pain [29, 33] and somatization disorder [26-28] independent of mood and anxiety disorders. However, prior suicide attempts are reported less frequently in those with hypochondriasis [35, 37].

Somatic Symptom Disorders and Suicidal Ideation or Estimated Suicide Risk

Research indicates somatization disorders may be an independent risk factor for suicidal ideation [and this evidence base is summarized in Table 3](#). Wiborg and colleagues examined prevalence of suicidality in primary care patients with somatoform disorders and identified contributing factors [1]. They performed a cross-sectional screening of 1,645 primary care patients, identifying 142 with a somatoform disorder. Those with a somatoform disorder, the majority of whom had a somatoform pain disorder, more frequently endorsed thoughts of being better off dead or hurting themselves (9th item of PHQ-9, 37% vs. 7% for rest of sample, $p < .001$). While suicidal ideation is estimated between 1-10% in the general population, on follow-up interview, 24% of those with a somatoform disorder had active suicidal ideation in the past 6 months and 18% reported a previous suicide attempt. In full multivariable

models, suicidal ideation was significantly associated with PHQ-8 score and the level of dysfunctional illness perception, but not anxiety, previous suicide attempts, or age of onset of somatoform symptoms. Although they did not measure it, the authors speculated hopelessness may be a mediator in this relationship. Individuals with somatoform disorders tend to feel their situation is hopeless as they experience continued frustrations over their unexplained symptoms [1, 38]. These results are consistent with another cross-sectional study conducted by Wiborg and colleagues, which examined 1,455 primary care patients in German [39]. Of those, 171 endorsed suicidal ideations. Significantly more patients with suicidal ideation had somatoform disorders compared to those who did not (30% vs. 6%).

Kämpfer and colleagues found similar results assessing suicidality in patients with somatoform disorder [in a German outpatient psychosomatic clinic](#) [20]. Of the 155 outpatients with somatoform disorder, approximately one-third of patients had active suicidal ideation. More than half of patients described thoughts of death and dying. In a cross-sectional study [in Turkey](#), 105 psychiatric outpatients reported active suicidal ideation and 770 matched controls did not report suicidal ideation [10]. Of the 105 patients, 9 (9%) had somatoform disorders, compared to 112 (15%) of the 770 control patients.

Another cross-sectional study by Ozturk and colleagues [in Istanbul, Turkey](#) investigated somatization as a predictor of suicidal ideation in patients [from a specialized dissociative disorders program](#) [40]. They examined 40 patients with dissociative identity disorder or dissociative disorder not otherwise specified. Patients with concurrent somatization disorder (N=16) were more likely to have suicidal ideation (75% vs. 13%). They had an average of 20.1 somatic complaints, compared to an average of 10.6 somatic complaints for those without suicidal ideation. Somatization disorder remained strongly associated with current suicidal ideation even after adjusting for history of childhood trauma, levels of state and trait dissociation, borderline personality disorder, and other variables.

Guz and colleagues assessed dissociative symptoms and other characteristics among patients with conversion and somatization disorders in a cross-sectional study in Turkey using the Patient Information Form, Dissociative Experience Scale, Symptom Check List, and the Suicide Ideation Scale [41]. The diagnostic groups did not significantly differ and had significantly elevated suicidal ideation compared to

the general population. Jepsen and colleagues examined 55 early-traumatized patients in Norway in a one-year naturalistic follow-up study after inpatient admission [42]. They divided participants into 3 groups: high psychoform and somatoform dissociative group (n=18), high somatoform low psychoform dissociative group (n=22), and low somatoform and low psychoform group (n=15). Suicidal ideation was found in 94% in the high psychoform and somatoform dissociative group, compared to 64%-67% other groups. In a cross-sectional study designed to test the validity of Minnesota Multiphasic Personality Inventory, Kopper and colleagues found conversion hysteria contributed significantly to predicting suicidal ideation among female students at University of Northern Iowa [43].

In Germany, Jordan and colleagues used machine learning to investigate the associations between the PHQ-8, GAD-7, and PHQ-15 and suicidal ideation as measured by the 9th item of the PHQ-9 (not equal to 0) among 6,805 people screened across 22 primary care practices in Hamburg [44]. In this sample, 12.6% endorsed suicide ideation. Across all methods, depressive symptoms were the most strongly associated with SI, but anxiety and somatoform disorders also played a minor role independent of the PHQ-8. The authors concluded that “comorbidities like GAD or somatoform disorders add some surplus value when it comes to estimating SI, but the dominating predictor remains the depression score” [44].

In Finland, Maaranen and colleagues investigated the relationship between psychological and somatoform dissociation in the general population through a cross-sectional study [45]. Study participants were mailed a questionnaire and stratified into four groups based on their responses: low dissociation, high psychologic dissociation, high somatoform dissociation, and high psychologic and somatoform dissociation. High somatoform dissociation, with psychologic dissociation (49% vs. 18%, $p < .001$) and alone (24% vs. 5%, $p < .001$), was associated with significantly increased suicidal ideation.

In a prospective study aimed at determining change in intensity of neurotic symptoms and change in SI following psychiatric treatment in a day hospital, Rodzinski and colleagues had participants complete the Symptoms Checklist KO “O” [46]. Of the 461 women, 45 (10%) had somatoform disorders, and 20 (9%) of the 219 men had somatoform disorders. Suicidal ideation was significantly decreased by

the end of therapy. Those with improvement in SI also had greater reduction in the somatization disorders score (as determined by the Symptoms Checklist KO “O” subtype).

In summary, cross-sectional studies have shown those with somatoform disorders [1, 20, 39, 42, 45], somatization disorder [40, 41], and conversion disorder [41, 43] are more likely to have thoughts of being better off dead or hurting themselves. Scores on somatoform screener (PHQ-15) add some small additional value in predicting suicidal ideation beyond depression and anxiety scores [44].

Somatization Disorders as Modifiers of Suicidal Ideation in Mood and Anxiety Disorders

Mood and anxiety disorders are often associated with both suicidal ideation and somatic symptoms [47]. Morrison and Herbstein investigated depression and somatization disorder in a sample of 54 women with somatization disorder who also met DSM-III criteria for MDD [28] and 29 with a primary affective disorder without somatization. In comparison with a group of females diagnosed solely with depression, the group with somatization disorder had significantly more reports of death wishes (83% vs. 59%, $p=.02$) and suicidal ideas (80% vs. 55%, $p=.02$). Ettinger and colleagues also found elevated risk of suicidal ideation (39.3%) in those with both depression and non-epileptic seizures [31].

In research conducted in the Netherlands, Carlier and colleagues investigated characteristics between patients with and without suicidal ideation with comorbid mood, anxiety, and somatoform disorders [11]. They performed a cross-sectional comparison of 1,245 outpatient psychiatry patients prior to treatment. Patients with active suicidal ideation had more mood disorders, including comorbid somatoform disorders, but the prevalence of somatoform disorders was not independently examined.

Chang and colleagues investigated cross-national differences in hypochondriasis symptoms between Korean and American outpatients with MDD [48]. They used data from 1,592 Korean patients from the Korean Burden of Illness Study and 3,744 American patients from the Sequenced Treatment Alternatives to Relieve Depression (STAR*D) study. Hypochondriasis symptoms were significantly *inversely* associated with suicidal ideation for Korean (aOR=0.42, 95% CI) and American patients (aOR=0.81, 95% CI) and were more common in older patients. Somatic anxiety was most strongly associated with hypochondriasis symptoms among both American (aOR=1.98, 95% CI) and Korean

patients (aOR=2.14, 95% CI) with MDD. The authors hypothesized that patients who experience somatic anxiety may be more prone to bias by overestimating the causes or impact of the symptoms, causing them to worry about having a serious illness. They found that Korean patients have greater prevalence of hypochondriasis and suicidal thoughts than American patients, consistent with an analysis of Jeon and colleagues of the same sample [49].

Using the Korean Epidemiologic Catchment Area Replication study, Park and colleagues found significantly higher percentages of suicidal ideation in those with multiple somatic pain (31.1%) and single somatic pain (23.9%) as compared to those without pain (13.4%) [29]. Although some of these participants had comorbid MDD, this variable was not measured separately.

In summary, cross-sectional studies have shown that patients with somatization disorder [28] and conversion disorder [31] who also have comorbid mood and anxiety disorders tend to have increased thoughts of being better off dead or wanting to harm themselves compared to those without these comorbid somatic symptom related disorders. Other studies note increased prevalence of suicidal thoughts among those with both a somatic symptom related disorder and comorbid depression/anxiety with the possible exception of hypochondriasis, but these specific studies do not describe whether these somatic symptom related disorders are independently associated with suicidal ideation [11, 29, 37, 48].

DISCUSSION

One aim of the paper was to assess the association of somatic symptom and related disorders on suicide risk. There has not been adequate study of suicide completion as an outcome. The literature does, however overall support an increased risk of suicidal ideation and suicide attempts in patients with somatic symptom and related disorders. [The prevalence of suicidal ideation in clinical samples of those with somatic symptom and related disorders is high](#), with estimates ranging from 24-34% of [patients with current or recent active suicidal ideation](#) [20, 39] and 26-39% [with suicidal ideation in their lifetime](#) [10, 31]. Studies also found an increased prevalence of suicide attempts in the presence of somatic symptom and related disorders, ranging from 13-67% of participants [20, 23, 25-28, 31]. In patients with an

elevated risk at baseline, such as those with depression and anxiety, the presence of comorbid somatic symptom and related disorders significantly elevated their risk of suicide attempts even further. Those with somatic symptom and related disorders are more likely to endorse suicidal ideation compared to those without such disorders; Wiborg and colleagues found 30% of participants with somatic symptom and related disorders endorsed suicidal ideation versus 6% of participants without these disorders [1, 39]. Patients who self-report suicidal ideations tend to report increased physical symptoms as well. As with attempted suicide, the presence of somatic symptom related disorders in those with mood and anxiety disorders significantly increases risk for suicidal ideation. However, there seems to be an exception with illness anxiety disorder, or hypochondriasis. Some research found that individuals with hypochondriasis specifically, those afraid of illnesses, are very preoccupied with their health and have no desire to die [50]. It is difficult to determine an association with completed suicides, as we were only able to identify three papers examining completed suicide as an outcome. Two underpowered studies were negative for hypochondriasis and Briquet's syndrome while the other focused on diagnoses of relatives of decedents.

Possible explanations for the increased prevalence of suicide attempts and suicidal ideation in those with somatic symptom and related disorders may be increased feelings of hopelessness that accompany those with symptoms that do not have a medically explained etiology. As suggested by Stone, hopelessness and frustration stem from repeated interactions with the healthcare system where patients feel they do not receive answers to their problems [38]. These frustrations and hopelessness can evolve into feelings of despair, which may contribute to increased suicidality. While hypotheses involving hopelessness are commonly discussed, measures of hopelessness have been lacking and are needed to directly test this prevailing hypothesis. Others hypothesize somatization disorders increase risk of suicidality by making individuals feel they need to limit their daily activities, such as work, due to their symptoms, although this hypothesis has also not been directly tested [51].

Another aim was to investigate the effect of somatic symptoms and related disorders independently on suicide risk. Once depression and anxiety were controlled for, somatic symptoms and related disorders still appeared to be associated with significantly increased risk of suicidality, suggesting

their impact on risk of suicide may be not simply explained by cooccurring mood and anxiety disorders [1]. It has been suggested that a general psychopathology factor, which is shared by most mental disorders, may underlie risk for suicidal behavior [52]. While the literature suggests that somatic symptom disorders are a risk factor independent of mood/anxiety disorders, further research is needed to explore any underlying factors that may be relevant. The role of medications on risk has also been ignored in the literature to date.

This body of research was difficult to compare due to the high degree of variability in the methodology and operational definitions used. Although a few studies used the PHQ-15 to assess somatic symptoms, others used questionnaires, which made it difficult to compare the degree of somatization among studies. Another obstacle was in the categorization of somatic symptom and related disorders. Some studies separated the specific disorders, such as illness anxiety disorder and conversion disorder, but many studies lumped these disorders together as “somatization disorders.” While some studies found no increased risk in suicidality with somatization disorders, these results may differ if the separate disorders were examined individually, as our findings suggest that illness anxiety disorder may represent an exception to the elevation in risk. Those that did differentiate types of disorders often did not provide data on how many individuals with a specific disorder, such as illness anxiety disorder, engaged in suicidal behavior. This makes it difficult to draw conclusions concerning which specific disorders may present with increased risk for suicidality. Diagnostic categories have also evolved over time. Several studies were conducted in psychiatric settings, rather than general medical settings where patients with somatic symptom and related disorders are often seen, and the resultant selection bias may inflate estimates of suicide outcomes for these settings, where other co-occurring mental disorders may be more likely.

Another relevant aspect that was difficult to explore is chronic pain in the context of somatic symptom and related disorders. In general, this is not yet mentioned as a separate category in the current literature, although it is a subclassification of somatic symptom and related disorders. An additional consideration is that although chronic pain has been shown to increase suicidal ideation independently of

comorbid mood and anxiety disorders [53], this may not specifically pertain to pain in the context of somatic symptom and related disorders. Further research in this field is needed. [The focus of our review as on DSM-5 based somatic symptom disorders and their predecessors. Our findings may not generalize to other functional somatic syndromes or disorders associated with pain.](#)

There is a striking paucity of prospective studies of suicide risk and risk factors for suicide in somatic symptom disorders. This research will be required to better characterize risk and to definitively establish risk factors. With some evidence for differential risk by the specific disorder, it will be helpful to at least briefly present results stratified by the specific disorder, even when underpowered, to detect associations by strata. Aggregate data across such studies may be useful to answer the question of whether certain somatization disorders are at a particular risk of suicide. Future research may also benefit from a uniform methodology to facilitate comparisons between studies. Overall, it appears that somatic symptom and related disorders present an independent risk factor to suicidality. By screening for these symptoms in patients, providers can better target at-risk individuals and intervene before they come to harm. Practice guidelines for the management of somatic symptom and related disorders similarly need to give suicide risk assessment the attention it deserves.

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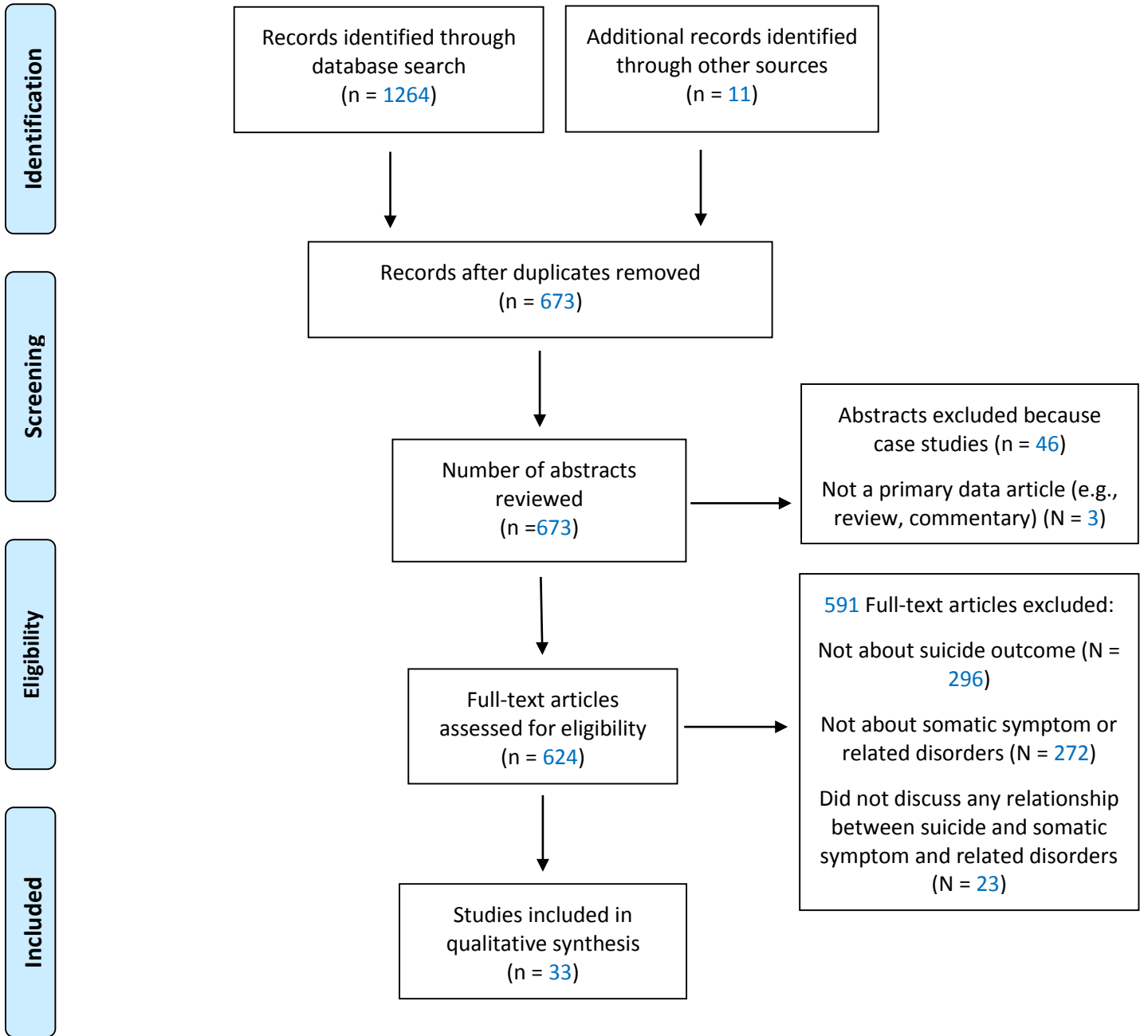
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Figure 1: PRISMA Search



PRISMA 2009 Flow Diagram



Author	Year	Sample	Method	Results	Newcastle-Ottawa Quality Rating
Robins E et al.	1959	Of the 134 deaths by suicide in St. Louis (United States) between 5/1956 and 5/1957, interviews were conducted with close friends or relatives for 119 cases and hospital, social service, and police records were examined.	Case-only psychological autopsy study	Only 1 death was identified as involving hysteria (conversion reaction) with drug addiction.	4/9 (applied as case control study without controls)
Stenback A et al.	1965	57 patients (inpatient and outpatient) in Helsinki, Finland identified as having died by suicide were examined via medical records for prior diagnoses.	Case-only chart review study	2/57 who died by suicide made frequent somatic complaints believed to be done to obtain emotional support and increased contact, which was not assessed as hypochondriasis	1/9 (applied as case control study without controls)
Coryell W	1981	76 female inpatients in Iowa (United States of America) identified as meeting research criteria for Briquet's syndrome on chart review of records between 1925 and 1950 with mortality assessment 42 years later.	Retrospective cohort study	Only 1/30 with Briquet's syndrome and available death certificates died by suicide, which was less frequent than matched comparison group with major depression. There was no excess mortality compared to age and sex-matched Iowans.	8/9

Pasi S et al.	2015	104 relatives of 25 individuals who died by suicide in Delhi, India identified from registry and referral. From an unknown number of total suicide deaths, 79 addresses were obtained and 25 families accepted the invitation to participate.	Case-only survey of family members	Higher frequency of Patient Health Questionnaire (PHQ) estimated somatoform disorders (25% vs. 18%) in first degree compared to other relatives. Within relatives, no association between PHQ-estimated somatoform disorders and history of suicide attempts.	2/9 (applied as case control study between first degree and other relatives)
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Table 1. Summary of studies reporting suicide deaths. This table summarizes key findings for studies looking at suicide mortality for somatic symptoms and related disorders. Sample descriptions include the sample size, location, and setting. Because of the wide range of dates encompassed, studies are presented in chronological order.

Author	Year	Sample	Design	Results	Newcastle-Ottawa Quality Rating
Asselmann E et al.	2018	2210 adolescents and young adults in Germany from Early Developmental Stages of Psychopathology Study followed for up to over 10 years. With structured diagnostic interview, 66 participants had a lifetime history of a somatoform disorder at the baseline assessment.	Prospective cohort study	Baseline somatoform disorders predicted suicide attempts at final assessment (OR=5.62, 95% CI 1.22-25.91).	8/9
Carter AB	1972	226 admitted to a psychiatry unit in Australia between 1968 and 1970 for self-poisoning.	Case-only chart review study	From this sample, the sole author reported that 48 teenage girls had "a syndrome that I regard as a form of hysteria".	1/9 (applied as case control study without controls)
Chioqueta AP et al.	2004	120 consecutive psychiatric outpatients in Norway including 29 female patients who met DSM-III-R criteria for somatization disorder on structured diagnostic interview.	Cross-sectional study	Patients with somatization disorder were significantly more likely to report having at least once attempted suicide (28% vs. 11%). They also were significantly more likely to have dysthymia and co-occurring anxiety disorders. In multivariable logistic regression, OR 4.52 (95% CI 1.36-14.98), adjusting for major depressive disorder or personality disorder.	4/10
Craven DE et al.	1994	7 patients treated for self-reported HIV in Boston HIV clinic later found to have factitious HIV infection were compared with 70 randomly selected controls from same time in the same clinic.	Case-control chart review study	Those with factitious HIV infection were significantly more likely to have previous suicide attempts recorded based on chart review (43% vs. 7%).	2/9

D'Alessio L et al.	2006	43 patients with PNES diagnosed by inpatient video electroencephalography in Argentina underwent a structured diagnostic assessment interview.	Case-control study	Suicide attempts were reported by 23% of patients and did not differ between those with pure PNES and those with co-morbid epilepsy.	2/9
Ettinger AB et al.	1999	56 patients with non-epileptic seizures in New York (United States of America), all diagnosed with conversion disorder, not factitious disorder or malingering, were assessed via phone interview at least 6 and a mean of 18 months after the diagnosis	Cross-sectional study	20% of patients reported at least one prior lifetime suicide attempt with no differences between those whose non-epileptic seizures resolved or continued.	3/10
Güleç MY et al.	2014	100 outpatients from Turkey with conversation disorder had assessment with questionnaires and compared to healthy controls consisting of hospital staff and relatives with no neurological or psychiatric disorders	Case-control study	35% of patients with conversion disorder reported a previous suicide attempt compared to none of the healthy controls selected from a non-comparable population.	1/9
Kämpfer N et al.†	2016	155 consecutive outpatients from German psychosomatic clinic diagnosed with somatoform disorders on semi-structured diagnostic interview	Cross-sectional study	13% of patients with somatoform disorders reported a suicide attempt in their lifetime. The study focused on comparing those with and without a lifetime history of suicide attempts.	3/10 (applied as designed with lifetime suicide attempts as exposure and current SI as outcome)
Morrison J and Herbstein J†	1988	54 female outpatients in California (United States of America) who met DSM-III criteria on structured diagnostic interview for somatization disorder and a major affective disorder compared to 29 patients with a primary affective disorder	Case-control study	Patients with somatization disorder and a major affective disorder were significantly more likely to report at least one lifetime suicide attempt (65% vs. 31%)	4/9

Öyekçin et al.†	2013	1073 outpatients in a psychiatry clinic in Turkey were asked about lifetime suicidal ideation and attempts with intake interview by psychiatrist in clinic. Diagnoses were made by DSM-IV-TR criteria without reference to semi-structured or structured instrument.	Cross-sectional study	20% of those with somatoform disorders had a history of suicide attempts, compared to 18% of the remainder of clinic patients who were diagnosed with mood (44%), anxiety (16%), psychotic (11%), and other mental disorders (7% undiagnosed).	1/10
Park S et al.	2018	In 6,022 participants of the Korean Epidemiologic Catchment Area study, various mental disorders were assessed as risk factors for a history suicide attempt, stratified by current suicide risk estimated from the MINI (high n=36, moderate n=126, low n=30).	Cross-sectional study	Somatoform disorders were associated with each MINI-based risk category for suicide attempt: high aOR 6.04, 95% CI 1.94-18.81, moderate aOR 2.80, 95% CI 1.02-7.63, low aOR 11.75, 95% CI 3.88-35.60.	6/10
Park MJ et al.†	2019	12,532 adults from nationally representative sample in Korea were assessed using a structured diagnostic interview	Cross-sectional study	Prior suicide attempts were significantly more common in those with multiple somatic pain (10%) and single somatic pain (5%) compared to those without pain (3%)	6/10
Rechlin T et al.	1997	18 patients in Germany meeting criteria for conversion disorder and pseudoseizure "status" (>30 minutes) had retrospective assessment (chart review) from standardized psychiatric interview.	Case-only chart review study	12 patients (67%) attempted suicide at least once, the majority (82%) by drug overdoses.	1/9 (applied as case control study without controls)
Srivastava AS and Kumar R	2005	60 outpatients with major depression in India of whom 10 had a history of suicide attempts, which was compared in relation to individual items from the Hamilton Rating Scale for Depression, including the item for hypochondriasis.	Cross-sectional study	Those with a history of suicide attempts scored significantly lower cross-sectionally on hypochondriasis item (mean (SD) 0.10 (0.32) vs. 0.78 (0.88).	2/10

Stenbäck A and Blumenthal M	1964	80 male outpatients in with chronic alcoholism were compared 200 random psychiatric patients of mixed gender implied to be inpatients, including 55 patients with hypochondriasis, for lifetime suicide attempts on chart review	Case-control chart review study	In the random sample of psychiatric outpatients, there were no significant differences between those with (7%) and without hypochondriasis (14%) on history of suicide attempts. Suicide attempts were observed in 15% of those with alcoholism.	2/9
Tomasson K et al.	1991	65 patients with somatization disorder and 56 patients with conversion disorder were identified by applying DSM-III criteria on chart review to all inpatients and outpatients with these and related diagnoses between 1984 and 1986 from the University of Iowa Hospitals and Clinics	Case-control chart review study	Patients with somatization disorder were significantly more likely to have a documented history of at least one suicide attempt than those with conversion disorder (51% vs. 16%)	3/9
Wiborg JF et al. <i>Psychosom Med</i> †	2013	142 outpatients in northern Germany confirmed to have a somatoform disorders on structured telephone interview following screening of 1,645 primary care patients	Cross-sectional study	18% of patients with somatoform disorders reported a prior lifetime suicide attempt. The study was not designed to compare this to those who were not identified with a somatoform disorder.	4/10
Zamani SN et al.	2013	30 inpatients admitted for self-immolation in Iran and 15 controls were examined using the short-form MMPI	Case-control study	Those who attempted self-immolation scored higher on personality traits of hysteria (11.5 vs. 5.2), depression, hypochondriasis (6.7 vs. 4.1), and psychopathic deviation than the control group.	1/9

Table 2. Summary of studies reporting suicide attempts. This table summarizes key findings for studies looking at suicide attempts in those with somatic symptom and related disorders or constructs. Sample descriptions include the sample size, location, and setting. Studies are presented in alphabetical order by first author. Abbreviations: DSM-III (Diagnostic and Statistical Manual of Mental Disorders, third edition), HIV (human immunodeficiency virus), MINI (Mini International Neuropsychiatric Interview), MMPI (Minnesota Multiphasic Personality Inventory), PNES (psychogenic non-epileptic seizures), SI (suicidal ideation). † Study also reports results under outcome of suicidal ideation.

Author	Year	Sample	Design	Results	Newcastle-Ottawa Quality Rating
Carlier IVE et al.	2016	1245 outpatients in the Netherlands with mood, anxiety, and somatoform disorders were assessed with a structured interview with the MINI, from which suicide risk as also estimated.	Cross-sectional study	Descriptively, a co-occurring somatoform disorder was associated with a quantitatively higher frequency of suicide risk in those with anxiety disorders (13% vs. 7%) and combined anxiety and mood disorders (46% vs. 39%), but not mood disorders (36% vs. 37%) although inferential statistics were not reported.	2/10
Chang KJ et al.	2016	1592 psychiatric outpatients from Korean Burden of Illness Study and 5336 patients from United States Sequenced Treatment Alternatives to Relieve Depression trial. All outpatients had major depressive disorder without psychosis.	Cross-sectional study	Suicidal ideation and hypochondriasis, each measured with the Hamilton Rating Scale for Depression were inversely associated with each other in multivariable models.	5/10
Chiu LPW et al.	1988	150 consecutive inpatients in Hong Kong between 5/1985 and 10/1986 were assessed retrospectively for hypochondriacal and paranoid symptoms	Cross-sectional chart review study	In those clinically depressed, suicidal ideas were less common in those with predominant hypochondriacal symptoms than those with predominant paranoid symptoms (3/11 vs. 8/9).	1/10

Guz H et al.	2004	87 patients with conversion disorder and 71 patients with somatization disorder recruiting from emergency and psychiatry departments in Turkey between 1/2001-10/2001. DSM-IV diagnosis was made by two psychiatrists and suicidal ideation assessed using Suicidal Ideation Scale.	Cross-sectional study	There were no significant differences in Suicide Ideation Scale scores between those with somatization and conversion disorder.	3/10
Jepsen EKK et al.	2014	55 inpatients in Norway with a history of early sexual abuse were administered self-report measures, including the Somatoform Dissociation Questionnaire-20. Suicidality was reported but not defined.	Prospective cohort study (Cross-sectional for analysis with SI)	The subgroup high in somatoform but not psychoform dissociation did not have more frequent suicidality as the group low in both (64% vs. 67%) while the group high in both somatoform and psychoform dissociation had significantly more suicidality (94%).	2/10 (as cross-sectional study)
Jordan P et al.	2018	6805 primary care outpatients in northern Germany were screened for SI using the 9th item. Machine learning methods were used to develop prediction models using items and scores from the GAD-7 (anxiety), PHQ-8 (depressive symptoms), and PHQ-15 (somatic symptoms).	Cross-sectional study	The dominating predictor of SI was the depression score although anxiety and somatic symptom measures added some additional value.	6/10

Kämpfer N et al.†	2016	155 consecutive outpatients from German psychosomatic clinic diagnosed with somatoform disorders on semi-structured diagnostic interview	Cross-sectional study	34% reported current active suicidal ideation (SI). The study focused on comparing those with and without a lifetime history of suicide attempts.	3/10 (applied as designed with lifetime suicide attempts as exposure and current SI as outcome)
Kopper BA et al.	2001	214 undergraduate students in Iowa were administered the MMPI-2 to assess its association with suicidal ideation as measured by the Suicide Probability Scale	Cross-sectional study	The MMPI conversion hysteria scale was significantly associated with SI in women, but not men.	3/10
Maaranen P et al.	2005	1334 participants from a general population sample in Norway completed the Dissociative Experiences Scale, the Somatoform Dissociation Questionnaire, and the Beck Depression Inventory for which item 9 served as the measure of SI.	Cross-sectional study	Those high in both somatoform and psychological dissociation had a higher frequency of suicidal ideation (49%) than those high only in somatoform (24%), high only in psychological (18%) dissociation, or high in neither (5%).	5/10
Morrison J and Herbstein J†	1988	54 female outpatients in California (United States of America) who met DSM-III criteria on structured diagnostic interview for somatization disorder and a major affective disorder compared to 29 patients with a primary affective disorder	Case-control study	Patients with somatization disorder and a major affective disorder were significantly more likely to report suicidal ideas (80% vs. 55%), which was not specified whether current or lifetime	4/9

Öyekçin et al.†	2013	1073 outpatients in a psychiatry clinic in Turkey were asked about lifetime suicidal ideation and attempts with intake interview by psychiatrist in clinic. Diagnoses were made by DSM-IV-TR criteria without reference to semi-structured or structured instrument.	Cross-sectional study	26% of those with somatoform disorders had a history of suicide ideation or attempts, compared to 28% of the remainder of clinic patients who were diagnosed with mood (44%), anxiety (16%), psychotic (11%), and other mental disorders (7% undiagnosed).	1/10
Öztürk E et al.	2008	40 patients in dissociative disorders program in Turkey with dissociative disorders were assessed by structured interview with additional self-report measures including the Scale for Suicidal Ideation.	Cross-sectional study	Patients with a concurrent somatoform disorder (n=16) were significantly more likely to report SI (75% vs. 13%).	4/10
Park MJ et al.†	2019	12,532 adults from nationally representative sample in Korea were assessed using a structured diagnostic interview	Cross-sectional study	SI was significantly more common in those with multiple somatic pain (31%) and single somatic pain (24%) compared to those without pain (13%)	6/10
Rodziński P et al.	2017	680 patients who completed psychiatric day hospital treatment in Poland completed the Symptom Checklist KO"O", which included a somatization disorder subgroup and an item related to SI.	Prospective cohort study	In sex-stratified analyses, both men and women who showed improvement in terms of SI had greater reductions in the somatization disorders score than those whose SI did not improve.	2/9

Wiborg JF et al. <i>Psychosom Med</i> †	2013	142 outpatients in northern Germany confirmed to have a somatoform disorders on structured telephone interview following screening of 1,645 primary care patients	Cross-sectional study	18% of patients with somatoform disorders reported a prior lifetime suicide attempt. The study was not designed to compare this to those who were not identified with a somatoform disorder.	4/10
Wiborg JF et al. <i>Gen Hosp Psychiatry</i>	2013	1455 primary care outpatients in northern Germany had screening with PHQ-9, GAD-7, and PHQ-15. The 9th item of the PHQ-9 served as the measure of SI.	Cross-sectional study	Those with SI were more likely to be across PHQ-15 cutoff suggestive of somatoform disorder (≥ 15) than those without SI (30% vs. 6%).	6/10

Table 3. Summary of studies reporting suicidal ideation or estimated suicide risk. This table summarizes key findings for studies looking at suicidal ideation or estimated risk of suicide in those with somatic symptoms and related disorders. Sample descriptions include the sample size, location, and setting. Studies are presented in alphabetical order by first author. Abbreviations: DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, fourth edition), MINI (Mini International Neuropsychiatric Interview), MMPI (Minnesota Multiphasic Personality Inventory), PHQ (Patient Health Questionnaire), SI (suicidal ideation). † Study also included findings in table on suicide attempts.

Appendix

PubMed, MEDLINE, and EMBASE searches were run on September 20, 2020
SCOPUS, PsycARTICLES, and PsycINFO were run on September 22, 2020.

PubMED

- S1. "somatoform disorders"
- S2. "somatoform disorders [MeSH Terms]"
- S3. "conversion disorder"
- S4. "conversion disorder [MeSH Terms]"
- S5. "hypochondriasis"
- S6. "hypochondriasis [MeSH Terms]"
- S7. "Munchausen Syndrome"
- S8. "Munchausen Syndrome [MeSH Terms]"
- S9. "functional disorder"
- S10. "illness anxiety disorder"
- S11. "suicide"
- S12. "suicide [MeSH Terms]"
- S13. S1 OR S3 OR S5 OR S7 OR S9 OR S10 AND S11
- S14. S2 OR S3 OR S5 OR S7 OR S9 OR S10 AND S11
- S15. S2 OR S4 OR S5 OR S7 OR S9 OR S10 AND S11
- S16. S2 OR S3 OR S6 OR S7 OR S9 OR S10 AND S11
- S17. S2 OR S3 OR S5 OR S8 OR S9 OR S10 AND S11
- S18. S2 OR S3 OR S5 OR S7 OR S9 OR S11 AND S12
- S19. S2 OR S3 OR S5 OR S7 OR S9 AND S11

LIMITERS:

Date: Up to 09-20-2020

Publication Type: "journal article" EXCLUDE "case reports"

English language, Human, Age Groups: All

MEDLINE

- S1. "somatoform disorders"
- S2. "somatoform disorders [MeSH Terms]"
- S3. "conversion disorder"
- S4. "conversion disorder [MeSH Terms]"
- S5. "hypochondriasis"
- S6. "hypochondriasis [MeSH Terms]"
- S7. "Munchausen Syndrome"
- S8. "Munchausen Syndrome [MeSH Terms]"
- S9. "functional disorder"
- S10. "illness anxiety disorder"
- S11. "suicide"
- S12. "suicide [MeSH Terms]"
- S13. S1 OR S3 OR S5 OR S7 OR S9 OR S10 AND S11

- S14. S2 OR S3 OR S5 OR S7 OR S9 OR S10 AND S11
- S15. S2 OR S4 OR S5 OR S7 OR S9 OR S10 AND S11
- S16. S2 OR S3 OR S6 OR S7 OR S9 OR S10 AND S11
- S17. S2 OR S3 OR S5 OR S8 OR S9 OR S10 AND S11
- S18. S2 OR S3 OR S5 OR S7 OR S9 OR S11 AND S12
- S19. S2 OR S3 OR S5 OR S7 OR S9 AND S11

LIMITERS:

Date: Up to 09-20-2020

Publication Type: “journal article” EXCLUDE “case reports”

English language, Human, Age Groups: All

EMBASE

- S1. ‘somatoform disorder’/de
- S2. ‘conversion disorder’/de
- S3. ‘hypochondriasis’/de
- S4. ‘munchausen syndrome’/de
- S5. ‘functional neurological disorder’/de
- S6. ‘illness anxiety disorder’/de
- S7. ‘suicide’
- S8. S1 OR S2 OR S3 OR S4 OR S5 OR S6
- S9. S7 AND S8

LIMITERS:

Date: Up to 09-20-2020

Publication Type: “journal article” EXCLUDE “case reports”

English language, Human, Age Groups: All

PsycARTICLES

- S1. “Somatoform Disorders”
- S2. “Conversion Disorder”
- S3. “Hypochondriasis”
- S4. “Illness Anxiety Disorder”
- S5. “Complex Somatic Symptom Disorder”
- S6. “Functional Neurological Disorder”
- S7. “Suicide”
- S8. “Suicide, Attempted”
- S9. S1 OR S2 OR S3 OR S4 OR S5 OR S6
- S10. S7 OR S8
- S11. S9 AND S10

LIMITERS:

Date: Up to 09-20-2020

Publication Type: “journal article” EXCLUDE “case reports”

English language, Human, Age Groups: All

PsycINFO

- S1. "Somatoform Disorders"
- S2. "Conversion Disorder"
- S3. "Hypochondriasis"
- S4. "Illness Anxiety Disorder"
- S5. "Complex Somatic Symptom Disorder"
- S6. "Functional Neurological Disorder"
- S7. "Suicide"
- S8. "Suicide, Attempted"
- S9. S1 OR S2 OR S3 OR S4 OR S5 OR S6
- S10. S7 OR S8
- S11. S9 AND S10

LIMITERS:

Date: Up to 09-20-2020

Publication Type: "journal article" EXCLUDE "case reports"

English language, Human, Age Groups: All

SCOPUS

- S1. "Somatoform Disorders"
- S2. "Conversion Disorder"
- S3. "Hypochondriasis"
- S4. "Illness Anxiety Disorder"
- S5. "Complex Somatic Symptom Disorder"
- S6. "Functional Neurological Disorder"
- S7. "Suicide"
- S8. "Suicide, Attempted"
- S9. S1 OR S2 OR S3 OR S4 OR S5 OR S6
- S10. S7 OR S8
- S11. S9 AND S10

LIMITERS:

Date: Up to 09-22-2020

Publication Type: "journal article" EXCLUDE "case reports"

English language, Human, Age Groups: All