INTRODUCTION

Somatic symptom disorder (SSD) is characterized by one or more somatic symptoms that are discomforting and distressing or significantly disruptive to daily life function, accompanied by excessive thoughts, feelings or behaviors related to the symptoms [1]. SSD symptoms are functional, without a well-defined structural organic disease, and even if organic pathology is found, it does not fully explain the extent of the symptoms [2]. Characteristic features of SSD include bodily stress, cataclysmic cognition, anxiety, depression, and excessive responses and attention to somatic symptoms and discomfort [3]. Somatic symptom syndrome is a mental disorder with a prevalence of 5% to 7% in the general adult population.

Research revealed that certain factors, such as genetic, cultural, and organic diseases all were responsible for contributing to bodily distress [2]. Risk factors for SSD were reported in patients with vertigo and dizziness, as well as patients suffering from anxiety and depression [4]. SSD prevalence increases in childhood and adolescence, with females having higher prevalence. Lack of physi-
Communication and sedentary lifestyle are risk factors [5]. Personality disorders also showed association with SSD and 41–63% of the SSD patients showed at least one comorbid personality disorder [6]. SSD is a diagnosis that has been recently introduced and it clearly eliminated the diagnoses of somatization disorder, undifferentiated somatoform disorder, hypochondriasis and pain disorder [7].

Management and treatment of SSD is a wide spectrum covering pharmacological, non-pharmacological, behavioral as well as psychological therapies. A study identified the role of exposure therapy and the need for its deliverance for patients diagnosed with SSD [8]. Pharmacological therapy included the use of antidepressants and among the non-pharmacological treatments, cognitive behavioral therapy was most studied [9]. Few studies understand SSD frequency in general populations, focusing on adolescents and older adults.

The diagnostic criteria for SSD was introduced in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) in 2013. The researchers carried out a thorough research of all English-language papers released between 2009 and 2020. Out of the 882 articles identified, 59 were included for analysis. The study discovered that the diagnostic criteria for SSD had acceptable reliability, validity, and clinical applicability; however, some psychological factors require more explanation. Approximately 12.9% of the general population, according to self-report surveys, may have SSD, although investigations using standardized diagnostic interviews are limited. Functional impairment, a worse quality of life, and a significant comorbidity with depression and anxiety disorders were all related with SSD. In areas including developmental characteristics, risk factors, suicide risk, and cultural and gender-related concerns in SSD, there are still study shortages [4]. According to study done in Germany, SSD was officially diagnosed in 7.7% of patients who saw general practitioners. Among them, 24.3% had ongoing symptoms, whereas 21.5% showed the clinical symptoms of SSD. These findings show the clinical importance of SSD symptoms in general practice and can be used as a guide for further research on the prevalence of SSD [10]. Another study looked at the incidence of SSD and its links to medical use, depression, and anxiety in Taiwan. The study involved 3,161 participants who completed questionnaires assessing medical usage, feelings of sadness, anxiety, and SSD. SSD was found to be 5.0% prevalent, with greater rates in female participants and those in the 40–49 age group. A third of SSD patients also struggled with anxiety or sadness. SSD and anxiety were linked to greater outpatient/emergency department visits when demographic factors were considered. Comorbid anxiety or depression did not, however, have a substantial effect on SSD patients’ use of medical care. The study finds that the incidence of SSD in Taiwan is consistent with the DSM-5 criteria on a national level and emphasizes how frequently SSD co-occurs with anxiety and depression; however, their co-existence does not significantly increase the number of SSD patients who seek medical attention [11]. A study done in 2019 stated that participants with serious medical illnesses scored higher on the SSD-12 evaluation instrument than those with typical primary care issues. Additionally, people with high SSD-12 scores utilized the healthcare system more frequently. These results point to the significance of medical comorbidity in determining SSD and the probable requirement for screening modified normative values [12]. A further study sought to determine the frequency and features of SSD in persons receiving primary medical care. The cross-sectional study included 2,000 Omani people who used primary healthcare facilities. A prevalence estimate of 30.1% for SSD was obtained using the Somatic Symptom Scale-8 (SSS-8), which revealed that 17.8% of individuals had the condition. Age, gender, marital status, and chronic comorbidities all had a substantial impact on SSD. The study emphasizes the need for improved diagnosis to lower healthcare overutilization and patient dissatisfaction and indicates the high frequency of SSD in primary care settings. Healthcare professionals should take into account how somatic symptoms are affected by age, gender, education, and comorbidities [13]. In another study, a long-term community-based follow-up study was conducted in the city of Uppsala, Sweden. The results show a link between somatic symptoms in adolescence and a higher likelihood of severe mental disease in maturity, which may need hospital-based mental health care. Regardless of the existence of depression or anxiety, the findings highlight the value of early therapy and thorough follow-up for adolescents with somatic symptoms [14]. Patients with SSD have decreased quality of life and impaired functioning, pointing to a significant psychological load unrelated to the underlying physical condition. This shows that SSD could be a reliable marker for those who have a particular disease entity and a significant mental health burden [15]. They compared SSD patients with healthy people and examined demographic, personality, and psychological characteristics of both groups. Results indicated that SSD patients had worse functional ratings. Depression and exercise levels were linked to overall quality of life in SSD patients. The study also discovered relationships between the disability scale score and age, novelty seeking, cognitive attitudes about the body and health, and depression levels. Path analysis demonstrated that all three measures of functioning were significantly impacted by depression [3]. In a 2018 study, the authors discussed the lack of knowledge and recommendations for treating pediatric patients with SSD in emergency departments. In order to identify individuals with SSD, they emphasized the significance of recognizing historical cues including adolescence, consistent daily subjective symptoms over a lengthy period of time, comprehensive medical history, and disproportionate functional impairment. The article emphasized the importance of emergency physicians in correctly diagnosing patients, giving them the right care, and enhancing their prognosis [5,16,17]. Another study was conducted on the efficacy of Emotional Awareness and Expression Therapy (EAET) in treating SSD. The 10-week internet-delivered EAET substantially decreased somatic symptoms and pain severity at post-treatment and follow-up compared to a control group. The treatment’s impact on somatic symptoms was partially medi-
ated by improved emotional processing. EAET showed promise as a therapy for SSD, with about 20% of patients achieving significant clinical improvement, even if the treatment effects were less pronounced than in a prior uncontrolled experiment. It is important to investigate customized therapies to improve efficacy [18]. The academic performance, sleep quality, and mental health of Saudi medical students were all evaluated using a survey. Poor sleep quality affected 63.2% of the 206 respondents, and it was linked to less physical activity and more screen time. Unexpectedly, sleep-deprived kids performed worse academically. There were 42%, 53%, and 31%, respectively, of students who reported having depression, anxiety, or stress, and poor sleep was substantially correlated with each of these mental health conditions. According to the study, medical students must prioritize their sleep in order to maintain good mental health [19].

The study reveals that 7%–12% of the general population is affected by SSD, causing confusion in healthcare. It provides valuable data for healthcare providers and future researchers, identifying risk factors and student populations contributing to SSD prevalence and improving quality of life. The study examines the prevalence of SSD among young adults in Pakistan's tertiary educational institutes who did not seek medical attention for pre-existing psychological issues. To find association of SSD with sleep quality, and find association of SSD with academic performance.

The study highlights the lesser understood association between SSD and sleep quality among students, revealing a prevalence of insomnia in SSD patients, highlighting the need for further research [9]. Study on COVID-19 students shows physical distancing, distant education, and changes in study habits increase somatic and psychological symptoms related to SSD, including impaired concentration, loneliness, anxiety, and poor academic performance. The latter most factor was least understood in hence, it needed to be investigated [20].

METHODS

Procedure and participants

This is a cross-sectional study which was undertaken in tertiary educational institutes of Pakistan. The data was collected in June 2023 from several universities, namely, University of Management and Technology, University of Lahore, University of Central Punjab, and University of Sialkot. The study was ethically approved by Research Ethic and Support Committee (RESC) of University of Management and Technology. A sample size of 377 was calculated using Raosoft sample size calculator [21]. After adding 15% attrition rate, a total of 435 participants were recruited using convenience sampling and written consent was taken from all individuals. The exclusion criteria for this research were as follows: 1) participants who did not give consent; 2) participants who left any part of the questionnaire unanswered; 3) participants who were taking any sort of anti-depressants or psychiatric medication that might alter the outcome of the questionnaires [22]; and 4) participants with any kind of mental illness [22].

The inclusion criteria were as follows: 1) participants who were enrolled in a university; 2) participants between the age of 18–27 years; and 3) participants who were not previously diagnosed with SSD.

A questionnaire was given to all individuals, which had questions to verify whether they met the inclusion criteria or exclusion criteria. Among the recruited 435 participants, 54 met the exclusion criteria, hence they were not included in the research. A final total of 381 participants were included in this study. Characteristics of the sample included students aged between 18–27 years, who were not previously diagnosed with SSD, as screening is done in healthy, undiagnosed individuals. The participants did not have any mental illness diagnosed by a psychiatrist, nor were they taking any antidepressants that could alter the outcome of their responses. They completed the questionnaire and provided written consent.

Assessment instruments

All participants were given a form to fill out, which consisted of questions regarding demographics (name, age, sex), questions regarding exclusion criteria (mental illness/SSD diagnosed/taking any psychiatric medicine), a questionnaire for SSD (Patient Health Questionnaire-15), a questionnaire to assess academic performance (Academic Performance Scale), and a questionnaire to check sleep quality (Functional Outcome of Sleep Questionnaire).

Patient Health Questionnaire-15

Patient Health Questionnaire-15 (PHQ-15) is a 15-component, self-administered questionnaire for screening of SSD, which is often used as a diagnostic tool for SSD [23]. This questionnaire is formulated based on diagnostic criteria of SSD explained in DSM-5. The PHQ-15 involves questions regarding multiple organ systems of the body and a person is assessed on the basis of the number of somatic symptoms they have faced in the past couple of weeks and how bothersome they were. The severity of these symptoms is scored over 3-point scale, where “not bothered at all” is scored as 0, “bothered a little” is scored as 1, and “bothered a lot” is scored as 2. The highest possible score is “30.” The score ranging from 0–4 means “SSD not present,” 5–9 means “mild SSD,” 10–14 means “moderate SSD,” and 15–30 means “severe SSD” [22]. PHQ-15 has a sensitivity of 78% and specificity of 71% [24]. However, in this study, only participants displaying moderate to severe symptoms of SSD were considered positive for SSD.

Academic Performance Scale

Academic Performance Scale (APS) is a self-administered questionnaire with an internal consistency of 0.89 and test-retest reliability of 0.85 [25]. This questionnaire can be used to assess how students are performing in their academic life without relying on their test scores, which can vary based on the intelligence of the student. Many studies have been found using this questionnaire [26]. This questionnaire has 8 parts, each part is rated on a 5-point scale in which there are 5 points for “strongly agree,” 4 for

Functional Outcomes of Sleep Questionnaire-10

Functional Outcomes of Sleep Questionnaire-10 (FOSQ-10) is used in studies [27,28] to assess the quality of sleep a person is getting based on how they function throughout the day and how tired they feel while doing daily life tasks. FOSQ-10 is a shortened version of the original Functional Outcomes of Sleep Questionnaire, which had 22 questions, while the short version (FOSQ-10) only has 10. The internal consistency and test-retest reliability of FOSQ-10 are 0.95 and 0.90, respectively [29]. Each question is evaluated over a 4-point scale, 4 means “no difficulty,” 3 means “yes, a little difficulty,” 2 is “yes, moderate difficulty,” and 1 is “yes, extreme difficulty” [29]. A lower score means high sleep disturbance or low sleep quality. The highest possible score in this questionnaire is 40. A score of 18 or lower is considered an indicator of low sleep quality in this study, whereas a score higher than 18 is referred to as high sleep quality.

Statistical analysis

The software used for the data analysis was SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Variables were created based on the research questionnaire and demographic data collected from the students. The SPSS variables included age, gender, PHQ-15 score, APS score, and FOSQ-10 score. Age and gender were already categorical variables. The scores of PHQ-10, APS, and FOSQ-10 questionnaires were also converted into categorical variables according to their scoring categories. Like, for PHQ-15, the data was separated into SSD positive coded as 1 and SSD negative individuals coded as 2. For APS, coding was done as; “excellent performance=5,” “good performance=4,” “moderate performance=3,” “poor performance=2,” and “failing performance=1.” Similarly, the scores from FOSQ-10 were categorized into “poor sleep quality” as 1 and “good sleep quality” as 2.

Descriptive statistics was used to analyze the data as all the variables under study were categorical (ordinal, nominal). To check the prevalence of SSD, frequency was used. Furthermore, the analysis of relation between SSD with academic performance and sleep quality was done by chi-square (p-value and ETA included). For checking the association of SSD with age and gender, crosstabs along with chi-square (p-value) was used.

Ethical consideration

Written consent was taken from the participants as a part of the questionnaire. It was informed consent, which mentioned that the data they provide on the questionnaire would be used for research purpose. Moreover, confidentiality was maintained throughout the research process.

RESULTS

Demographics characteristics

A total of 381 students were assessed by PHQ-15 questionnaire to screen for SSD. In this sample size, 186 subjects had moderate to severe symptoms of SSD according to PHQ-15 and were considered positive for SSD. The prevalence of SSD was 48.8% as shown in Figure 1.

The distribution of SSD did not vary across available ages. The relation between age and SSD was insignificant (p=0.341). Crosstabs and chi-square was used to analyze this association which showed that the prevalence did not vary significantly across the participants aged between 18–27 years as represented in Pearson chi-square with a value greater than 0.05, indicating a nonsignificant relation (Table 1).

There was a positive association recorded between gender and prevalence of SSD (p<0.001). Chi-square test indicates a very strong significant difference of prevalence of SSD between both genders (females, males), as indicated in Table 2. Among 186 SSD positive subjects, 122 (65.6%) were females, whereas among 195 SSD negative individuals, 82 (42.1%) were females, as shown in Table 3. This analysis infers that SSD is more common in females than males (p<0.001).

Analysis of association between SSD and academic performance

Analysis of the association between SSD and academic performance revealed a positive association between the two variables.

<table>
<thead>
<tr>
<th>Somatic symptom disorder prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Positive</td>
</tr>
</tbody>
</table>

Figure 1. Pie chart of prevalence of somatic symptom disorder (SSD) in university students of Pakistan showing 48.8% SSD positive and 51.2% SSD negative students.

| Table 1. Chi-square test between SSD screening results and age |
|---------------------|-----|------------------|
| Pearson chi-square  | 11.212 | 10 | 0.341 |
| Likelihood ratio    | 11.694 | 10 | 0.306 |
| Linear-by-linear association | 5.806 | 1 | 0.016 |

SSD, somatic symptom disorder
There was a significant relation between the variables. In Table 4, the subject who were positive for SSD had greater percentage (31%) of moderate to failing performance as compared to 16% in the subjects who were not SSD positive. Table 5 shows the outcome of chi-square test that refers to this relation as significant with p=0.003 (p<0.05).

**Analysis of association between SSD and sleep quality**

Upon investigation, there was no relation seen between the quality of sleep and presence of SSD in subjects. The trend of sleep disturbance among the sample did not reveal any evidence that SSD might affect the sleep quality in the participants who were positive in the screening test for the presence of this disorder. Chi-square test indicated an insignificant relation between sleep quality and SSD (p=0.281). Figure 2 depicts that the sleep quality of SSD positive and negative individuals did not vary much.

**DISCUSSION**

SSD is not a rare disorder as healthcare professional face such patients more often than they realize. However, the available data on this disorder is fragmented, which interferes with timely diagnosis and treatment [11]. This study produced three main findings in terms of demographics related to SSD, its relationship with sleep quality, and how it affects academic performance of students who are currently enrolled in universities.

SSD or somatoform disorders have a varied prevalence in different populations as suggested by previous studies. A study done in 2023 on the prevalence of SSD in Taiwanese population indicated a prevalence of 5% [11], whereas another study revealed a prevalence of 30.1% in Muscat, Oman in 2023. A study in 2021 revealed that 7.7% of the patients seeking medical help had SSD in Germany [10]. However, a study in 2022 indicated that complaints of somatic symptoms were prevalent in 72.2% of students in Czech Republic and 69.5% of students in Slovakia [20], which means that the prevalence in students is significantly higher as compared to general population according to this literature. To confirm this dramatic increase of prevalence in students, this study focused on SSD in university students and revealed a prevalence of 48.8%. Hence, this study agrees with the previous literature that the burden on SSD is much higher in students in Pakistan as well. This research also showed that occurrence of this disorder is strongly correlated with the gender of the individual as 65.6% of students suffering from SSD were females as shown in Table 3. Similar result was noticed in many other researches that

<table>
<thead>
<tr>
<th>Gender, n (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>122 (65.6)</td>
</tr>
<tr>
<td>Negative</td>
<td>82 (42.1)</td>
</tr>
<tr>
<td>Total</td>
<td>204 (53.5)</td>
</tr>
</tbody>
</table>

Table 3. Cross tabulation between SSD and gender

<table>
<thead>
<tr>
<th>SSD screening</th>
<th>Gender, n (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Positive</td>
<td>64 (34.4)</td>
<td>186</td>
</tr>
<tr>
<td>Negative</td>
<td>113 (57.9)</td>
<td>195</td>
</tr>
<tr>
<td>Total</td>
<td>177 (46.5)</td>
<td>381</td>
</tr>
</tbody>
</table>

SSD, somatic symptom disorder

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymptomatic significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson chi-square</td>
<td>21.207</td>
<td>1</td>
</tr>
<tr>
<td>Continuity correction</td>
<td>20.272</td>
<td>1</td>
</tr>
<tr>
<td>Likelihood ratio</td>
<td>21.425</td>
<td>1</td>
</tr>
<tr>
<td>Linear-by-linear assoc.</td>
<td>21.152</td>
<td>1</td>
</tr>
</tbody>
</table>

SSD, somatic symptom disorder

Table 4. Cross tabulation between SSD and Academic Performance Scale

<table>
<thead>
<tr>
<th>SSD screening</th>
<th>Failing</th>
<th>Poor</th>
<th>Moderate</th>
<th>Good</th>
<th>Excellent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>0 (0)</td>
<td>6 (3.2)</td>
<td>44 (23.7)</td>
<td>96 (51.6)</td>
<td>40 (21.5)</td>
<td>186 (100)</td>
</tr>
<tr>
<td>Negative</td>
<td>1 (0.5)</td>
<td>2 (1.0)</td>
<td>29 (14.9)</td>
<td>90 (46.2)</td>
<td>73 (37.4)</td>
<td>195 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>1 (0.3)</td>
<td>8 (2.1)</td>
<td>73 (19.2)</td>
<td>186 (48.8)</td>
<td>113 (29.7)</td>
<td>381 (100)</td>
</tr>
</tbody>
</table>

SSD, somatic symptom disorder

Figure 2. Bar chart with somatic symptom disorder (SSD) screening and sleep quality. The trend of sleep disturbance is almost identical in both SSD positive and negative individuals.
also concluded that prevalence of SSD is higher in females as compared to males [13,20,30]. Furthermore, when it comes to age, this study observed no effect of age on the prevalence of SSD. However, there are many studies stating that people of certain age are more prone to having SSD. For example, a study conducted in 2023 suggested that individuals aged between 50–69 had higher scores of SSD compared to those aged between 20–29 [11]. Another study stated that students younger than 25 are more likely to have SSD than the students aged 31 [20]. Nevertheless, this study is in no position to verify or deny the claims made in the studies mentioned previously because the population of this study was from 18 to 27 years old only. In this age group, there is no significant difference between the SSD positive and negative students based on age as shown in Table 1.

Another objective of this study was to assess the relationship between the academic performance and SSD. Looking at the existing literature, there has not been any study that could shed light on this ignorant area, highlighting whether this high percentage of students suffering from SSD are facing any challenges in their studies due to this disorder. Some of the previous studies revealed that those who were facing any mental or psychological disorders have low academic performance [31], and mental health is directly related to the academic performance of the students [32]. The results of a study conducted in 2022 on students of 1st year of several undergraduate programs revealed that individuals with depression may face challenges that negatively affect their academic performance [33]. It is worth noting that the nature of the association between SSD and academic performance is not explicitly explored in these studies. However, it is possible that the physical and psychological symptoms associated with SSD, such as pain, fatigue, depression and anxiety, could interfere with cognitive functioning and concentration of a student, thereby hindering academic performance. This study was done to verify whether SSD has any role to play in the poor academic performance of students. The results revealed a positive association between SSD and academic performance, indicating that individuals with SSD were more likely to experience moderate to failing performance compared to those without SSD. As SSD is also a psychological disorder, it also correlates with the aforementioned research that mental health issues are an obstacle in the way of good academic performance in students.

The goal of this review was to reduce uncertainty in the field of healthcare for future researchers as to whether an association exists between sleep quality and SSD severity. Sleep problems are very common and the prevalence of general sleep disturbances was 32% [34]. The literature is divided on whether sleep quality is related to SSD severity. Six studies found a moderate to high correlation between sleep quality and somatic symptoms, with insomnia being the most investigated factor. Parasomnias and digital amnesia also positively affect somatic symptoms [35]. Sleep is significantly associated with poorer psychiatric diagnosis and it does affect PTSD severity along with somatic symptoms severity [36]. Research during COVID-19 pandemic revealed that somatic symptoms were closely related to anxiety as well as insomnia population [37]. A negative correlation between scores of anxiety/depression and somatic symptoms was found. Sleep scores using PSQI were significantly higher in hospitalized psychiatric patients. Hence, somatic symptoms did not directly affect sleep quality scores [38]. Studies show a positive relationship between sleep quality and somatic symptoms, including anxiety, depression, COVID-19 isolation, and PTSD. These disorders may be intrinsically linked, creating a global public health burden. SSD may not be directly associated with sleep disturbance if psychological conditions, disease, or suffering are excluded. Common mental factors significantly affect sleep quality [39].

Our study found no direct association between SSD and sleep quality, possibly due to the organic and symptomatic link between sleep and mental health disorders. The study excluded participants with any psychological or psychotic disorders or treatment protocols to determine if SSD is directly linked to sleep disturbance.

Limitations
The study’s limitations include self-administered questionnaires without psychiatrist involvement, and potential exaggeration of symptoms by the participants, limiting the precise prevalence of the disease.

Conclusion
The study reveals that SSD is prevalent in 48.8% of Pakistani tertiary students, with females having a higher prevalence than males. There is no significant age-related relationship between SSD and academic performance or sleep quality, suggesting no significant correlation between SSD and sleep quality.

Future recommendations
Increased awareness on SSD is crucial for its management in academic settings. Early identification, referral to mental health services, stress reduction strategies, and fostering a supportive learning environment can help mitigate its impact. Future studies can help develop a standard treatment protocol for the patients suffering from SSD and help identify its link with mental disorders. Research can aid in identifying the risk factors for the development of SSD in individuals and the ways to prevent its development. Experimental studies can help in providing more clarity on the development and treatment of this disorder. SSD patients should be studied to identify the adverse effects of this disease in detail and raise its awareness to reduce the burden on healthcare.

Conflicts of Interest
The authors have no potential conflicts of interest to disclose.

Availability of Data and Material
Data is available upon request from the corresponding author.

Author Contributions
Conceptualization: all authors. Data curation: Riha Zahid. For-

ORCID iDs
Riha Zahid https://orcid.org/0009-0002-6526-9951
Hafiz Junaid Ahmad https://orcid.org/0009-0003-4810-6581
Ifrah Khan https://orcid.org/0009-0005-1224-017X
Ayesha Mujeeb https://orcid.org/0009-0002-4888-1709
Muhammad Sundar Ali https://orcid.org/0009-0009-7773-0507
Nouman Siddique https://orcid.org/0009-0000-0458-8233

Funding Statement
None

Acknowledgments
None

REFERENCES