Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Explaining ‘medically unexplained’ symptoms: student perceptions of teaching at the University of Auckland

Nancy Huang
nancyhuang41@gmail.com
University of Auckland
Frederick Sundram
University of Auckland
David Benjamin Menkes
University of Auckland

Research Article

Keywords: Medically unexplained physical symptoms, Medical education, Functional somatic symptoms, Psychiatry teaching, Interdisciplinary teaching, Clinical communication skills, Cross-sectional survey

Posted Date: June 29th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9666820/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Medically unexplained physical symptoms (MUPS) commonly present across medical disciplines and can be disabling for patients. Despite this, MUPS are often poorly managed, causing distress, strained doctor-patient relationships, and higher healthcare costs. Inadequate medical training has been recognised as contributing to these poor outcomes. The first of its kind in New Zealand, this study assessed the knowledge, attitudes, and exposure to MUPS during medical school.

Methods

Final-year University of Auckland medical students completed an anonymous online survey including multiple-choice questions, Likert-scale items, and optional free-text comments. Descriptive statistics were used to analyse the data.

Results

84 of 281 (30%) eligible students completed the survey. Despite its limited presence in the medical curriculum, approximately 70% of respondents could not confidently recall having received formal education on MUPS. Among those who could recall such teaching, roughly two-thirds identified clinical psychiatry rotations as the provider. The great majority of respondents endorsed further need for education on clinical recognition (71/84) and management (75/84) of MUPS and disagreed with the proposition that patients with MUPS receive satisfactory healthcare. Students also perceived MUPS as relatively common and associated with moderate functional impairment.

Conclusions

Medical students perceive MUPS as common, functionally impairing, and insufficiently addressed in the medical curriculum. Interdisciplinary teaching that emphasises communication skills and includes biopsychosocial explanatory models may better prepare junior doctors to assess and manage patients with MUPS.

Clinical trial number:

Not applicable

Background

Medically unexplained physical symptoms (MUPS) are persistent physical symptoms that lead to functional impairment or subjective distress, without an adequate organic cause found on clinical assessment. Related terms used in literature include functional somatic syndrome, somatic symptom disorder, bodily distress disorder, psychosomatic illness, and persistent physical symptoms.

The MUPS spectrum includes common symptom clusters labelled as specific syndromes including irritable bowel syndrome (IBS), chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME), fibromyalgia, and functional neurological disorder (FND), including functional/dissociative seizures (FDS) [1]. More recently, long COVID has reignited interest and research into MUPS due to its similarities with CFS,[2] with an estimated 13–45% of long COVID patients meeting the US National Academy of Medicine definition of CFS/ME.[3]

Studies from around the world have estimated that 25–50% of primary care patients present with MUPS, which makes this the most common category of complaints in primary care.[4] In specialist care, MUPS comprise roughly one-third of consultations.[5]

These syndromes also come at significant cost to the sufferer and wider society. Far from being the worried-well, MUPS cause similar or greater levels of disability compared to symptoms caused by organic disease.[6] For example, CFS/ME is associated with worse disability and a lower quality of life than both heart failure and cancer.[7,8]

From an economic perspective, a British study of working adults estimated the annual burden of MUPS to be £18 billion.[9] By comparison, £19 billion is attributed to cardiovascular disease by similar metrics.[10] In America, the estimated direct and indirect cost of ME/CFS alone is upwards of $51 billion annually.[3]

MUPS remain frustrating and clinically challenging, even for general practitioners who see the majority of patients with MUPS.[11,12] Nonetheless, evidence suggests that clinicians can improve patient outcomes by adopting the general principles and skills laid out in national guidelines.[13–15] By contrast, specific interventions delivered by GPs, such as cognitive behavioural therapy or reattribution therapy, appear to be of little benefit.[16,17]

UK medical curricula have generally regarded teaching on MUPS as low priority, with doctors reporting little to no formal training in their management, prompting an urgent call to improve education in this area.[18–20]

In summary, much evidence suggests that medical training is generally inadequate to prepare doctors to assess and manage MUPS, despite the significant impacts these syndromes have for patient well-being and function. This survey probes the knowledge and attitudes of final year New Zealand medical students regarding MUPS, in order to identify gaps and possible areas for improvement in medical curricula.

Methods

Ethical approval

for this study was granted by The University of Auckland Human Participants Ethics Committee (UAHPEC22956) on 6 October 2021.

Design:

The study comprised an anonymous online survey of 15 items divided across three domains: demographics, knowledge of MUPS, and attitudes towards MUPS.

For the purposes of this study, the term 'MUPS' was used as a broad umbrella term which included the following conditions: IBS, CFS/ME, fibromyalgia, and FDS.

The survey included both open and closed-ended questions, the latter presented on a Likert 5-point scale. The survey was delivered on the secure, browser-based platform Qualtrics XM (September 2021 version) used at the University of Auckland.

Participants were given the option of a prize draw to win one of five $50 gift vouchers at the end of the survey via a de-linked contact form. The full survey is presented in Additional file 1.

Participants

Eligible participants were final year medical students (Bachelor of Medicine and Bachelor of Surgery, MBChB) at the University of Auckland in 2021; the survey was limited to senior students to ensure that responses reflected the entire medical curricula from Year 2–6.

Recruitment and Data Collection

This study aimed to recruit a minimum of 60 students (approximately 20% of the class).

Participants were recruited via the school's email list and class Facebook group. Survey responses were collected over 11 days from 12–22 October 2021. A follow-up email reminder sent on day 7.

Analysis

Responses to closed questions were coded by Qualtrics XM and analysed descriptively.

Of the 84 respondents, three did not complete all survey items. Analyses were conducted using available responses for each item; paired comparisons included only participants with complete data for both variables.

Results

Demographics

The response rate was 30%, with 84 respondents out of an eligible pool of 281 students.

65% identified as female and 35% as male, comparable to the overall class composition (63% female and 37% male). The mean age of respondents was 24.2 years.

80% of respondents entered medicine as undergraduates, 20% as post-graduates. As respondents could identify with more than one ethnicity, 94 responses were recorded for ethnicity. In descending order of frequency, 48% identified as European, 39% Asian, 6.4% Pasifika, 4.3% Māori, and 2.1% Other.

Knowledge

Students reported how often during clinical attachments they encountered patients experiencing MUPS [Table 1].

Table 1
Student report on frequency of clinical encounters with MUPS (n = 84)

Question	Never n (%)	Monthly n (%)	2–4 times a month n (%)	Weekly n (%)
How often have you encountered patients experiencing MUPS during clinical attachments?	3 (3.6)	48 (57.1)	20 (23.8)	13 (15.5)

Students were then asked to estimate the prevalence of MUPS in the patient population [Fig. 1].

For a primary care setting, the modal estimated prevalence was 10–30%. For a secondary/tertiary care setting, the modal estimated prevalence was 5–10%.

When asked whether they could recall any teaching on MUPS as part of the formal/compulsory medical curriculum, 25 (30%) responded *"yes definitely"*, 15 (18%) could not recall any teaching, and 44 (52%) were unsure. Of the 25 who could recall teaching on MUPS, all but two indicated they found the teaching useful.

When asked which module/domain/attachment provided this teaching, 17 (68%) cited psychiatry attachments, five (20%) a pre–clinical lecture on IBS, and four (16%) another (unspecified) lecture.

Table 2
Student responses to statements on education (n = 84)

Question	Agree n (%)	Disagree n (%)	Neither agree nor disagree n (%)	Median Likert Scale Response
My undergraduate medical training provided adequate teaching on MUPS	15 (17.9)	51 (60.7)	18 (21.4)	2 – Somewhat disagree
I would have liked to receive more teaching/training on recognising MUPS in clinical practice	71 (84.5)	4 (4.8)	9 (10.7)	4 – Somewhat agree
I would have liked to receive more teaching/training on managing MUPS in clinical practice	75 (89.3)	2 (2.4)	7 (8.3)	5 – Strongly agree

Students rated three statements related to their undergraduate curriculum on MUPS on a Likert scale [Table 2].

51 (61%) of respondents *disagreed* that the medical curriculum provided adequate teaching on MUPS. Clear majorities agreed they would have preferred to receive more teaching on recognising (85%) or managing MUPS (89%) in clinical practice. Further breakdown of responses by degrees of agreement or disagreement are shown in Fig. 2.

57% of students answered the optional free-text question *"what do you feel is missing from the current formal teaching on MUPS? What would you like to see more of?"*. Responses were categorised according to broad themes [Table 3].

Table 3
Free-text responses to the question "What do you feel is missing from the current formal teaching on MUPS?"

Thematic responses	Count
Management principles	23
Communication skills	12
Recognition in clinical practice	6
Addressing attitudes and negative biases	5
Earlier exposure in the curriculum	4
Teaching on latest research on aetiology	4
Dedicated MUPS tutorial during psychiatry rotation	3
Syndrome-specific teaching	3
Mind-body connection	2

Attitudes

Students rated the level of functional impairment they associated with specific medically unexplained syndromes and more conventionally recognised conditions according to the following scale: 0 = None; 2 = Mild; 4 = Moderate; 6 = Severe.

The mean level of perceived functional impairment was 3.3 (SD 1.0) for IBS, 4 (SD 1.2) for fibromyalgia, 4.2 (SD 1.2) for FDS, and 4.5 (SD 1.1) for CFS/ME. The mean level of perceived functional impairment was 3.8 (SD 1.2) for type 2 diabetes mellitus, 5.2 (SD 0.7) for chronic obstructive pulmonary disease, and 5.3 (SD 0.7) for major depressive disorder. [Fig. 3].

Figure 3. Mean perceived functional impairment by condition. Error bars represent standard deviations.

CFS/ME = chronic fatigue syndrome/myalgic encephalomyelitis; *COPD =* chronic obstructive pulmonary disease; *FM =* fibromyalgia; *IBS =* irritable bowel syndrome; *MDD =* major depressive disorder; *FDS =* Functional/dissociative seizures; *T2DM =* Type 2 diabetes mellitus.

The mean perceived functional impairment for MUPS syndromes was 4.0 (SD 0.9), whilst conventional disorders were rated higher at 4.8 (SD 0.7). The mean paired difference was 0.75 (95% CI 0.54–0.95), $t(83) = 7.33$, $P < .001$, Cohen's $d = 0.80$. [Fig. 4].

Figure 4. Combined mean perceived functional impairment between selected medically unexplained syndromes and conventional disorders. Error bars represent standard deviations.

Students rated three statements related to patient care and the doctor-patient relationship according to a Likert scale response [Table 4].

Table 4
Student attitudes toward patients with MUPS (n = 81)

Question	**Agree n (%)**	**Disagree n (%)**	**Neither agree nor disagree n (%)**	**Median Likert Scale Response**
I prefer not to deal with patients who present with MUPS compared to conventional diseases	43 (53.1)	22 (27.2)	16 (19.7)	4 – Somewhat agree
I feel I can empathise with patients experiencing MUPS	57 (70.4)	11 (16)	13 (13.6)	4 – Somewhat agree
I believe that patients experiencing MUPS generally receive satisfactory care from health professionals	3 (3.7)	72 (88.9)	6 (7.4)	2 – Somewhat disagree

Students rated two statements related to their beliefs regarding the validity and aetiology of MUPS [Table 5 and Table 6].

Finally, 83% (67/81) of respondents answered “Yes” to the question *“Do you personally know anyone (including yourself) who has experienced MUPS? This also includes named syndromes e.g. IBS, fibromyalgia, ME/CFS, etc”*.

Table 5
Responses to the question: “To what extent to you believe that the named condition is not a ‘real’ medical illness? (‘Real’ is open to your interpretation.)” (n = 81)

Condition	**Strongly disagree** **n (%)**	**Somewhat disagree** **n (%)**	**Neither agree nor disagree** **n (%)**	**Somewhat agree** **n (%)**	**Strongly agree** **n (%)**	**Median Likert scale response**
IBS	46 (56.8)	29 (35.8)	2 (2.5)	4 (4.9)	0	1 – Strongly disagree
CFS/ME	37 (45.7)	29 (35.8)	8 (9.9)	6 (7.4)	1 (1.2)	2 – Somewhat disagree
FDS	32 (39.5)	29 (35.8)	10 (12.3)	10 (12.3)	0	2 – Somewhat disagree
Fibromyalgia	27 (33.3)	36 (44.4)	10 (12.3)	6 (7.4)	2 (2.5)	2 – Somewhat disagree

IBS = irritable bowel syndrome; CFS/ME = chronic fatigue syndrome/myalgic encephalomyelitis; FDS = functional/dissociative seizures

Table 6
Responses to the question: “To what extent do you believe that the named condition is primarily a psychological disorder?” (n = 81)

Condition	Strongly disagree n (%)	Somewhat disagree n (%)	Neither agree nor disagree n (%)	Somewhat agree n (%)	Strongly agree n (%)	Median Likert scale response
IBS	14 (17.3)	36 (44.4)	15 (18.5)	12 (14.8)	4 (4.9)	2 – Somewhat disagree
CFS/ME	3 (4.0)	28 (34.6)	17 (21.0)	25 (30.9)	7 (8.6)	3 – Neither agree nor disagree
FDS	2 (2.5)	12 (14.8)	21 (25.9)	33 (40.7)	13 (16.0)	4 – Somewhat agree
Fibromyalgia	4 (4.9)	17 (21.0)	21 (25.9)	32 (39.5)	7 (8.6)	3 – Neither agree nor disagree

IBS = irritable bowel syndrome; CFS/ME = chronic fatigue syndrome/myalgic encephalomyelitis; FDS = functional/dissociative seizures

Discussion

This study investigated the knowledge and attitudes of Auckland medical students towards MUPS. To our knowledge, it is the first study of its kind in a New Zealand setting.

Despite the substantial healthcare burden associated with MUPS, our results indicate that this topic has received inadequate attention from the undergraduate medical programme, reflecting similar findings from UK studies.[18–20] Less than one-third of respondents could confidently recall having received formal education on MUPS in medical school, and only 18% of respondents considered their training in this area to be adequate. As students were one month away from graduation at the time of data collection, the survey was timed to capture the full extent of their experience of MUPS in medical school.

While survey responses suggested a scarcity of teaching on MUPS, the topic was in fact present in the curriculum. At the time of the survey, teaching included a three-hour multidisciplinary lecture in Year 5 of the six year course, an e-learning module during clinical psychiatry rotations, and small-group teaching at some clinical sites.

The students’ poor recollection rate of having received formal teaching on MUPS suggests a mismatch between its delivery and uptake. This may reflect restricted learning opportunities that were easy to overlook, as well as a perception that MUPS are academically inconsequential because the topic is not

formally assessed. There may also be a perception that MUPS is primarily of concern to psychiatry, even though it typically presents in primary care and across non-psychiatric specialty settings.

Our findings also highlighted a clear desire among students for more education on MUPS. The majority agreed they would have liked further teaching on both recognition (84%) and management (89%) of MUPS in clinical practice. Free-form text responses supported this observation, with students requesting more practical teaching on communication and management strategies.

Students generally recognised that MUPS were common and associated with considerable functional impairment. The modal estimate of MUPS prevalence in primary care was 10–30%, matching estimates reported by some studies.[3,20] Students perceived an overall "moderate" level of functional impairment associated with MUPS syndromes, only slightly lower than that of conventionally defined chronic diseases such as T2DM, COPD, and major depressive disorder.

The study also revealed an important attitudinal finding that while 70% of respondents reported that they could empathise with patients experiencing MUPS, over half (53%) stated they would prefer not to deal with such patients compared to those with a conventionally defined disease. This reluctance to care for patients experiencing MUPS may reflect a lack of adequate training, and in turn a lack of confidence, in clinical management. It may also reflect negative biases towards MUPS. As one study put it, there is an *"accumulation of research suggesting that negative attitudes towards [functional syndromes] are common amongst doctors and can be internalised by students"*.[18]

Despite the cross-disciplinary nature of MUPS presentations, our findings suggest that MUPS teaching was primarily delivered during psychiatry attachments, in accord with a UK study of 24 medical schools.[21]

Restricting teaching to a single specialty – psychiatry – may inadvertently frame these conditions as primarily psychiatric in nature and overlook the need for interdisciplinary collaboration. MUPS are present frequently in primary care and across multiple specialties, under which they are considered specialty-specific diagnoses e.g., IBS in gastroenterology, FDS in neurology, fibromyalgia in rheumatology, multiple chemical sensitivity in immunology, chronic pelvic pain in gynaecology, etc.

In addition, the perceived siloing of MUPS within psychiatry may reinforce a dualistic interpretation of illness that separates symptoms into either purely biomedical or purely psychological categories.[22] This may partly explain our findings that significant proportions of our sample viewed MUPS syndromes as primarily psychological disorders (40% for CFS/ME, 48% for fibromyalgia, 57% for FDS).

While the U in MUPS acronym stands for 'unexplained', the absence of a single unifying biomedical explanation does not imply an absence of underlying pathophysiology. A growing body of evidence describes multiple physiological mechanisms that contribute to the precipitation and perpetuation of some 'medically unexplained' symptoms. The former includes autonomic dysregulation, central sensitisation, aberrant prediction-error signalling and other examples of maladaptive neuroplasticity,

together with immune and inflammatory dysfunction, mitochondrial abnormalities, circadian rhythm disruption, and genetic and epigenetic influences.[3,5,22–24]

Contemporary insights into functional disorders integrate these biological processes within a broader, complex system that acknowledges the reciprocal influence of psychosocial factors. Such factors include illness-related beliefs, maladaptive coping and avoidance behaviours, certain personality traits, poor social support, prior traumatic and adverse childhood experiences, as well as the traumatic experience of illness itself.[22,25–29]

Together, these perspectives challenge overly narrow interpretations of MUPS and underscore the need for integrated explanatory models in both teaching and provision of care.

Recommendations

1) Undergraduate medical programs may benefit from incorporating formal assessments that evaluate students' ability to establish rapport and effectively communicate contemporary biopsychosocial explanatory models to patients presenting with MUPS.[30–33] See Additional File 2 for examples of explanatory models.

- Rationale:
- Reviews and national guidelines on MUPS management emphasise the importance of strengthening the doctor-patient relationship through validation and empathy, and through co-creating a satisfactory and cohesive illness narrative with the patient.[14,34] Doing so can facilitate acceptance and tolerance of symptoms and empower patients to embrace self-management strategies.[34,35]
- Understanding has progressed of the varied physiological and psychological mechanisms by which symptoms can occur in the absence of observable pathology. Thus 'medically unexplained' is becoming more explainable. However, clinical practice lags behind research in the application of biopsychosocial models of symptom experience. Teaching future doctors a more contemporary, less dualistic approach in conceptualising MUPS will help close this gap.
- In formally assessing taught content on MUPS, students are incentivised to study the topic and are given a clear signal that this subject is clinically relevant.
- Explanation is also a consultation skill that is transferrable beyond MUPS and contributes to overall clinician competence and cultural safety.

2) Ensure that formal and informal teaching on MUPS is extended from the domain of psychiatry to include other clinical disciplines across multiple settings.

Rationale: Functional syndromes appear in every specialty, and effective management often requires multidisciplinary input; teaching should reflect this reality.

Limitations

The study achieved a response rate of 30% of the eligible class, providing a reasonable sample of final-year medical students. The survey captured both knowledge-based and attitudinal domains, offering a more comprehensive picture of student perspectives on MUPS.

However, the study has several limitations. Participation was voluntary, and respondents may have had a personal or academic interest in the topic, potentially introducing selection bias. For example, 82.7% reported personally knowing someone with MUPS, which could include themselves.

The survey also used a broad umbrella definition of MUPS that encompassed several syndromes and related diagnostic terms. The term ‘MUPS’ was employed as it appeared etiologically neutral and less likely to unduly influence student perceptions compared to other synonymous terms.

However, the lack of nosological specificity introduces construct ambiguity. Student responses thus could reflect impressions of specific syndromes, single transient symptoms, or the general phenomenon.

Finally, this study was conducted at a single medical school, The University of Auckland, limiting generalisability. However, the study findings mirror those reported internationally, suggesting that the observed gaps may reflect broader educational trends rather than isolated curricular deficiencies.

Conclusion

Medical students in this cohort recognised MUPS as common and functionally impairing yet felt the undergraduate curriculum insufficiently prepared them to manage such presentations. Moreover, psychiatry rotations were cited as the primary source of teaching on MUPS, highlighting a disproportionate reliance on a single specialty for presentations that are widespread across medicine.

Our findings are consistent with international studies reporting gaps in undergraduate education on MUPS. Curricular approaches that prioritise communication skills, clear explanatory models, interdisciplinary teaching, and biopsychosocial, non-dualistic frameworks may help better equip graduates for this aspect of practice.

Future research that involves multiple institutions, patient and educator perspectives, as well as evaluations of targeted educational interventions, may help clarify how best to integrate MUPS teaching into medical school curricula and improve patient outcomes.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was granted by the University of Auckland Human Participants Ethics Committee (UAHPEC22956) on October 6th, 2021. All methods were conducted in accordance with the Declaration of Helsinki and the Health Research Council of New Zealand's Research Ethics Guidelines. All students provided electronic informed consent to participate in the survey study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding was received for this research.

Author contributions

NH conceived the study, designed the methodology, collected the data, performed the analysis, interpreted the results, and drafted the manuscript.

FS and DBM provided supervision, contributed to study design refinement and interpretation of findings, and critically revised the manuscript for important intellectual content.

All authors approved the final manuscript.

Acknowledgements

Not applicable.

References

1. Hingray C, Popkirov S, Kozlowska K, et al. Functional/dissociative seizures: Proposal for a new diagnostic label and definition by the ILAE task force. Epilepsia. 2025;66(11):4162–82. 10.1111/epi.18574.
2. Davidson SL, Menkes DB. Long covid: reshaping conversations about medically unexplained symptoms. BMJ. 2021;374. 10.1136/bmj.n1859.
3. Komaroff AL, Dantzer R. Causes of symptoms and symptom persistence in long COVID and myalgic encephalomyelitis/chronic fatigue syndrome. Cell Rep Med Cell Press. 2025;6(8).

10.1016/j.xcrm.2025.102259.

4. Edwards TM, Stern A, Clarke DD, Ivbijaro G, Kasney LM. The treatment of patients with medically unexplained symptoms in primary care: A review of the literature. Ment Health Fam Med. 2011;7(4):209–21.
5. Burton C, Fink P, Henningsen P, Löwe B, Rief W. Functional somatic disorders: Discussion paper for a new common classification for research and clinical use. *BMC Med*. *BioMed Central Ltd.* 2020;18(1). 10.1186/s12916-020-1505-4
6. Hatcher S, Arroll B. Assessment and Management of Medically Unexplained Symptoms. Med J. 2008;336(7653):1124–8. 10.1136/bmj.39554.592014.BE.
7. Komaroff AL, Fagioli LR, Doolittle TH, et al. Health status in patients with chronic fatigue syndrome and in general population and disease comparison groups. Am J Med. 1996;101(3):281–90. 10.1016/S0002-9343(96)00174-X.
8. Hvidberg MF, Brinth LS, Olesen AV, Petersen KD, Ehlers L. The health-related quality of life for patients with myalgic encephalomyelitis / chronic fatigue syndrome (ME/CFS). PLoS ONE. 2015;10(7):1–16. 10.1371/journal.pone.0132421.
9. Bermingham SL, Cohen FRCGPA, Hague BSDRCOG, JM, Parsonage MB. The cost of somatisation among the working-age population in England for. Ment Health Fam Med. 2010;7:71–84.
10. Wilkins E, Wilson L, Wickramasinghe K, Bhatnagar P. European Cardiovascular Disease Statistics 2017. *European Heart Network*. Published online 2017.
11. Woivalin T, Krantz G, Mäntyranta TRKC. Medically unexplained symptoms: perceptions of physicians in primary health care. Fam Pract. 2004;21(2):199–203. 10.1093/fampra/cmh217.
12. Chew-Graham CA, Heyland S, Kingstone T, et al. Editorials Medically unexplained symptoms: Continuing challenges for primary care. British J Gen Practice Royal Coll Gen Practitioners. 2017;67(656):106–7. 10.3399/bjgp17X689473.
13. Trimbos Instituut/Netherlands Institute of Mental Health and Addiction. Multidisciplinaire Richtlijn SOLK en Somatoforme Stoornissen. [Multidisciplinary guideline medically unexplained symptoms and somatoform disorders]. *Houten: Ladenius Communicatie BV*. Published online 2010.
14. Olde Hartman TC, Rosendal M, Aamland A, et al. What do guidelines and systematic reviews tell us about the management of medically unexplained symptoms in primary care? BJGP Open. 2017;1(3):bjgpopen17X101061. 10.3399/bjgpopen17X101061.
15. Olde Hartman TC, Blankenstein AH, Molenaar B, et al. NHG Standaard SOLK [NHG Guideline on Medically Unexplained Symptoms (MUS)]. Huisarts Wet. 2013;56(5):222.
16. Arnold IA, de Waal MW, Eekhof JA, Assendelft WJ, Spinhoven P, van Hemert AM. *Medically Unexplained Physical Symptoms in Primary Care: A Controlled Study on the Effectiveness of Cognitive-Behavioral Treatment by the Family Physician*. 2009.
17. Morriss R, Dowrick C, Salmon P, et al. Cluster randomised controlled trial of training practices in reattribution for medically unexplained symptoms. Br J Psychiatry. 2007;191:536–42.

18. Joyce E, Cowing J, Lazarus C, Smith C, Zenzuck V, Peters S. Training tomorrow's doctors to explain 'medically unexplained' physical symptoms: An examination of UK medical educators' views of barriers and solutions. Patient Educ Couns. 2018;101(5):878–84. 10.1016/j.pec.2017.11.020.
19. Yon K, Habermann S, Rosenthal J, et al. Improving teaching about medically unexplained symptoms for newly qualified doctors in the UK: Findings from a questionnaire survey and expert workshop. BMJ Open BMJ Publishing Group. 2017;7(4). 10.1136/bmjopen-2016-014720.
20. Warner A, Walters K, Lamahewa K, Buszewicz M. How do hospital doctors manage patients with medically unexplained symptoms: a qualitative study of physicians. J R Soc Med. 2017;110(2):65–72. 10.1177/0141076816686348.
21. Howman M, Walters K, Rosenthal J, Good M, Buszewicz M. Teaching about medically unexplained symptoms at medical schools in the United Kingdom. Med Teach. 2012;34(4):327–9. 10.3109/0142159X.2012.660219.
22. Löwe B, Toussaint A, Rosmalen JGM, et al. Persistent physical symptoms: definition, genesis, and management. *The Lancet*. Elsevier B V. 2024;403(10444):2649–62. 10.1016/S0140-6736(24)00623-8.
23. Tate W, Walker M, Sweetman E, et al. Molecular Mechanisms of Neuroinflammation in ME/CFS and Long COVID to Sustain Disease and Promote Relapses. Front Neurol. 2022;13. 10.3389/fneur.2022.877772.
24. Phillips W. Pathophysiology of functional neurological disorder for the general neurologist. *BMJ Neurol Open*. BMJ Publishing Group. 2025;7(2). 10.1136/bmjno-2025-001309.
25. Saunders C, Sperling S, Bendstrup E. A new paradigm is needed to explain long COVID. Lancet Respir Med Elsevier Ltd. 2023;11(2):e12–3. 10.1016/S2213-2600(22)00501-X.
26. Carlson AMA, Tkachuk GA. A Psychological Approach to Functional Illness. In: Blakley Brian W, Blakley JE, editors. Functional Illness of the Head and Neck. Springer International Publishing; 2023. pp. 197–220. 10.1007/978-3-031-12998-8_19.
27. Afari N, Ahumada SM, Wright LJ, et al. Psychological trauma and functional somatic syndromes: A systematic review and meta-analysis. Psychosom Med. 2014;76(1):2–11. 10.1097/PSY.0000000000000010.
28. Bussières A, Hancock MJ, Elklit A, et al. Adverse childhood experience is associated with an increased risk of reporting chronic pain in adulthood: a stystematic review and meta-analysis. Eur J Psychotraumatol Taylor Francis Ltd. 2023;14(2). 10.1080/20008066.2023.2284025.
29. Yang T, Roberts C, Winton-Brown T, et al. Childhood trauma in patients with epileptic vs nonepileptic seizures. Epilepsia. 2023;64(1):184–95. 10.1111/epi.17449.
30. Chrousos GP. Stress and disorders of the stress system. Nat Rev Endocrinol. 2009;5(7):374–81. 10.1038/nrendo.2009.106.
31. Yaribeygi H, Panahi Y, Sahraei H, Johnston TP, Sahebkar A. The impact of stress on body function: A review. EXCLI J. 2017;16:1057–72. 10.17179/excli2017-480.

32. WONCA Working Party on Mental Health. Addressing the needs of patients with Medically Unexplained Symptoms (MUS).
33. Van Ravenzwaaij J, Olde Hartman TC, Van Ravesteijn H, Eveleigh R, Van Rijswijk E, Lucassen PLBJ. Explanatory models of medically unexplained symptoms: A qualitative analysis of the literature. Ment Health Fam Med. 2011;7(4):223–31.
34. Hubley S, Uebelacker L, Eaton C. Managing Medically Unexplained Symptoms in Primary Care: A Narrative Review and Treatment Recommendations. Am J Lifestyle Med. 2016;10(2):109–19. 10.1177/1559827614536865.
35. Kirmayer LJ, Groleau D, Looper KJ, Dao MD. Explaining medically unexplained symptoms. Can J Psychiatry. 2004;49(10):663–72. 10.1177/070674370404901003.

Figures

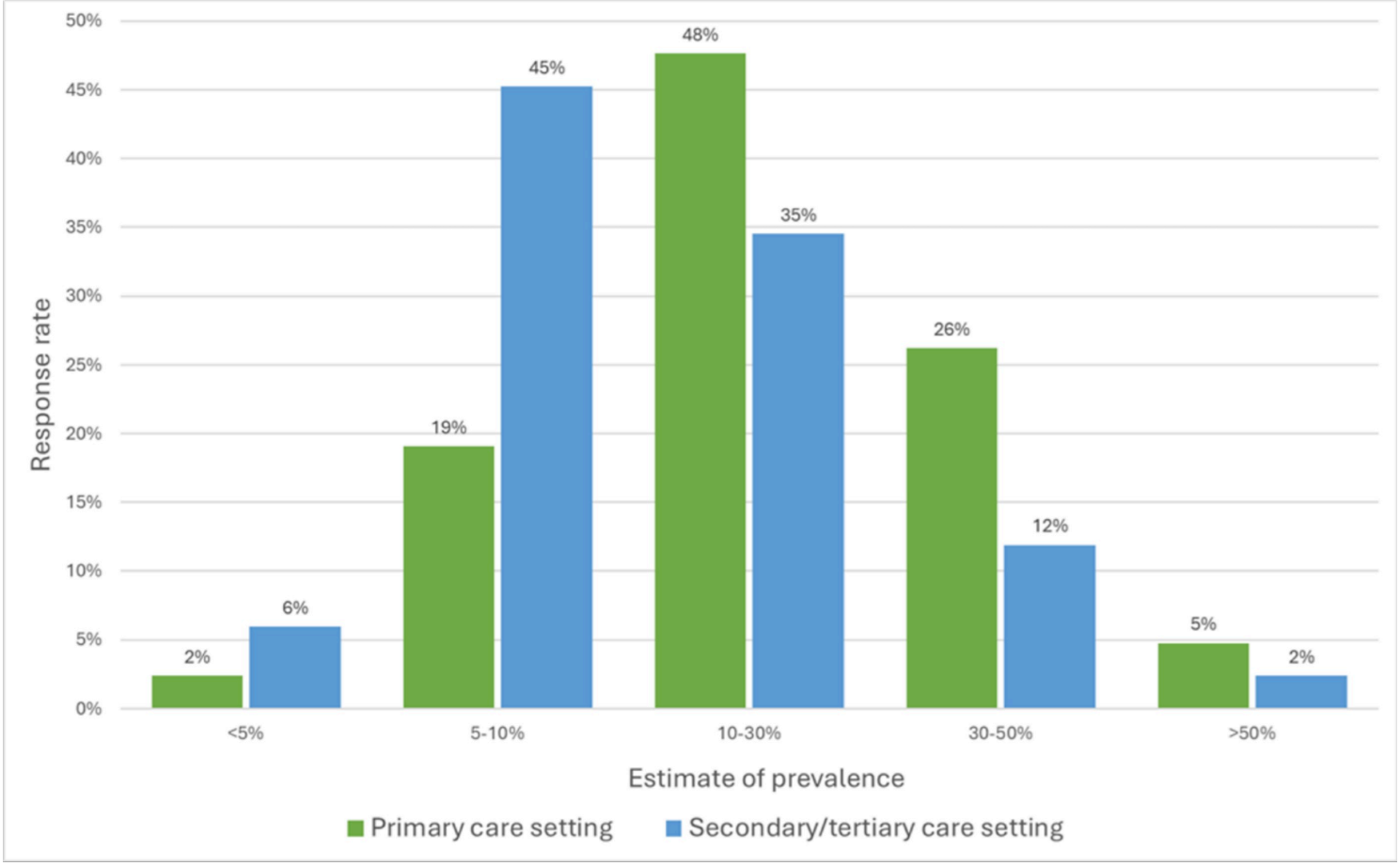


Figure 1

Student estimates of the prevalence of medically unexplained physical symptoms in primary and secondary care settings (n = 84).

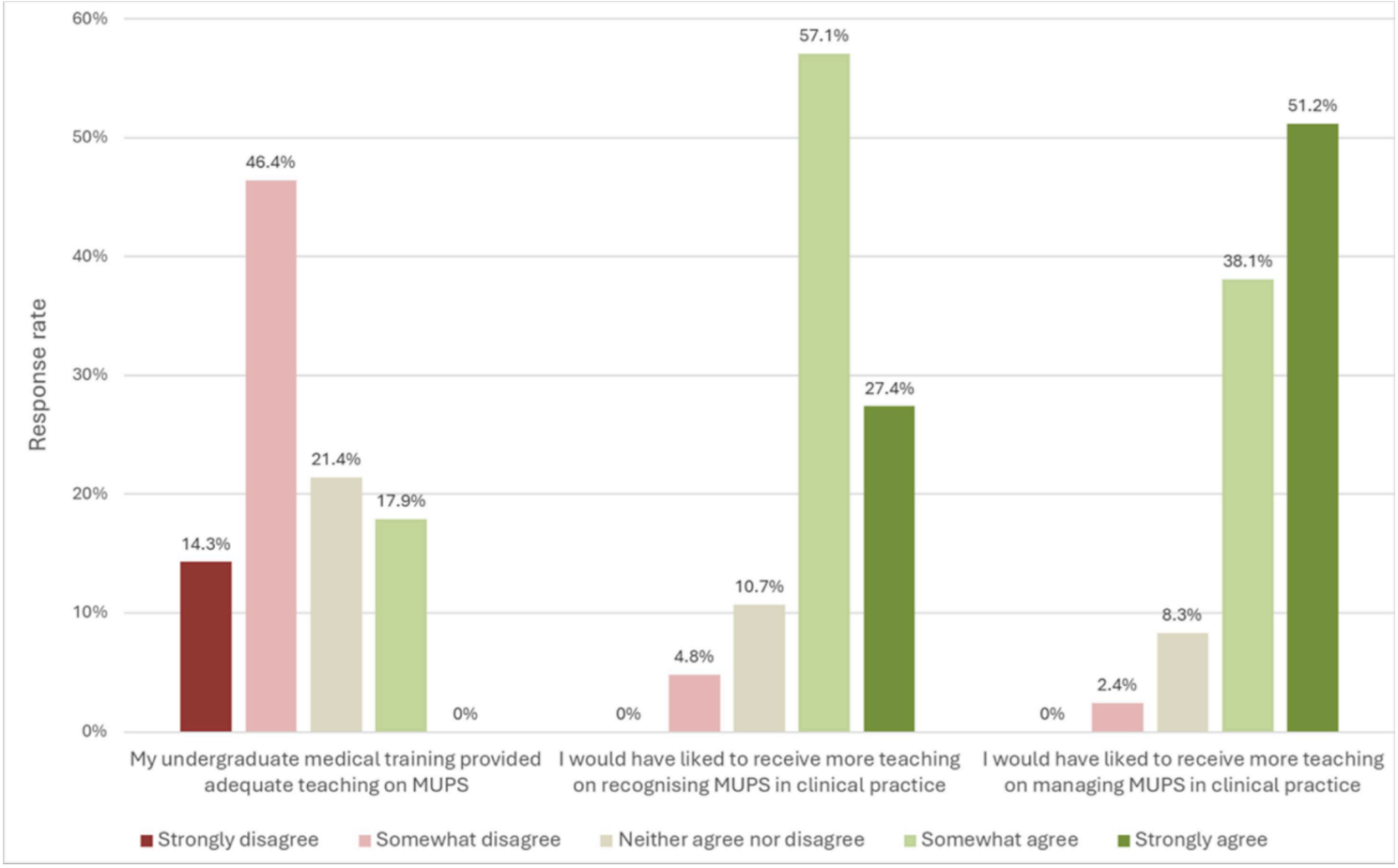


Figure 2

Student responses to statements regarding the medical curriculum on medically unexplained physical symptoms (n = 84).

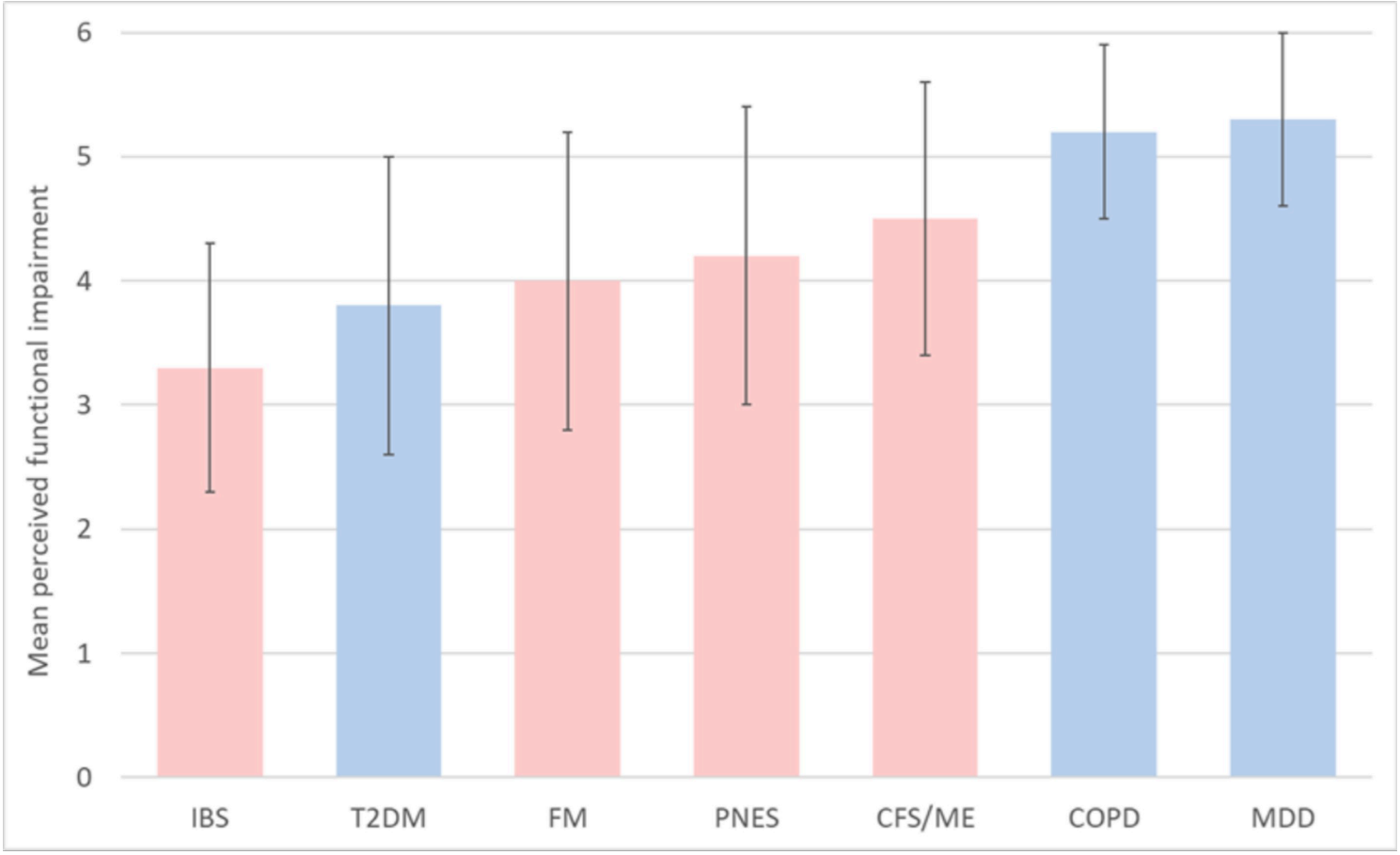


Figure 3

Mean perceived functional impairment by condition. Error bars represent standard deviations.

CFS/ME = chronic fatigue syndrome/myalgic encephalomyelitis; *COPD* =chronic obstructive pulmonary disease; *FM* = fibromyalgia; *IBS* = irritable bowel syndrome; *MDD* = major depressive disorder; *FDS* = Functional/dissociative seizures; *T2DM* = Type 2 diabetes mellitus.

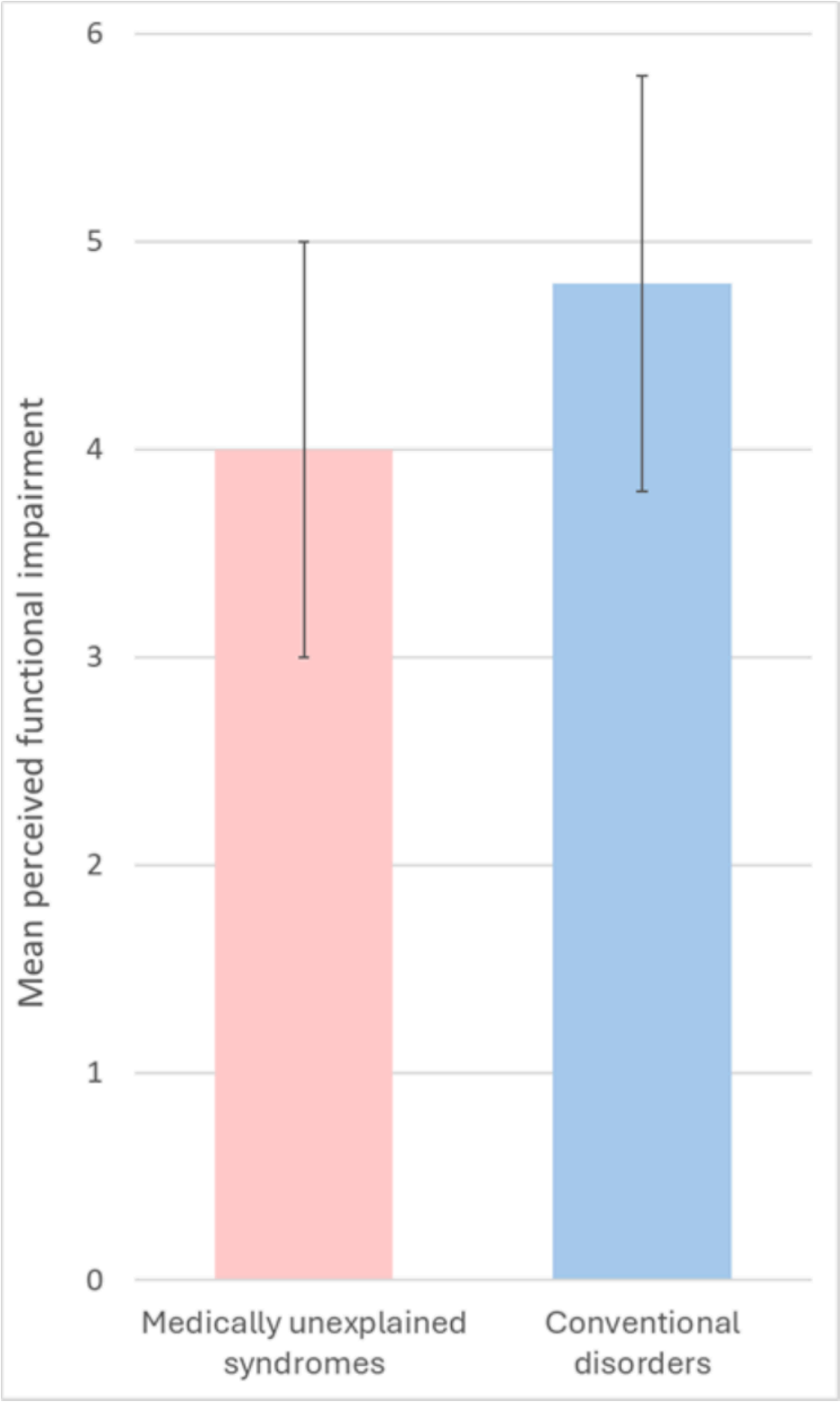


Figure 4

Combined mean perceived functional impairment between selected medically unexplained syndromes and conventional disorders. Error bars represent standard deviations.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Additionalfile1Survey.pdf
- Additionalfile2Explanatorymodels.docx