Journal of Occupational Rehabilitation
https://doi.org/10.1007/s10926-026-10382-y

Transdiagnostic Symptoms in Electronic Health Records of Sick-Listed Employees

F. O. W. Muntinghe[1,2] · T. Hoekstra[1,3] · A. A. Laganga[1,3,4] · M. L. W. Ziech[1,3,4] · S. Brouwer[1,3] · C. A. M. Roelen[1,2]

Received: 7 November 2025 / Accepted: 27 March 2026

Abstract

Purpose Transdiagnostic symptoms are the subjective physical and mental features that span across various diseases and share commonalities irrespective of the diagnosis. This study investigated which transdiagnostic symptoms are reported in electronic health records of sick-listed employees and how these symptoms are described. Furthermore, differences in transdiagnostic symptoms were studied across diagnostic categories.

Methods Cross-sectional register-based study of consultation notes recorded in electronic health records of 25,981 employees sick-listed due to mental, musculoskeletal, cardiovascular, neurological, or gastrointestinal disorders between April 2019 and March 2020. Electronic health records were randomly drawn until data saturation, defined as no new transdiagnostic symptoms in 10 consecutive electronic health records, resulting in a final analytic sample of 262 electronic health records. Descriptions of transdiagnostic symptoms were analysed in Atlas-ti using a thematic analysis.

Results A total of 129 unique symptoms were identified in the 262 electronic health records and thematically categorised into seven groups: psychological symptoms, pain, fatigue, sleep symptoms, vegetative symptoms, cognitive symptoms, and physical symptoms. Psychological symptoms were most prevalent (36%), followed by pain (30%), and fatigue (25%). In the majority of the health records, sequences of transdiagnostic symptoms were reported with brief indications of cause, severity, duration and temporal course. Transdiagnostic symptoms varied across diagnostic categories, though pain was highly prevalent in all diagnostic categories.

Conclusion Seven thematic groups of transdiagnostic symptoms were identified in electronic health records of sick-listed employees. These seven groups can be used in further studies to identify symptom profiles that are related to poor work outcomes.

Keywords Medical records · Occupational health · Sickness absence · Pain · Fatigue

Introduction

Sick-listed employees often experience general symptoms such as pain, fatigue, or sleep disturbance, irrespective of their diagnosis [1, 2]. In consultations, healthcare providers explore these symptoms and capture them in health records. Research has shown that approximately 10% of the symptoms in occupational health records were general in the sense that they were not attributable to a specific organ system [3]. When underdiagnosed and undertreated, general symptoms may have a negative impact on patient-reported outcomes including functional performance, cognitive status, and quality of life [4]. In the field of psychiatry, the importance of general symptoms, such as mood and anxiety symptoms and sleep disorders occurring in various psychiatric disorders,

✉ F. O. W. Muntinghe
F.O.W.Muntinghe@umcg.nl

1 Department of Health Sciences, Community and Occupational Medicine, University of Groningen, University Medical Center Groningen (UMCG), Hanzeplein 1, PO Box 30.001, 9700 RB Groningen, The Netherlands

2 Arbo Unie, Knowledge Institute for Work and Health, Nieuwegein, The Netherlands

3 Research Center for Insurance Medicine (KCVG), Amsterdam, The Netherlands

4 Dutch Social Security Institute: Institute for Employee Benefit Schemes (UWV), Amsterdam, The Netherlands

Published online: 26 April 2026

has been recognised and led to a 'transdiagnostic approach'. This transdiagnostic approach is based on the finding that risk and perpetuating factors in mental disorders, whether they be biological, socioenvironmental, or psychological, show no specificity for particular diagnostic categories but rather appear across diagnostic boundaries [5, 6]. Furthermore, this transdiagnostic approach is also used to better understand the underlying mechanisms and processes in patients with persistent somatic symptoms [7].

In line with the transdiagnostic approach, the present study uses the term *transdiagnostic symptoms* for the subjective physical and mental features that span across different diagnostic and share commonalities irrespective of the diagnostic categories of the international classification of diseases (ICD). For example, fatigue and sleep disturbance may be reported by employees sick-listed due to mental disorders (ICD-10 category F), but also by employees with musculoskeletal (ICD-10 category M) or cardiovascular disorders (ICD-10 category I). Pain may be reported by employees sick-listed due to musculoskeletal disorders, but also by employees sick-listed with neurological (ICD category G) or gastrointestinal disorders (ICD-10 category K), or in accordance with somatisation with mental disorders (ICD-10 category F) [8]. Thus, transdiagnostic symptoms are not specific for a diagnostic category but appear in different diagnostic categories, probably because they reflect common underlying mechanisms that are not related to the specific disease [7]. For example, patients may develop transdiagnostic distress, health anxiety or disturbed mood because they worry about their illness.

Transdiagnostic symptoms have been examined in various clinical settings, showing that the disease burden of patients with chronic conditions was mainly explained by transdiagnostic symptoms, such as pain and fatigue, concentration problems, and physical symptoms [9]. Oncological patients often experience a multitude of transdiagnostic symptoms (e.g. fatigue, pain, sleep problems and mood disturbances) independent of the type of cancer [4]. Multiple co-occurring transdiagnostic symptoms have also been described in chronic obstructive pulmonary disease [10], end-stage renal disease [11], and HIV [12]. In a Danish population survey (DanFunD), patients with functional somatic disorder, presenting with a broad array of symptoms, more often received sickness-, unemployment-, and disability benefits during follow up than those without functional somatic disorder [13].

Transdiagnostic symptoms are not only highly prevalent in the clinical setting, but also in public and occupational healthcare [14]. Fatigue and pain are the most cited transdiagnostic symptoms in the working population [15]. Other transdiagnostic symptoms among employees are depressed mood and anxiety [16, 17]. A review of reviews revealed that depressed mood and anxiety were associated with delayed return to work in employees sick-listed with common mental disorders, cardiovascular diseases or cancer [18]. Sleep disturbance, depression and pain are common symptoms found in employees with prolonged sickness absence trajectories. [19].

Although transdiagnostic symptoms have been recognised as important risk factors for sickness absence and delayed return to work, the literature on transdiagnostic symptoms is inconsistent and there are no studies that systematically searched for transdiagnostic symptoms in public and occupational healthcare. Somatic symptom profiles have been identified in a Danish population survey [20]. However, psychological symptom profiles were not investigated while psychological symptoms are highly prevalent and increasing in the working population [21, 22].

The aims of the present study were to:

1. Identify which somatic and psychological transdiagnostic symptoms were recorded in the consultation notes of sick-listed employees;
2. Investigate how transdiagnostic symptoms were described in the consultation notes;
3. Analyse whether reports of transdiagnostic symptoms differed across diagnostic categories.

The results of this study contribute to the knowledge of symptom profiles, which will enable occupational health and rehabilitation professionals to better understand and support employees presenting with multiple transdiagnostic symptoms.

Methods

Study Design and Setting

In The Netherlands, occupational health services are the primary providers of work-related care to both employees and employers. Dutch employers are legally obliged to contract an occupational health service. Occupational health providers working at occupational health services advise and support employees during sickness absence. Sickness absence is initially self-reported by the employee to the employer. On the first day of sickness absence the employer enters a sick report in the occupational health services' sickness absence register. Sick-listed employees are invited for a consultation with an occupational health provider within 42 days of reporting sick. Dutch sickness absence policies do not require, a medical certification of sickness absence from primary or clinical healthcare before this consultation. The occupational health provider records consultation notes about medical, work-related, home-related, and person-related factors contributing to sickness absence, issues a

sickness absence certification and advises an individualised return-to-work plan.

The consultation notes were recorded by all occupational health providers employed at Arbo Unie, a Dutch nationwide occupational health service that services a total of 1.2 million employees in The Netherlands. The consultation notes were anonymised by a trusted third party (STIZON) prior to analysis. STIZON performed irreversible anonymisation and transformed the data into a Common Data Model (CDM), removing all directly and indirectly identifying personal information. The research team only received the fully anonymised data and had no access to identifiers or re-identification keys. The anonymised dataset was stored and analysed within a secure research environment in accordance with institutional data protection policies.

The occupational health services' sickness absence register included the consultation notes of $N = 37{,}017$ sickness absence episodes which started between April 2019 and March 2020. For this study, we included the consultation notes of the $n = 25{,}981$ electronic health records linked with the five most common causes for long-term (≥ 6 consecutive weeks) sickness absence and work disability in The Netherlands, being mental disorders (ICD-10 F00 – F99), musculoskeletal disorders (M00 – M99) and injuries (S00–S99), cardiovascular disorders (I00–I99), neurological disorders (G00–G99), and gastrointestinal disorders (K00–K99) [8]. Respiratory disorders ranked sixth as cause for sickness absence and were not included to prevent bias by COVID-19, which became prevalent after March 2020 in the Netherlands. The study analysed first consultations with occupational health providers, because first consultations contained the most extensive consultation notes.

Electronic health records were drawn randomly from the sickness absence register by using a pseudorandom number generator from NumPy [23]. Random sampling was performed by drawing electronic health records one-by-one until sufficient analytic depth was achieved to support a coherent and comprehensive account of transdiagnostic symptoms relevant to the research question. The research team decided to stop sampling when no new themes were identified in ten consecutive health records. This decision was based on the idea that further sampling was unlikely to meaningfully extend, refine, or challenge the developing symptom framework. Thus, the decision to conclude sampling was based on analytic sufficiency (saturation) rather than a fixed numerical threshold.

Data Analysis

Thematic analysis of the consultation notes was conducted following the six-phase approach described by Braun and Clarke [24]. First, the researchers familiarised themselves with the data through repeated reading of the consultation notes and notifying initial observations. Second, initial codes were systematically generated across the entire dataset to identify relevant features of the data. Third, the coded data were examined to search for patterns and to collate codes into potential themes. Fourth, these preliminary themes were reviewed and refined by assessing their coherence in relation to both the coded extracts and the complete dataset, leading to the modification, merging, or removal of themes where necessary. Fifth, the final themes were defined and named to clearly capture their scope and meaning, with subthemes identified where appropriate. Finally, the analysis was completed by selecting representative data extracts and relating the themes back to the research questions and existing literature. Notes that might represent an employee's subjective experiences were regarded as transdiagnostic symptoms if they occurred across ICD-10 categories [25]. For example, the note "pain" was coded as a transdiagnostic symptom even though it was unknown whether this was experienced by the employee or observed by the occupational healthcare provider. Diagnostic labels (e.g. depression, generalised anxiety disorder) were not coded as symptoms; however, symptom-level descriptions (e.g. disturbed mood or anxiety) were coded as transdiagnostic symptoms even when documented within the context of a specific diagnosis. These symptoms were considered transdiagnostic because they occur across diagnostic categories. For example, anxiety is a core symptom of generalised anxiety disorders, but also occurs in other medical conditions when patients are anxious about their disease or treatment. Disturbed mood is a core symptom of depression but also occurs when patients feel frustrated about persistent symptoms hindering daily functioning.

Two authors FM (male, MD, physician with 4 years of work experience) and CR (male, MD PhD, occupational physician with 25 years of work experience) identified and coded transdiagnostic symptoms in the consultation notes. The codes were then categorised into groups by three authors FM, CR and MZ (female, MD PhD, insurance physician with 9 years of work experience), and reviewed by all authors (FM, TH, AL, MZ, SB, CR) to define the final thematic groups. In ATLAS-ti version 23 (Scientific Software Development GmbH, Berlin), it was investigated how transdiagnostic symptoms were described in the consultation notes and how thematic groups of symptoms were interrelated.

Ethics

The Medical Ethics Review Board of the University Medical Center Groningen reviewed and approved the study protocol (METc UMCG 2023/114). Sick-listed employees approved the use of their sickness absence register data for scientific research. Informed consent specifically for this study was

not required because the electronic health records were fully anonymised and could not be traced back to individual employees. The study was designed and executed in line with the Consolidated Criteria for Reporting Qualitative Research (COREQ) [26].

Results

Of the 25,981 employees included in the study, $n = 12,366$ (48%) had a mental disorder, 9006 (35%) musculoskeletal, 1499 (6%) cardiovascular, 1626 (6%) neurological or 1484 (6%) gastrointestinal disorders. Data saturation was reached after reviewing the consultation notes of 262 randomly drawn electronic health records. At the time of the first consultation, these 262 employees were sick-listed median 34 (interquartile range [IQR] 21 to 51) days, and their total median sickness absence duration was 178 (IQR 117 to 298) days. The characteristics and sickness absence durations of the 262 workers included in the analysis did not differ significantly from those of the total of 25,981 eligible electronic health records (Table 1).

Identification of Transdiagnostic Symptoms

A total of 314 transdiagnostic symptoms were identified and encoded into 129 unique codes (Table 2). These unique codes were thematically categorised into seven thematic groups: psychological symptoms, pain, fatigue, sleep symptoms, vegetative symptoms, cognitive symptoms and physical symptoms. A total of 14 codes were excluded because they were non-specific (e.g. not feeling good), too specific (e.g. rashes), or not clear (e.g. mucus, swelling).

Psychological symptoms were mentioned in 94 (36%) consultations, mostly in relation to mental disorders, but also related to neurological or cardiovascular disorders. Pain was mentioned in 79 (30%) consultations across all ICD-10 diagnostic categories. Fatigue, sleep symptoms, vegetative symptoms and cognitive symptoms were mentioned in 66 (25%), 58 (22%), 43 (16%) and 31 (12%) consultation notes, respectively, and varied across diagnostic categories. Physical symptoms were only mentioned by employees sick-listed due to musculoskeletal disorders and injuries and gastrointestinal disorders (Fig. 1).

Percentage of Symptoms by Diagnosis

We found combinations of symptoms in many consultation notes (Table 3). For example, psychological symptoms co-occurred with fatigue ($n = 44$) and sleep symptoms ($n = 43$). Cognitive symptoms frequently occurred in combination with psychological symptoms ($n = 24$; 77%) and fatigue ($n = 19$; 61%). Sleep symptoms occurred in combination with psychological symptoms in 43 electronic health records (74%) and fatigue occurred with psychological symptoms in 44 electronic health records (67%). Physical symptoms co-occurred with pain in five out of six consultations in which physical symptoms were reported.

Description of Transdiagnostic Symptoms

Psychological Symptoms

A broad range of psychological symptoms was found in the consultation notes. In addition to depressed mood and anxiety, known from literature, distress symptoms such as feeling

Table 1 Characteristics of the electronic health records

	Characteristics of the total cohort ($n = 25,981$)	Characteristics of included electronic health records ($n = 262$)
Age in years	46.4 (11.0)[a]	46.3 (12.3)[a]
Gender		
Men	13,294 (51%)	128 (49%)
Women	12,686 (49%)	134 (51%)
Sickness absence duration in days	194 (81—305)[b]	178 (117—298)[b]
Diagnosis (ICD-10)[c]		
Mental disorders (F00 – F99)	12,366 (48%)	135 (52%)
Musculoskeletal disorders (M00 – M99)	9006 (35%)	94 (36%)
Cardiovascular disorders (I00 – I99)	1499 (6%)	12 (5%)
Neurological disorders (G00 – G99)	1626 (6%)	8 (3%)
Gastrointestinal disorders (K00 – K99)	1484 (6%)	13 (5%)

aMean (standard deviation)

bMedian (interquartile range)

cInternational Classification of Diseases, 10th version [21]

Table 2 Code and themes of transdiagnostic symptoms in 262 electronic health records

Psychological symptoms, *n* = 94 (35.9%)	Pain symptoms, *n* = 79 (30.0%)	Fatigue symptoms, *n* = 58 (22.1%)	Sleep symptoms, *n* = 58 (22.1%)	Vegetative symptoms, n = 43 (16.3%)	Cognitive symptoms, *n* = 31 (11.8%)	Physical symptoms, *n* = 6 (2.2%)	Other
Agitation, aggression, anger outburst, angry, anxiety, avoiding contact, blackout, burnout complaints, collapsed, couldn't handle it mentally anymore, cranky, crying, dares, feels depressed, difficulty doing anything, down, emotional, emotional imbalance, feeling worn out, feels hunted, flashbacks, flipping out, gloomy, grumpy, to be on one's last legs, hallucinating, head is full, hurrying, irritable, irritation, knot in stomach, labile, loss of control, loss of interest, lump in throat, mental complaints, loss of motivation, negative thoughts, nervous, nightmares, no longer able to act, not relaxed, in low spirits, overloaded, panic, feels fed up, powerlessness, silent, rebellious, restless, restlessness, lack of self-confidence, shaking, short fuse, startling, stress, suicidal thoughts, tension, unhappy, push oneself to the limit, withdrawing, worrying	Ache, cramps, discomfort, dull feeling, pain, tension, stiffness	Activities cost more energy, fatigue, lethargic, listless, low energy, tired	Awake, falling asleep, little sleep, need for sleep, night rest, sleep stress, sleeping badly, sleeping through, sleeps during the day, snoring, waking up early	lack of condition, feeling miserable, shortness of breath, hyperventilation, stomach symptoms, changed stool pattern, bloated feeling in the abdomen, nauseous, loss of appetite, weight change, dizzy, palpitations, change in heart rate, fever, pale, sweating, hot and cold symptoms, tinnitus, black before the eyes	Loss of concentration, difficulty making decisions, distracted, drowsy, memory loss, problems organizing thoughts, sensitive to stimuli, slow thinking	Loss of power, reduced mobility	Can't go on, feeling unwell, illness, in bad shape, inflamed mouth, loss of functions, mucus, not feeling good, numb feeling, rashes, numbness, swelling, tingling [feeling], trouble starting the day

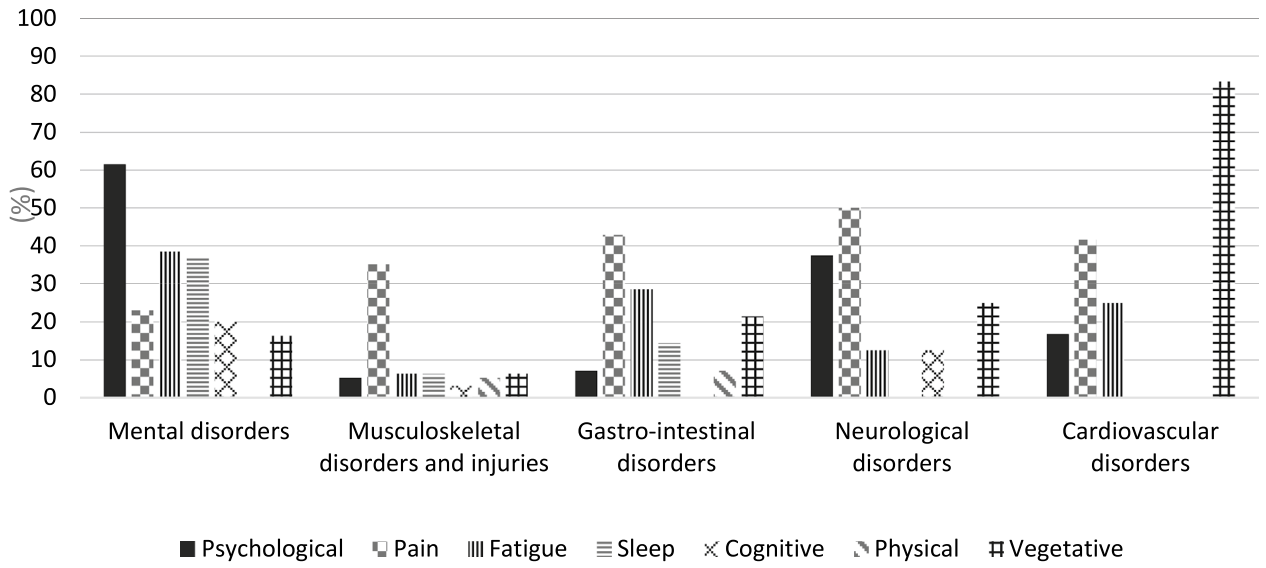

Fig. 1 Percentage of transdiagnostic symptoms by diagnosis

Table 3 Co-occurrence of the transdiagnostic symptom themes in 262 electronic health records

	Psychological ($n=94$)	Pain ($n=79$)	Fatigue ($n=66$)	Sleep ($n=58$)	Vegetative ($n=43$)	Cognitive ($n=31$)	Physical symptoms ($n=6$)
Psychological		25	44	43	22	24	0
Pain			19	19	19	11	5
Fatigue				24	18	19	2
Sleep					15	16	3
Vegetative						4	0
Cognitive							1

nervous, agitated, jittery, or stressed were frequently mentioned. In many consultation notes, we found a sequence of psychological symptoms which were sometimes accentuated with an adjective (e.g. lots of crying, very nervous), but were not described into further detail.

Case 20 (Woman, age Unknown; Diagnosis ICD-10 F43.2, Adjustment Disorder)

Symptoms since November, very tired, low Hb, GP prescribed iron; poor concentration, fatigue, lots of crying, panic attacks, stress for no reason, very nervous about nothing. GP referred to POH-GGZ, conversations once every two weeks, advice to go outside, exercise, do fun things, sleeps a little better now, goes to bed at 9 p.m.

In most consultation notes, there was an indication of the duration of psychological symptoms and sometimes it was mentioned what triggered the psychological symptoms, for example arguments or difficulties in cooperating with a colleague or supervisor.

Case 108 (Man, 42 years Diagnosis ICD-10 F43.2, Adjustment Disorder)

Tired since September after his wedding, blood test results showed nothing significant. The GP referred him to a psychiatrist. The psychiatrist gave him medication. In the course of the afternoon, he notices the fatigue, so he is working half days now. Can't get everything done right now. During the day, he gets tired and can just fall asleep. Work: doesn't feel empowered there. Colleagues who do not respond to him. This has been going on for a while now. There is criticism about his performance. This breaks him down and frustrates him. It's a matter of trust. He is therefore extra vigilant.

Pain

Pain was mentioned in many consultation notes, sometimes described in terms of cramps and stiffness, but in most cases only the word pain was recorded with an indication of the site where pain was allocated, such as headache, pain in

the leg, pain in the shoulder, or pain in the stomach. The duration of pain and the course of pain over time were often mentioned, as well as limitations in daily activities.

Case 163 (Man; 58 years; Diagnosis ICD-10 F43.2, Adjustment Disorder)

Many headaches since November 2018. Visited ENT surgeon / oral surgeon and neurologist back then. Later again a bad period in November 2019, he fell during winter sports while he is a good skier. He is now insecure, clumsy, falls more often. Injured his knee and was taken away in a banana [rescue toboggan]. He also fell on his head but was wearing a helmet. Knee got better but his head did not. Now he has loss of concentration. He can answer some mail at home, but in texts everything is red from the spell checker, energy is limited, and also has a short fuse. His GP thought of concussion, but the complaints exist for quite some time now. He also prefers not to drive a car, it does not feel safe.

The type of pain (burning, throbbing, stabbing) was sporadically mentioned in consultation notes.

Case 30 (Man, 59 years; Diagnosis ICD-10 M91, Chondropathy)

Shoulder problems on the left, frozen shoulder, months of specialised physiotherapy. December it went reasonably well again, building up work, but sometimes there was a toothache-like feeling in the shoulder. Then takes paracetamol, pain then comes and goes for several hours. He is experiencing a decline in shoulder mobility. At work he does things he shouldn't have done. GP has now prescribed tramadol.

Fatigue

Fatigue was described as a lack of energy, being lethargic, tired, or listless. Fatigue was usually mentioned together with a sequence of various psychological symptoms. The duration of fatigue and the consequences for daily functioning were often found in the consultation notes. However, the type of fatigue (e.g. mental fatigue or physical fatigue) was not described.

Case 153 (Man, 48 years; Diagnosis ICD-10: Z73.0, Burn-Out)

Already extremely tired before summer, things didn't interest him anymore. Is on the municipal council but has recently noticed that he has less energy for discussions. Slept for three days on holiday and wasn't awake. After the holiday, he went back to work reluctantly, feeling weak. Has also cancelled the council meetings a few times. Has been to the GP three times, all he says is: stressed out. Things have been going a bit better in recent weeks, but if he has do something or arrange something, he breaks out in a sweat. Young family, council member, party leader of the municipal council. Gets up in the morning with children. Then, a walk, household chores, lunch, and another walk after lunch. Tired at the end of the afternoon.

Sleep Problems

In contrast to other transdiagnostic symptoms, sleep problems were explored into more detail. The type of sleep problem (e.g. problems falling asleep, disturbed sleep, early awakening) was almost always recorded in the consultation notes. The duration of sleep problems was frequently described, though quantitative descriptions, for example how many hours of sleep were lacking.

Case 123 (Woman, 22 years; Diagnosis, ICD-10 F43.2, Adjustment Disorder)

Has had symptoms for two months, which started with sleeping problems. Falling asleep, worrying, emotional for six months now. Has already been to the GP for medication, sleeping pills, but too many side effects. Now goes to psychiatrist who diagnosed autism disorder for which Wellbutrin was prescribed. Also effective for ADD [attention deficit hyperactivity disorder], which she has had since she was 14. Zopiclone for sleeping for one week now. Current symptoms: sleeping problems, now falls asleep, but wakes up and then can't sleep anymore. Contact with employer is good. When she has obligations during the day, her sleep is even worse.

Vegetative Symptoms

Vegetative symptoms such as feeling miserable, dyspnoea, palpitations and sweating were mentioned in consultation notes, but were usually not explored in detail. Sometimes the duration and temporal course of vegetative symptoms were recorded.

Case 193 (Man, 57 years; Diagnosis ICD-10: K92.9, Disease of Digestive System, Unspecified)

Weight loss, stomach complaints, severe inflammation in the stomach. Sleeps diagonally with a back support, takes medication for sleeping, because wakes up a lot; is very tired, now weighs 61 kg, is also very thin. There is no cancer, was told that the oesophagus looks good, is very tired in particular, with few pain symptoms.

Case 43 (Man, 62 years; Diagnosis ICD-10: I21.9, Acute Myocardial Infarction, Unspecified)

After cycling with friends, he was sitting on the sofa at home and got severe chest pain and felt nauseous. Called 112, five days hospitalisation. Angioplasty and stent with medication. Starting with two days of cardiac rehabilitation a week, he is tired.

Cognitive Symptoms

The cognitive symptoms recorded in the consultation notes were almost always difficulties concentrating and sometimes memory loss. These symptoms were not further explored into more detail. In some electronic health records, the cause, duration and course over time were recorded.

Case 79 (Man, 37 years; Diagnosis, ICD-10 F43.2, Adjustment Disorder)

Reduced concentration, forgetful, unable to take action, emotional, easily irritated. The GP has referred him to the mental-health specialised general physician assistant. He sees various things at work as causes: understaffing, new working methods, things that do not work properly, and private matters; he has a lot to deal with at home, with neighbours who cause nuisance, which often disturbs his sleep.

Physical Symptoms

Physical symptoms were sporadically found in consultation notes. Usually, the consequences for daily functioning were described and sometimes the duration and course of physical symptoms over time.

Case 65 (Woman, 44 years, Diagnosis ICD-10: M79.606 Pain in Leg, Unspecified)

Problems with right leg since August/September. Decreased right hip strength. Wednesday afternoon was no longer able to stand. Symptoms limitations now pain in the upper leg and right hip, not getting any better yet, constantly present, more pain at the end of the day. Does not take any medication. If sitting on the couch for too long, watching TV for 1–2 h, has to switch positions, otherwise, the pain increases. Bending over and getting back up hurts. Walking is fine, running is not. Also not allowed to play football.

If the diagnosis was clear, particularly in case of musculoskeletal injuries such as a broken clavicula or distorted ankle, the consultation notes included no or few transdiagnostic symptoms.

Case 37 (Man, 50 years; Diagnosis ICD-10: S42 Clavicular Fracture)

Fell off a mountain bike, on his left shoulder, hospital clavicle displaced. A torn ligament. Now sling and physiotherapy, doing exercises at home. Is right-handed. Medication: paracetamol for sleeping. Check-up with surgeon on 18 June.

Discussion

The present study explored somatic and psychological transdiagnostic symptoms in electronic health records of sick-listed employees. Using a thematic analysis, seven groups of transdiagnostic symptoms were identified: psychological symptoms, pain, fatigue, sleep symptoms, vegetative symptoms, cognitive symptoms and physical symptoms. In the consultation notes, we found brief descriptions of the cause, severity, duration and temporal course of transdiagnostic symptoms. However, the transdiagnostic symptoms themselves were not described in great detail, except for sleep problems. The seven groups of transdiagnostic symptoms were differently distributed across the ICD-10 diagnostic categories, except for pain which was common in all diagnostic categories.

Main Findings in Relation to Existing Research

The categories of transdiagnostic symptoms are in line with the symptom categories found in previous studies [9]. Neijenhuis et al. identified psychological symptoms, pain, fatigue, insomnia, concentration and memory problems, and physical symptoms by applying machine-learning techniques to self-reports of 1032 cancer patients [27]. The authors also found constipation, diarrhoea, nausea, vomiting, loss of appetite, and shortness of breath. In the present study symptoms were thematically categorised as vegetative symptoms [28]. Other symptoms, such as problems with intimacy/sexuality, hearing problems and tinnitus, could not be confirmed in our study.

In a Danish population-based study (DanFunD), fatigue and combinations of musculoskeletal pain with general or gastrointestinal symptoms were found to be associated with poorer self-perceived health [20]. Our study added that besides these somatic symptoms, psychological symptoms are very common among sick-listed employees, particularly in the diagnostic categories of mental disorders, neurological disorders and cardiovascular disorders. Persistent somatic symptoms such as pain or fatigue have significantly poorer health and work outcomes when combined with

psychological symptoms. Senger et al. reported that depression and health anxiety were predictors of poor therapy outcomes in patients with persistent somatic symptoms [29]. Psychological symptoms were associated with longer sickness absence in employees with somatic disorders [30, 31]. Furthermore, for disability pension benefit analysis, fear of negative evaluation, fatigue, concentration problems, negative alterations in mood, and dissociative symptoms showed the strongest association with functional impairment measures in a prospective study of Swiss outpatients of psychiatric units [32].

Psychological Symptoms, Pain and Fatigue were the Most Common Transdiagnostic Symptoms

Our finding that psychological symptoms were the most common transdiagnostic symptoms is in line with a recent systematic review by Harris et al. showing that symptoms such as worrying, feeling nervous, feeling sad, and feeling irritable were the most reported transdiagnostic symptoms in cancer patients [33]. In the consultation notes, there were indications of the duration and cause of psychological symptoms. The severity of symptoms was sometimes accentuated by using adverbs. The psychological symptoms themselves, however, were only mentioned and not further explored into more detail. In electronic health records linked with mental disorders, we found sequences of psychological symptoms which may indicate an attempt of occupational health providers to reach a diagnosis.

Pain was the second most common transdiagnostic symptom, and occurred across all diagnostic categories, even in employees sick-listed with mental disorders. For pain, the location and its consequences in terms of limitations for daily activities were mentioned, but not the type of pain. This contrasts with primary care physicians, who differentiate between nociceptive, nociplastic or neuropathic pain or a combination of these [34]. The fact that the type of pain was not explored in diagnostic detail is probably due to the role of occupational health providers in the Dutch healthcare system. Occupational health providers focus on assessing work ability, work limitations and work accommodations rather than diagnosing and treating medical conditions such as pain. Most sick-listed employees are already diagnosed with a disease when they first consult with an occupational health provider. This might explain why there were few or no transdiagnostic symptoms in the electronic health records of employees with clear diagnoses.

Fatigue as third most common transdiagnostic symptom was particularly found in the consultation notes of employees sick-listed with mental disorders. They referred to fatigue as feelings of tiredness and lack of energy, representing mental fatigue [35]. Alternatively, employees sick-listed with cardiovascular and gastrointestinal disorders referred to fatigue as a symptom limiting daily functioning, potentially representing physical fatigue [35]. However, in the consultation notes fatigue was not described in terms of mental fatigue or physical fatigue. Interestingly, fatigue was scarcely found in the consultation notes of employees with musculoskeletal disorders, while fatigue is one of the predominant symptoms for patients with rheumatic and musculoskeletal disorders [36]. Either the occupational health provider did not ask about fatigue, or it was not registered into the electronic health records.

Strengths and Limitations

An important strength of the study is that the results were representative of all 25,981 employees sick-listed with mental, musculoskeletal, cardiovascular, neurological or gastrointestinal disorders, the five most common causes for long-term sickness absence in the period from April 2019 to March 2020. Performing a qualitative analysis of electronic health records offered the opportunity to explore how symptoms were recorded and described. Furthermore, inductive content analysis of consultation notes without predefined theoretical framework allowed flexibility to study emerging patterns, themes, and concepts. As with all qualitative analyses, this approach involves researcher interpretations and may introduce subjectivity. To enhance analytic rigor, the coding process was iterative and involved repeated discussions within the research team to refine codes and interpretations. A limitation of the study is that analysing the consultation notes can only be as thorough as the information documented by occupational health providers with different styles of writing consultation notes. When transdiagnostic symptoms were expected but not reported (e.g. fatigue in employees with musculoskeletal disorders), we could not assess whether these symptoms were not discussed or not recorded by the occupational health provider. Finally, the consultation notes were recorded for practical purposes guiding sick-listed employees back to work. Hence, there were no predefined scientific criteria or guidelines for recording transdiagnostic symptoms. This type of information bias is inherent to health record studies [37]. Another limitation is the cross-sectional design, which prevents conclusions about temporal or causal relationships between transdiagnostic symptoms and sickness absence duration. Consequently, it is not possible to determine whether these symptoms preceded sick leave, emerged during the period of sick leave, or resulted from it.

Data saturation was operationalised pragmatically as the point at which no new symptoms emerged in ten consecutive health records. It is possible that some less common or context-specific symptoms were not captured in our sample. As with all qualitative analyses, our findings reflect the patterns

within the sampled dataset rather than being represent every possible symptom present in sickness absence records.

Future Research and Implications

Employees scarcely presented with a single symptom. A sequence of transdiagnostic symptoms from different thematic groups was frequently found in the consultation notes of sick-listed employees. [10, 38]Symptom profiles with multiple symptoms were shown to be associated with poorer self-reported health and poorer work outcomes [14]. Compared with single symptoms, symptom clusters are associated with worse patient outcomes in terms of reduced functional status and poorer quality of life [39–41]. Furthermore, symptom clusters are more predictive of healthcare use and mortality than single symptoms [10]. Furthermore, it may be more difficult to assess the quality of separate symptoms when multiple symptoms are experienced simultaneously [38].

The present study provides insight into transdiagnostic symptom groups in the occupational health care setting, examining a large sample of sick-listed employees diagnosed with one of the five most common causes for long-term sickness absence and work disability. This knowledge may support further research of transdiagnostic assessment of symptom clusters and transdiagnostic treatment aimed at underlying biopsychosocial mechanisms which contributes to a better understanding and a more personalised approach of patients with multiple symptoms.

Furthermore, we need knowledge about combinations of transdiagnostic symptoms (clusters) in relation to work outcomes. It has been recommended to monitor transdiagnostic symptom (clusters) over time to investigate whether transdiagnostic symptom clusters are stable or vary over time [4]. A monitoring instrument, which collects employee-reported transdiagnostic symptoms, could also bypass the potential underreporting of symptoms by occupational health providers, and thus provide a more integrated view of which symptoms occur in disease categories. Furthermore, the associations of transdiagnostic symptom clusters with sick-leave duration and return to work remain to be investigated. Knowing that employees with certain symptom clusters may be at risk of long-term sickness absence and work disability enables occupational healthcare providers to timely advise interventions aimed at facilitating return to work.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10926-026-10382-y.

Acknowledgements The authors wish to thank Manna Alma, Bo Krauze, Wia Barkema and Sheila Timp. Manna Alma, for methodological advice and design of this study. Bo Krauze and Wia Barkema for their administrative support, and finally Sheila Timp for data collection.

Author contributions All authors involved in designing the study. FM, MZ, CR contributed to the analysis. FM, TH, MZ, CR, SB contributed to the writing of the manuscript. All authors reviewed, discussed, and approved the manuscript.

Funding The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

Data Availability The data that support the findings of this study are available from the authors but restrictions apply to the availability of these data, which were used under license from Arbo Unie, Knowledge Institute for Work and Health, for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission from Arbo Unie, Knowledge Institute for Work and Health.

Declarations

Competing interests Muntinghe FOW and Roelen CAM receive salary from Arbo Unie as physicians. Arbo Unie had no role in conceptualisation, design, analysis, or the decision to publish.

References

1. Bültmann U, Nielsen MBD, Madsen IEH, Burr H, Rugulies R. Sleep disturbances and fatigue: independent predictors of sickness absence? A prospective study among 6538 employees. Eur J Public Health. 2013;23(1):123–8. https://doi.org/10.1093/eurpub/ckr207.
2. Standal M, Aasdahl L, Jensen C, Foldal V, Hagen R, Fors E, et al. Subgroups of long-term sick-listed based on prognostic return to work factors across diagnoses: a cross-sectional latent class analysis. J Occup Rehabil. 2021;31:383–392. https://doi.org/10.1007/s10926-020-09928-5.
3. Divita G, Luo G, Tran LT, Workman TE, Gundlapalli A, Samore M. General symptom extraction from VA electronic medical notes. Stud Health Technol Inform. 2017;245:356–60.
4. Miaskowski C, Barsevick A, Berger A, Casagrande R, Grady PA, Jacobsen P, et al. Advancing Symptom Science Through Symptom Cluster Research: Expert Panel Proceedings and Recommendations. J Natl Cancer Inst. 2017;109(4):djw253. https://doi.org/10.1093/jnci/djw253. (**PubMed PMID: 28119347**).
5. Fusar-Poli P, Solmi M, Brondino N, Davies C, Chae C, Politi P, et al. Transdiagnostic psychiatry: a systematic review. World Psychiatry. 2019;18(2):192–207. https://doi.org/10.1002/wps.20631.
6. Dalgleish T, Black M, Johnston D, Bevan A. Transdiagnostic approaches to mental health problems: current status and future directions. J Consult Clin Psychol. 2020;88:179–95. https://doi.org/10.1037/ccp0000482.

7. Löwe B, Zipfel S, Van den Bergh O, Henningsen P. Reconsidering persistent somatic symptoms: a transdiagnostic and transsymptomatic approach. Psychother Psychosom. 2024;94:1–6. https://doi.org/10.1159/000541741.
8. World Health Organization. International statistical classification of diseases and related health problems. 10th rev. 2nd ed. Geneva: World Health Organization; 2004.
9. Menting J, Tack CJ, Bleijenberg G, Donders R, Droogleever Fortuyn HA, Fransen J, et al. Is fatigue a disease-specific or generic symptom in chronic medical conditions? Health Psychol. 2018;37(6):530–43. https://doi.org/10.1037/hea0000598. (**PubMed PMID: 29781654.**).
10. Park SK, Larson JL. Symptom cluster, healthcare use and mortality in patients with severe chronic obstructive pulmonary disease. J Clin Nurs. 2014;23(17–18):2658–71. https://doi.org/10.1111/jocn.12526.
11. Amro A, Waldum-Grevbo B, Dammen T, Miaskowski C, Os I. Symptom clusters in patients on dialysis and their association with quality-of-life outcomes. J Ren Care. 2014;18:40. https://doi.org/10.1111/jorc.12051.
12. Moens K, Siegert R, Chantry-Taylor S, Namisango E, Harding R. Symptom clusters in people living with HIV attending five palliative care facilities in two Sub-Saharan African countries: a hierarchical cluster analysis. PLoS ONE. 2015;10:e0126554. https://doi.org/10.1371/journal.pone.0126554.
13. Petersen M, Wellnitz K, Carstensen T, Dantoft T, Ørnbøl E, Ahrendt Bjerregaard A, et al. Welfare benefit utilization for people with functional somatic disorder. A population-based cohort study. J Psychosom Res. 2025;191:112073. https://doi.org/10.1016/j.jpsychores.2025.112073.
14. Eurofond. Living and working in Europe 2017. Luxembourg: Publications Office of the European Union; 2018. https://doi.org/10.2806/603802.
15. European Agency for Safety and Health at Work (EU-OSHA). Occupational safety and health in post-pandemic workplaces. Bilbao: EU-OSHA; 2022.https://doi.org/10.2802/478476.
16. Jones AM, Koehoorn M, Bültmann U, McLeod CB. Impact of anxiety and depression disorders on sustained return to work after work-related musculoskeletal strain or sprain: a gender stratified cohort study. Scand J Work Environ Health. 2021;47(4):296–305. https://doi.org/10.5271/sjweh.3951. (**PubMed PMID: 33744976.**).
17. Lagerveld SE, Bültmann U, Franche RL, Dijk F, Zijlstra-Vlasveld M, Van der Feltz-Cornelis C, et al. Factors associated with work participation and work functioning in depressed workers: a systematic review. J Occup Rehabil. 2010;20:275–92. https://doi.org/10.1007/s10926-009-9224-x.
18. Gragnano A, Negrini A, Miglioretti M, Corbière M. Common psychosocial factors predicting return to work after common mental disorders, cardiovascular diseases, and cancers: a review of reviews supporting a cross-disease approach. J Occup Rehabil. 2018;28(2):215–31. https://doi.org/10.1007/s10926-017-9714-1. (**PubMed PMID: 28589524.**).
19. Linder J, Jansen G, Ekholm K, Ekholm J. Relationship between sleep disturbance, pain, depression and functioning in long-term sick-listed patients experiencing difficulty in resuming work. J Rehabil Med. 2014;46(8):798–805. https://doi.org/10.2340/16501977-1833.
20. Eliasen M, Jørgensen T, Schröder A, Dantoft T, Fink P, Poulsen C, et al. Somatic symptom profiles in the general population: a latent class analysis in a Danish population-based health survey. Clin Epidemiol. 2017;9:421–33. https://doi.org/10.2147/CLEP.S137167.
21. Deady M, Morris R, Harvey S, Glozier N. Changing prevalence of psychosocial occupational stressors and their impact on employee mental health across birth cohorts. J Epidemiol Community Health. 2025;79(8):jech-2024. https://doi.org/10.1136/jech-2024-223096.
22. Parikka S, Holm M, Suvisaari J, Lahti J, Reinikainen J, Tolonen H, et al. Past trends and future projections of psychological distress among general population in Finland Original research. BMJ Public Health. 2025;4(3–2):2026. https://doi.org/10.1136/bmjph-2024-002026.
23. Harris CR, Millman KJ, van der Walt SJ, Gommers R, Virtanen P, Cournapeau D, et al. Array programming with NumPy. Nature. 2020;585(7825):357–62. https://doi.org/10.1038/s41586-020-2649-2.
24. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3:77–101. https://doi.org/10.1191/1478088706qp063oa.
25. Forbush TB, Gundlapalli AV, Palmer MN, Shen S, South BR, Divita G, et al. Sitting on pins and needles": characterization of symptom descriptions in clinical notes. AMIA Jt Summits Transl Sci Proc. 2013;2013:67–71 (**PubMed PMID: 24303238**).
26. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349–57. https://doi.org/10.1093/intqhc/mzm042.
27. Neijenhuijs KI, Peeters CFW, van Weert H, Cuijpers P, Leeuw IVde. Symptom clusters among cancer survivors: what can machine learning techniques tell us? BMC Med Res Methodol. 2021;21(1):166. https://doi.org/10.1186/s12874-021-01352-4.
28. Paradiso S, Duff K, Vaidya JG, Hoth A, Mold JW. Cognitive and daily functioning in older adults with vegetative symptoms of depression. Int J Geriatr Psychiatry. 2010;25(6):569–77. https://doi.org/10.1002/gps.2376. (**PubMed PMID: 19806600.**).
29. Senger K, Schröder A, Kleinstäuber M, Rubel J, Rief W, Heider J. Predicting optimal treatment outcomes using the Personalized Advantage Index for patients with persistent somatic symptoms. Psychother Res. 2021;32(2):165–178. https://doi.org/10.1080/10503307.2021.1916120.
30. Terluin B, Rhenen W, Anema J, Taris T. Psychological symptoms and subsequent sickness absence. Int Arch Occup Environ Health. 2011;84:825–37. https://doi.org/10.1007/s00420-011-0637-4.
31. Hoedeman R, Blankenstein N, Krol B, Koopmans P, Groothoff J. The contribution of high levels of somatic symptom severity to sickness absence duration, disability and discharge. J Occup Rehabil. 2010;20:264–73. https://doi.org/10.1007/s10926-010-9239-3.
32. Tanner J, Zeffiro T, Wyss D, Perron N, Rufer M, Mueller-Pfeiffer C. Psychiatric symptom profiles predict functional impairment. Front Psychiatry. 2019;10:37. https://doi.org/10.3389/fpsyt.2019.00037.
33. Harris CS, Kober KM, Conley YP, Dhruva AA, Hammer MJ, Miaskowski C. Symptom clusters in patients receiving chemotherapy: a systematic review. BMJ Support Palliat Care. 2022;12(1):10–21. https://doi.org/10.1136/bmjspcare-2021-003325. (**PubMed PMID: 34921000.**).
34. Bonezzi C, Fornasari D, Cricelli C, Magni A, Ventriglia G. Not all pain is created equal: basic definitions and diagnostic work-up. Pain Ther. 2020;9:1–15. https://doi.org/10.1007/s40122-020-00217-w.
35. Ishii A, Tanaka M, Watanabe Y. Neural mechanisms of mental fatigue. Rev Neurosci. 2014;13:25. https://doi.org/10.1515/revneuro-2014-0028.
36. Geenen R, Overman C, Christensen R, Åsenlöf P, Capela S, Huisinga K, et al. EULAR recommendations for the health professional's approach to pain management in inflammatory arthritis and osteoarthritis. Ann Rheum Dis. 2018;77(6):797–807. https://doi.org/10.1136/annrheumdis-2017-212662.
37. Tang AS, Woldemariam SR, Miramontes S, Norgeot B, Oskotsky TT, Sirota M. Harnessing EHR data for health research.

Nat Med. 2024;30(7):1847–55. https://doi.org/10.1038/s41591-024-03074-8.
38. Jurgens C, Moser D, Flayter R, Carlson B, Sethares K, Riegel B. Symptom clusters of heart failure. Res Nurs Health. 2009;32:551–60. https://doi.org/10.1002/nur.20343.
39. Doong SH, Dhruva A, Dunn LB, West C, Paul SM, Cooper BA, et al. Associations between cytokine genes and a symptom cluster of pain, fatigue, sleep disturbance, and depression in patients prior to breast cancer surgery. Biol Res Nurs. 2015;17(3):237–47. https://doi.org/10.1177/1099800414550394. (**PubMed PMID: 25304131**).
40. Illi J, Miaskowski C, Cooper B, Levine JD, Dunn L, West C, et al. Association between pro- and anti-inflammatory cytokine genes and a symptom cluster of pain, fatigue, sleep disturbance, and depression. Cytokine. 2012;58(3):437–47. https://doi.org/10.1016/j.cyto.2012.02.015. (**PubMed PMID: 22450224**).
41. Kim HJ, Barsevick AM, Beck SL, Dudley W. Clinical subgroups of a psychoneurologic symptom cluster in women receiving treatment for breast cancer: a secondary analysis. Oncol Nurs Forum. 2012;39(1):E20-30. https://doi.org/10.1188/12.ONF.E20-E30. (**PubMed PMID: 22201665**).