

Patients with Somatic and Comorbid Mental Disorders have Similar Psychological Capacity Impairment Profiles like Patients with Mental Disorders

Patienten mit komorbiden somatischen und psychischen Erkrankungen haben ähnliche Fähigkeitsbeeinträchtigungen wie Patienten mit psychischen Erkrankungen



Authors

Beate Muschalla¹ , Michael Jöbges²

Affiliations

- 1 Psychotherapy and Diagnostics, Technische Universität Braunschweig, Humboldtstraße Braunschweig Germany
- 2 Schmieder-Klinik, Eichhornstraße Konstanz, Germany

Key words

Somatic illness, chronic illness, mental disorders, capacities, comorbidities, ICF

Schlüsselwörter

Somatische Erkrankung, chronische Erkrankung, psychische Erkrankung, Fähigkeiten, Komorbidität, ICF

published online 30.06.2022

Bibliography

Rehabilitation 2023; 62: 86–93

DOI 10.1055/a-1839-5048

ISSN 0034-3536

© 2022. The Author(s).

This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (<https://creativecommons.org/licenses/by-nc-nd/4.0/>)

Georg Thieme Verlag KG, Rüdigerstraße 14,
70469 Stuttgart, Germany

Correspondence

Prof. Dr. B. Muschalla
Technische Universität Braunschweig
Psychotherapy and Diagnostics
Humboldtstraße 33
38106 Braunschweig
Germany
b.muschalla@tu-braunschweig.de

ABSTRACT

Objectives In patients with somatic illness and additional mental disorder, not only motor or sensory functions may be impaired, but also psychological capacities. These become more and more important for work ability in our modern working world. There are presently no data about the type and distribution of psychological capacity impairments in patients with comorbid somatic and mental disorders. These data are however important for estimation of diagnostic and therapy requirements.

Methods 402 orthopedic, cardiological, and neurological patients with additional mental disorders were investigated with a structured clinical assessment for mental disorders (MINI) and psychological capacity impairments (Mini-ICF-APP).

Results In all three somatic indications at least half of the comorbid patients had any clinically relevant psychological capacity impairment. Neurological patients (67%) and orthopedic patients (72%) were more often affected than cardiological patients (50.5%). Orthopedic patients are slightly more impaired in self-care; neurological and orthopedic patients are more impaired in mobility; and cardiological patients are less impaired in assertiveness.

Conclusion In comparison of all three somatic patient groups with mental disorders the number of psychological capacity impairments is similar. In contrast to patients with mental disorders only (i. e. those without somatic comorbidity), the psychological impairment quality in comorbid patients may be influenced by the somatic illness. The data from this study are important in order to estimate diagnostic and therapeutic needs, such as capacity training or compensation of psychological capacity impairments.

ZUSAMMENFASSUNG

Hintergrund und Ziel Bei Patienten mit komorbiden somatischen psychischen Erkrankungen können nicht nur motorische oder sensorische Funktionen beeinträchtigt sein, sondern auch psychische Fähigkeiten. Letztere werden in unserer modernen Arbeitswelt immer wichtiger für die Arbeitsfähigkeit.

Über die Art und Verteilung von Beeinträchtigungen der psychischen Leistungsfähigkeit bei Patienten mit komorbiden somatischen und psychischen Erkrankungen liegen derzeit keine Befunde vor. Solche Daten sind jedoch wichtig für die Abschätzung des Diagnose- und Therapiebedarfs.

Methode 402 orthopädische, kardiologische und neurologische Patienten mit zusätzlichen psychischen Erkrankungen wurden mit einem strukturierten Interview für psychische Erkrankungen (MINI) und psychischen Fähigkeitsbeeinträchtigungen (Mini-ICF-APP) untersucht.

Ergebnisse Bei allen drei somatischen Indikationen wies mindestens die Hälfte der komorbiden Patienten eine klinisch relevante Beeinträchtigung der psychischen Leistungsfähigkeit auf. Neurologische Patienten (67%) und orthopädische Patienten (72%) waren häufiger betroffen als kardiologische Patienten (50.5%). Orthopädische Patienten waren etwas stärker in der Selbstversorgung beeinträchtigt. Neurologische und orthopädische Patienten waren stärker in der Mobilität beeinträchtigt, und kardiologische Patienten waren weniger stark in ihrem Durchsetzungsvermögen beeinträchtigt.

Schlussfolgerung Im Vergleich aller drei somatischen Patientengruppen mit psychischen Erkrankungen ist die Anzahl der Beeinträchti-

gungen der psychischen Leistungsfähigkeit ähnlich. Im Gegensatz zu Patienten mit ausschließlich psychischen Erkrankungen (d. h. ohne somatische Komorbidität) wird die Qualität der psychischen Beeinträchtigungen bei komorbiden Patienten durch die somatische Erkrankung beeinflusst. Die Daten bieten eine Grundlage für die Einschätzung diagnostischer und therapeutischer Bedarfe bzgl. Fähigkeitstrainings oder Kompensation von chronischen psychischen Fähigkeitsbeeinträchtigungen.

ABBREVIATIONS

DSM	Diagnostic and Statistical Manual for Mental Disorders
ICF	International Classification of Functioning, Disability and Health
Mini-ICF-APP	Observer rating for psychomental capacity impairments
MINI	Mini International Neuropsychiatric Interview

Introduction

Mental disorders occur in about one-fourth of the general population. They are often chronic and coming along with enduring psychological capacity impairments and work performance problems [1]. Similar to the general epidemiology [2], also a relevant amount of patients with somatic diseases suffer from comorbid mental disorders [3]. In some cases, these are true comorbidities, i. e. independent mental disorders which in most cases have already been present for a long time and even before the somatic illness. In other cases, mental health problems occur as a by-phenomenon due to a somatic illness, e. g. problems in affect regulation after a stroke or heart infarction, or anxiety which may arise after acute somatic event or acute treatment [4]. Anyway, when there are mental health symptoms, psychological capacities may be impaired.

Psychological capacities become more and more important for work ability in most professions [5] and in daily life.

Comorbidity may potentially increase the degree of psychological capacity impairment [6, 7]. In patients with comorbid somatic and mental disorders, not only motor or sensory functions may be impaired, but also psychological capacities. But, in contrast to patients with mental disorders only, the impairment in comorbid patients can be partly due to the somatic illness. For example, an *agoraphobic patient (mental disorder)* cannot use the bus because s/he is afraid of a panic attack. An *orthopedic patient (somatic disorder)* may be unable to use the bus because s/he cannot step in (capacity impairment due to a somatic problem). In addition, an orthopedic patient may be unable to use the bus because s/he is afraid that s/he cannot step in (capacity impairment due to a somatic-associated anxiety problem), or because s/he is afraid of a panic attack (capacity impairment due to an additional anxiety problem besides the somatic problem).

There are presently no data about the type and distribution of psychological capacity impairments in patients with comorbid somatic and mental disorders. These data are however important for estimation of diagnostic and therapy requirements. Furthermore, description of type and degree of psychological capacity impairments is essentially for work ability description, which is an important task in psychosomatic medicine. This research takes a first step to fill this gap by investigating capacity impairment in patients who suffer from mixed somatic and mental disorders at the same time.

Objectives are:

1. How many of patients with comorbid somatic and mental disorders suffer from *clinically relevant psychological capacity impairments* according to Mini-ICF-APP?
2. Do patients with *different somatic diseases* and mental disorders have *different psychological capacity impairments*?
3. Do patients with somatic and mental disorders have *similar or different psychological capacity (impairment) profiles* than patients with mental disorders?

Materials and Methods

Study design and setting

Incoming patients in three rehabilitation clinics (cardiology, orthopedy, neurology) were investigated in a diagnostic interview in 2012–2014. According to the clinic's quality report of the period the investigation took place, cardiological patients were most often treated in the clinic due to ICD diagnosis of state after acute myocardial infarction (30.2%), essential hypertension (31.4%), chronic ischemic heart disease (14.0%) [8]. Orthopedic patients were most often treated due to koxarthrosis (22.2%), gonarthrosis (19.3%), and other disc damages (13.6%). Neurological patients (physis D)

were treated most often due to state after brain insult (41.3%), multiple sclerosis (4.8%), hemiparesis and hemiplegia (3.5%) [8].

All patients admitted to the three clinics who were aged 18–64 years, who were mobile and cognitively able to participate in the routine rehabilitation program, were invited for participation in the study. These consecutive patients got an initial date in their rehabilitation schedule which included information on the study and agreement for participation. If they agreed to participation, a structured interview was done including sociodemographic and work characteristics, followed by present and lifetime mental disorders, assessed with the Mini International Neuropsychiatric Interview (MINI [9]). If patients fulfilled criteria of any mental disorder according to MINI, these patients were additionally investigated concerning psychological capacity impairments according to the Mini-ICF-APP [10].

These interviews lasted about 60–90 minutes and were all conducted by the same behavior therapist who had more than ten years of training in rehabilitation medicine and diagnostic of capacity impairments (B.M.). From 1619 patients invited, 1610 participated in the diagnostic interview (505 cardiological, 290 orthopedic, 815 neurological). 402 patients reported mental disorders according to the MINI and were additionally interviewed concerning psychological capacity impairments (Mini-ICF-APP).

Patients participated in this study with written informed consent. The study was reviewed and approved by the ethics and data protection committee of the University of Potsdam.

Instruments

Capacity impairments assessed with Mini-ICF-APP. The Mini-ICF-APP [10, 11] is an observer rating instrument that is internationally evaluated and translated [12–15] and established in social medicine [16–19] to measure capacity impairments in the context of mental disorders. It offers a selection of capacity dimensions derived from the WHO's *International Classification of Functioning, Disability and Health*, ICF. The Mini-ICF-APP capacity impairment assessment is observer rated and the usual time frame for present capacity impairment is the last two weeks. It has been validated with the Groningen Social Disability Interview [20].

The Mini-ICF-APP assesses psychological capacities which are often required in modern life and work contexts, and which are often impaired due to mental disorders. The capacity dimensions have been derived by content analysis with reference to the chapter of activities and participation of the ICF [21]. The thirteen capacity dimensions are assessed with the Mini-ICF-APP: (1) adherence to regulations, (2) planning and structuring tasks, (3) flexibility, (4) applying expertise, (5) capacity to judge and decide, (6) endurance, (7) assertiveness, (8) contacts with others, (9) teamwork and group interaction capacity (10) dyadic relationships, (11) proactivity, (12) self-care, and (13) mobility. Each dimension is explored by the interviewer according to the manual [10, 11], and the impairment is rated on a five-point Likert scale: 0 = *no limitations*, 1 = *mild limitations without problems in the environmental context*, 2 = *moderate limitations causing problems in the environment*, 3 = *severe limitations causing problems and the necessity for assistance*, and

► Tab 1 Characteristics of patients from different somatic indications who suffer from chronic mental health problems. Means (standard deviation) for continuous variables are reported. Percentages for frequencies are reported. Chi²-Test and ANOVA (Overall analysis, and Post-Hoc tests with Bonferroni correction for multiple testing) have been calculated.

	Cardiology (n = 106)	Orthopedy (n = 64)	Neurology (n = 232)	All (N = 402)	Significance of difference between the groups (ANOVA, X ²) p
Gender male	70.8%	18.8%	48.7%	49.8%	.000
Age	52.42 (6.60)	50.80 (8.08)	49.30 (8.91)	50.36 (8.32)	overall test: .005 Pairwise comparisons: CvsN .004
Sick leave duration past 12 months in weeks	8.42 (14.74)	20.39 (21.13)	7.86 (15.33)	10.00 (16.82)	overall test: .000 Pairwise comparisons: OvsN .000 OvsC .000
Disability pension					.000
– planned	13.2%	21.9%	6.9%	10.9%	
– applied for	3.8%	14.1%	5.2%	6.2%	
Presently employed	77.1%	70.3%	84.8%	80.5%	.021
Number of lifetime mental disorders according to MINI	0.91 (1.16)	1.14 (1.45)	1.25 (1.46)	1.14 (1.39)	.074

Note: Overall test signals that there are any differences between the three groups. Pairwise comparisons (Post-Hoc tests in ANOVA) compare the indicative groups directly: CvsN Cardiology versus Neurology, OvsN Orthopedy versus Neurology, OvsC Orthopedy versus Cardiology.

► **Tab 2** Psychological capacity impairments according to Mini-ICF-APP in patients from different somatic indications who suffer from chronic mental health problems. Means (standard deviation) for continuous variables are reported. Percentages for frequencies of clinically relevant impairment (capacity impairment rating 3 or 4) and means of impairment (standard deviation) are reported. Chi²-Test and ANOVA (Overall analysis, and Post-Hoc tests with Bonferroni correction for multiple testing) have been calculated.

Mini-ICF-APP capacity dimensions (impairment degrees were rated 0–4)	Cardiology (n = 106)	Orthopedy (n = 64)	Neurology (n = 232)	All (N = 402)	Significance of difference between the groups (ANOVA, X ²) p
Adherence to regulations	0.59 (0.82) 2.8%	0.92 (0.96) 6.3%	0.83 (0.96) 7.7%	0.78 (0.93) 6.2%	Overall .038 X ² .230
Planning and structuring tasks	0.70 (0.85) 5.7%	0.83 (0.81) 3.1%	1.00 (0.97) 9.9%	0.89 (0.93) 7.7%	Overall .020 CvsN .020 X ² .135
Flexibility	1.41 (1.04) 15.2%	1.94 (0.85) 25.0%	1.67 (0.96) 22.3%	1.65 (0.98) 20.9%	Overall .002 CvsO .002 X ² .226
Capacity to judge and decide	1.25 (1.05) 15.2%	1.69 (1.02) 17.2%	1.50 (0.99) 17.8%	1.47 (1.02) 17.0%	Overall .016 CvsO .019 X ² .843
Endurance	1.76 (1.04) 26.4%	1.86 (1.06) 28.6%	1.92 (1.08) 36.8%	1.87 (1.07) 32.8%	Overall .470 X ² .126
Contacts with others	0.68 (0.99) 5.7%	0.89 (0.98) 3.1%	0.69 (0.95) 6.0%	0.72 (0.97) 5.5%	Overall .296 X ² .081
Teamwork capacity	0.71 (1.13) 8.6%	1.23 (1.27) 14.0%	0.86 (1.05) 6.9%	0.88 (1.12) 8.5%	Overall .012 CvsO .010 X ² .190
Assertiveness	1.26 (1.14) 16.2%	1.78 (1.17) 28.1%	1.41 (1.21) 26.7%	1.43 (1.20) 24.2%	Overall .021 CvsO .017 X ² .081
Mobility	0.31 (0.79) 4.7%	0.84 (1.16) 15.6%	0.65 (1.07) 10.3%	0.59 (1.03) 9.7%	Overall .002 CvsO .003 CvsN .014 X ² .058
Applying expertise	0.94 (1.1) 14.3%	1.38 (1.23) 25.0%	1.30 (1.15) 19.8%	1.22 (1.16) 19.2%	Overall .016 CvsN .025 X ² .214
Proactivity	0.56 (0.78) 1.9%	0.88 (0.93) 6.3%	0.72 (0.88) 5.2%	0.71 (0.87) 4.5%	Overall .067 X ² .309
Dyadic (familiar and intimate) relationships	0.56 (0.88) 3.8%	0.70 (0.90) 3.1%	0.60 (0.81) 0.9%	0.61 (0.84) 2.0%	Overall .564 X ² .159
Self care	0.42 (0.78) 1.9%	0.67 (0.93) 6.2%	0.40 (0.68) 1.7%	0.45 (0.75) 2.5%	Overall .031 OvsN .028
Any clinically relevant capacity impairment	50.5%	71.9%	67.0%	63.5%	X ² .004
Number of clinically relevant capacity impairment	0: 49.5% 1: 23.8% >1: 26.7%	0: 28.1% 1: 29.7% >1: 42.2%	0: 33.1% 1: 24.6% >1: 42.4%	0: 36.5% 1: 25.2% >1: 38.3%	X ² .014
Sum of clinically relevant capacity impairment	1.20 (1.81)	1.81 (1.97)	1.70 (2.03)	1.59 (1.98)	Overall .058
Mini-ICF-APP capacity limitations mean	0.88 (0.65)	1.20 (0.63)	1.05 (0.61)	1.03 (0.63)	Overall .004 OvsC .003 OvsN .056

Note: Overall test signals that there are any differences between the three groups. Pairwise comparisons (Post-Hoc tests in ANOVA) compare the indicative groups directly: CvsN Cardiology versus Neurology, OvsN Orthopedy versus Neurology, OvsC Orthopedy versus Cardiology.

4 = total limitations and exemption from all specific role duties in the context of reference. Anchor definitions for each item are provided in the rating manual [10]. Clinically relevant capacity impairments occur when an impairment has reached a quality which make assistance by thirds necessary. In the Mini-ICF-APP assessments, clinically relevant impairments are those rated with “3 = assistance is needed in order to fulfill the activities related to this capacity” or “4 = complete impairment”.

Inter-rater reliability varies from $r = .70$ (untrained raters) to $r = .90$ (trained raters) [10]. The Mini-ICF-APP has become a standard capacity assessment instrument in social-medicine, as guidelines show [17–19].

The Mini-ICF-APP exploration [10, 11] and rating was conducted with reference to the present work context of the patients (e. g. present workplace, or – if presently unemployed - any workplace on the general labor market). The choice of this context is according to the social medicine routine for work ability assessment in rehabilitation clinics.

Sociodemographic characteristics. In the interview, patients were asked whether or not they had planned or applied for disability pension, and about their cumulated sick leave duration in the past twelve months in weeks.

Mental disorders. All investigated patients were explored for mental disorders according to DSM criteria by means of the internationally established *Mini International Neuropsychiatric Interview* (MINI) [9], which covers the broad range of common mental disorders (anxiety, depression, adjustment, addiction, personality disorder).

Statistical analysis

Data have been analyzed with SPSS. Descriptive statistics (► **Tab. 1**), and group comparisons by Chi²-Test (► **Tab. 2**) or T-Test for independent samples (► **Fig. 1**), and analysis of variance (ANOVA, with Bonferroni correction) have been calculated. An additional covariance analysis was conducted in order to check for influence of selected sociodemographics.

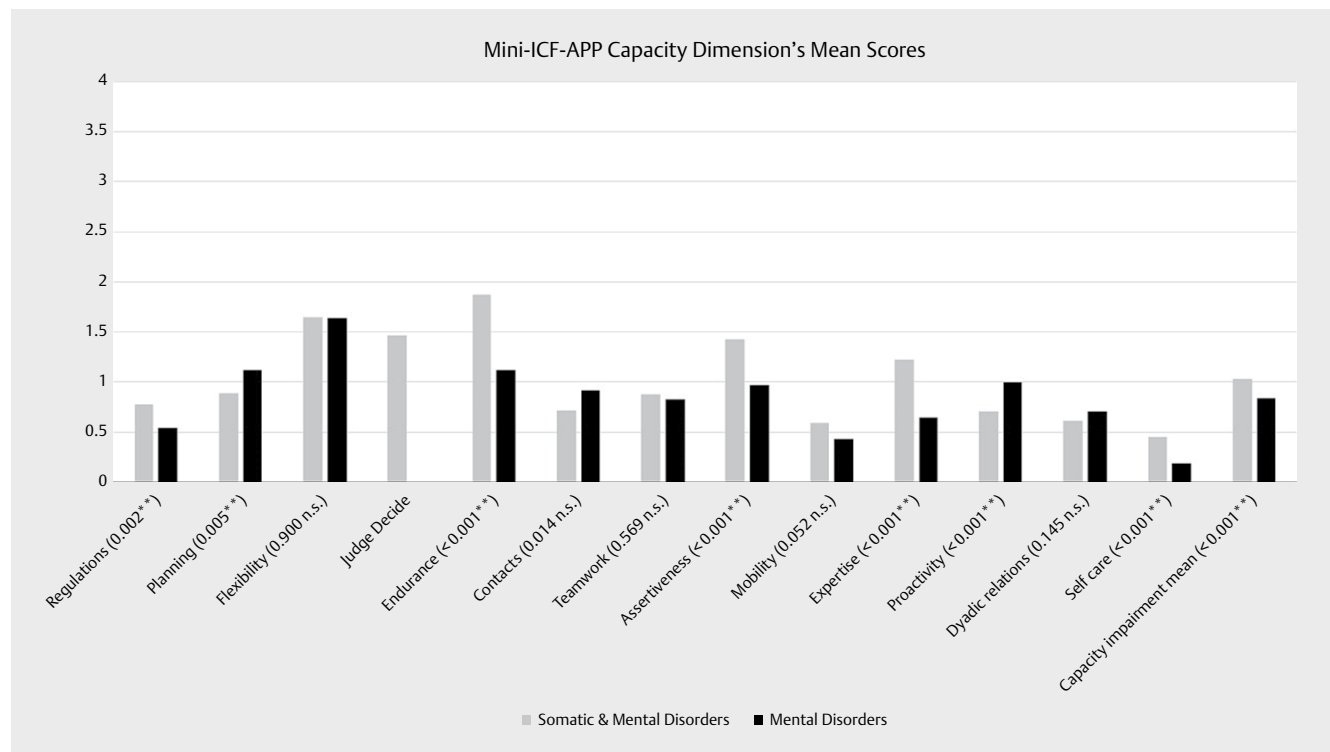
Results

Patients' characteristics

From 1619 patients invited, 1610 participated in the diagnostic interview (505 cardiological, 290 orthopedic, 815 neurological, ► **Tab. 1**). 402 patients reported additional mental disorders and were additionally interviewed concerning psychological capacity impairments. Patients were on average 50 years of age. 11 % planned and 6 % have already applied for disability pension.

Men were overrepresented in cardiology (70 %), and women in orthopedy (81.2 %).

Orthopedic patients had most often applied for disability pension (14 %), had longest past sick leave durations (20 weeks). Number of mental disorders was similarly distributed in the three indications. In orthopedic patients, there were tendentially more often hypochondriasis (O: 4.4 %, C: 3.6 %, N: 0.8 %, $p = .085$, Chi²-Test) and agoraphobia (O: 29.4 %, C: 7.1 %, N: 12.9 %, $p < .001$, Chi²-Test), i. e. anxiety syndromes with avoidance behavior.



► **Fig 1** Capacity impairments according to Mini-ICF-APP in patients with somatic and mental disorders and patients with mental disorders (cited from Linden et al., 2009). Means and significance level of differences in independent T-tests are reported.; Note: Judgment and decision making was not included in the early Mini-ICF-APP version used in 2009. Therefore data of psychosomatic rehabilitation patients are only available from the present (psycho-somatic comorbid) study cohort.

Frequencies of clinically relevant capacity disorders

In all three somatic indications at least half of the patients had any clinically relevant capacity impairment (i. e. rating 3 or 4, with need for support from thirds). Neurological patients (67 %) and orthopedic patients (72 %) were more often affected than cardiological patients (50.5 %) (► **Tab. 2**). 25.2 % of all patients had one clinically relevant capacity impairment, and 38.3 % had two or more capacity impairments. In orthopedic and neurological patients, 42 % had two or more capacity impairments.

Types of capacity impairments in different somatic diseases

Capacity impairments vary slightly, but are on average rather similarly distributed in the three groups of patients (► **Tab. 2**). There is a tendency that orthopedic patients are slightly more impaired in self-care, neurological and orthopedic patients more impaired in mobility, and cardiological patients are less impaired in assertiveness.

Altogether, orthopedic patients are most frequently impaired with any clinically relevant capacity impairment (O: 71.9 % as compared to C: 50.5 and N: 67 %), and have on average the highest impairment mean score over all 13 capacity dimensions ($M_O = 1.20$ versus $M_C = 0.88$ and $M_N = 1.05$).

Because the patient groups are naturally varying in composition of gender and some basic characteristics, an additional analysis with covariates age, gender and sick leave duration has been conducted. Significant influences were seen for past sick leave duration (Pillai trace $p = .002$), and gender ($p = .042$), which were not equally distributed in the three samples. There were no differential effects related with age ($p = .917$).

Capacity impairments in patients with mental disorders as compared with patients with mental and somatic illness

In order to compare capacity profiles of patients with mental disorders to our here investigated comorbid patients, we refer to findings from an investigation in 213 psychosomatic rehabilitation patients with diverse common mental disorders [10] (without treatment-relevant severe acute or chronic somatic illness). The patients with mental disorders were mostly women (70 %), on average 45 years old, 41 % were unfit for work at intake. 61 % had anxiety or stress-related disorders, 29 % affective disorders, and 10 % personality disorders.

T-Tests for independent samples have been calculated by using means and standard deviation data from the here investigated patients and the published data on the psychosomatic patients [10]. It can be seen that the overall profile of capacity impairments is similar in both groups (► **Fig. 1**): Flexibility, planning and structuring, and endurance were most strongly impaired in both groups, whereas mobility and self-care had comparatively low impairments.

In comparison with patients with mental disorders patients with mental and somatic disorders had stronger levels of capacity impairment in seven capacity dimensions (adherence to regulations, planning, assertiveness, expertise, proactivity, self-care, and especially endurance). But, they were similar in five other capacities: flexibility, contacts, teamwork, mobility, and dyadic relations. Dif-

ferences were on average not very strong: Cohens d effect size of difference in the overall capacity impairment degree was $d = 0.31$.

Discussion

Psychological capacity impairment occurs in patients with comorbid somatic and mental disorders

The here investigated typical rehabilitation patients with somatic diseases who suffer from comorbid mental disorders have in 50–70 % of cases relevant psychological capacity impairments. There is a similar ranking of the types of capacity impairment in all three somatic indication groups.

In comparison to patients with only chronic mental disorders the *profile of capacity impairments is similar* [10]. This makes sense, as it signals that patients with mental disorders have psychological capacity problems, may there be a comorbid somatic illness or not.

Orthopedic patients had highest capacity limitations and longest sick leave duration, and were also least often employed. Social-medicine status (sick leave) and employment status may thus be overall indicators for capacity limitations, which then need to be explored clinically in detail.

Specific psychological capacity dimensions may be affected by somatic disorders

Regarding the capacity dimensions in detail, there are two important findings:

Firstly, there is a range of capacities which were not higher impaired in comorbid patients than in those with mental disorders. These are flexibility, mobility, dyadic relations, proactivity, contacts, teamwork, planning and structuring.

The second finding is that *some capacity dimensions were stronger impaired* in patients with psycho-somatic comorbidity (than in mental disorder patients): endurance, assertiveness, expertise. This stronger impairment may give a hint that there are specific capacities which may be impaired by both somatic and mental disorder. Hereby comorbidity might increase the intensity of impairment. Our data give a hint that endurance might be one such capacity: Endurance can be needed on a cognitive, social or physical level. Endurance is a basic demand in a normal working day and here means to be able to work about eight hours. Patients with vital exhaustion due to any reason are often impaired in endurance. Vital exhaustion may occur in many somatic illness (e. g. after heart or brain insult), as well as in many mental disorders (e. g. depression or anxiety disorder). Therefore both mental as well as somatic disorder might impact on endurance.

Judging capacity impairment in clinical practice

An interesting and practically important aspect is what the capacity impairment data mean for clinical practice: On the first view, the overall degree of impairment might seem as not very high: the total score of capacity impairment is on average 1.3 on a scale from no impairment (0) to full impairment (4). But, there are 63.5 % of the investigated patients who have at least one clinically relevant impairment which means need for support, and 38 % with even more capacities relevantly impaired. This signals that patients with comorbid somatic and mental disorders have participation-rele-

vant problems. These mean an indication for rehabilitative action also in the domain of psychological aspects, especially endurance, flexibility, assertiveness, as has been discussed already from a clinical point of view [6, 7]. The overall mean score of capacity impairment over all 13 dimensions is of low relevance for clinical practice [11]. The assessed capacities are 13 different capacities which each for itself include very different activities (e. g. cognitive, interactional, and basic activities) and each capacity dimension may have a specific impact. A patient may have *only one impaired capacity*, such as mobility (e. g. patient cannot drive a vehicle due to agoraphobic anxiety), but in case this is a *relevant capacity* for him (e. g. the patient is bus driver), the patient is fully unfit for work due to his mobility impairment. In contrast, there might be other cases, in which several moderately impaired capacities do not impact very much in sum: E.g. a patient with moderate impairment in contacts, teamwork and dyadic relationships who is living on his own and has a single place office job, does not have severe consequences due to his interactional deficits. Thus, in clinical practice, impairment degree and needs for treatment cannot be concluded dependent on the overall mean score of capacity impairment [10]. Clinical exploration is needed to find out which capacities are relevant in daily and professional life and whether capacity demands cannot be fulfilled due to respective impairments the patient has in these dimensions. In the context of work ability, this relational description of a person's fit to specific demands is known as person-job-fit [22, 23], and it is also a core idea in the relational interactive health model of the ICF [21].

Limitations and Outlook

In this present study, we used the Mini-ICF-APP for assessment and description of quantitative capacity impairments. The Mini-ICF-APP is an internationally established assessment instrument and often used for social-medicine purposes in patients with mental disorders [11–19]. Other ICF-based instruments have been developed in the area of mental health as well [e. g. 24, 25]. We chose to use the Mini-ICF-APP here because it is the only instrument which consistently measures *psychological capacities* and nothing else. These thirteen capacities are relevant in daily and working life and which are often impaired by common mental disorders. The Mini-ICF-APP does not include symptoms, which is sometimes the case in other ICF-based measures. For example, the ICF items like “sensation of pain”, or “muscle power functions” which are included in an ICF core set [24] describe functional problems, but not capacities in the sense of activity groups. Furthermore, it could be questioned whether such specific ICF-items such as “hand and arm use” or “fine hand use” are important for assessment of impairment for the range of common mental disorders such as anxiety, depression, personality disorders. Such physical aspects might be relevant in rather specific (but not all, see frequency of disc problems) orthopedic or neurological disorders. In the investigated patient samples however, we find the broad range of mental disorders, and for psychological capacity impairment description (as is the aim here), psychological capacity dimensions are necessary. This study is a cross-sectional observation study and thus lacks an investigation of capacity impairments over the course of illness development. Further research should investigate whether and to which degree

psychological capacity impairments may decrease when the somatic or the mental illness (or both) is remitting.

Another further research question is, whether some somatic rehabilitation patients without mental disorders do also suffer from psychological symptoms and capacity impairments, and to which degree. Somatic illness may come along with mental health symptoms in the sense of accompanying symptoms which are not mental disorders as such [4]. For example, as neurological illness is by definition affecting brain functions and makes accompanying mental health symptoms in form of reduced mood and reduced learning ability, speech problems, memory problems, it may be that also patients with mental health problems due to somatic illness may suffer from psychological capacity impairments. Differential diagnostic of “somatic patients with accompanying mental health symptoms”, and “somatic patients with mental disorders” needs further research and differentiation, also on the level of capacity impairment diagnostic and treatment.

Conclusion

The findings from this study are important as they can help to estimate diagnostic and therapeutic needs in respect to psychological capacity training or compensation of capacity impairments in patients with chronic illness. The Mini-ICF-APP makes it possible to describe type and degree of psychological capacity impairment, which is an essential aspect in work ability decisions and descriptions [16–19]. It is also useful in somatic indications for patients with mental comorbidity, 63.5% of whom suffer from any psychological capacity impairment.

Clinical messages

- Patients with comorbid chronic somatic illness and mental disorders have similar psychological capacity impairments like patients with chronic mental health disorders.
- The data are important in order to estimate diagnostic and therapeutic needs in respect to psychological capacity training or compensation of capacity impairments in patients with both mental and somatic illness.

Research protocol approval

The study protocol (including research questions and outcome measures) was reviewed and approved by the German federal Pension Fund rehabilitation research review board.

Ethics approval and consent to participate

Patients participated in this study with written informed consent. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was reviewed and approved by the data protection committee of the Deutsche Rentenversicherung Bund and the ethics committee of the University of Potsdam in 2012.

Authors contribution

B.M. attracted the study's funding, planned and conducted the study, analysed the data and wrote the manuscript. M.J. assisted study conduction and added somatic medicine content to the research.

Acknowledgment

The manuscript underwent English language proofreading by Kelly GmbH.

Funding

This research has been financially supported by the German Pension Fund. 8011–106–31/31.107.

Conflict of interest

The authors declare that they have no conflict of interest.

References

- [1] Stansfeld SA, Clark C, Caldwell T, Rodgers B, Power C. Psychosocial work characteristics and anxiety and depressive disorders in midlife: the effects of prior psychological distress. *Occup Environ Med* 2008; 65: 634–642. doi:10.1136/oem.2007.036640
- [2] Wittchen HU, Jacobi F, Rehm J, Gustavsson A, Svensson M, Jönsson B, Steinhausen HC. The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* 2011; 21: 655–679. doi:10.1016/j.euroneuro.2011.07.018
- [3] Angermann CE, Ertl G. Depression, Anxiety, and Cognitive Impairment. Comorbid Mental Health Disorders in Heart Failure. *Curr Heart Fail Rep* 2018; 15: 398–410. doi:10.1007/s11897-018-0414-8
- [4] Linden M, Muschalla B. Standardized diagnostic interviews, criteria, and algorithms for mental disorders: garbage in, garbage out. *Eur Arch Psychiatry Clin Neurosci* 2012; 262: 535–544
- [5] Harvey SB, Modini M, Joyce S, Milligan-Saville JS, Tan L, Mykletun A et al. Can work make you mentally ill? A systematic meta-review of work-related risk factors for common mental health problems. *Occup Environ Med* 2017; 74: 301–310. doi:10.1136/oemed-2016-104015
- [6] Henning A, Meyer-Zier R. Psychische Symptome und Fähigkeitsbeeinträchtigungen bei neurologischen Erkrankungen. *Praxis Klinische Verhaltensmedizin und Rehabilitation* 2019; 108: 311–321
- [7] Neue DC, Schikora M. Psychische Funktionsstörungen und Fähigkeitsbeeinträchtigungen bei Patienten in der kardiologischen Rehabilitation. *Praxis Klinische Verhaltensmedizin und Rehabilitation* 2019; 108: 312–330
- [8] Michels KU, Michels KJ, Jöbges M, Hoffmann F. Qualitätsbericht 2014 Brandenburgklinik Bernau GmbH 2014 Online available via <https://www.michelskliniken.de/kliniken/brandenburgklinik-berlin-brandenburg/ihre-klinik/qualitaetsmanagement/>
- [9] Sheehan D, Lecrubier Y, Sheehan H, Amorim P, Janavs J, Weiller E et al. The Mini International Neuropsychiatric Interview: the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10 1998. *J Clin Psychiatry* 1998; 59: 22–33
- [10] Linden M, Baron S, Muschalla B. Mini-ICF-Rating für psychische Störungen (Mini-ICF-APP). Ein Kurzinstrument zur Beurteilung von Fähigkeits- bzw. Kapazitätsstörungen bei psychischen Störungen. [A short rating for capacity limitations in mental disorders (Mini-ICF-APP)]. Göttingen: Hans Huber 2009
- [11] Linden M, Baron S, Muschalla B, Ostholt-Corsten M. Fähigkeitsbeeinträchtigungen bei psychischen Erkrankungen. Diagnostik, Therapie und sozialmedizinische Beurteilung in Anlehnung an das Mini-ICF-APP. Göttingen: Hogrefe; 2015
- [12] Pinna F, Fiorillo A, Tusconi M, Guiso B, Carpiello. Assessment of functioning in patients with schizophrenia and schizoaffective disorders with the Mini-ICF-APP: a validation study in Italy. *Int J Men Health Syst* 2015; 9: 37. doi:10.1186/s13033-015-0030-x
- [13] Balestrieri M, Isola M, Bonn R, Tam T, Vio A, Linden M, Maso E. Validation of the Italian version of Mini-ICF-APP, a short instrument for rating activity and participation restrictions in psychiatric disorders. *Epidemiol Psychiatr Sci* 2012; 22: 81–91. doi:10.1017/S2045796012000480
- [14] Molodynski A, Linden M, Juckel G, Yeeles K, Anderson C, Vazquez-Montes M et al. The reliability, validity, and applicability of an English language version of the Mini-ICF-APP. *Soc Psychiatr Psychiatr Epidemiol* 2013; 48: 1347–1354. doi:10.1007/s00127-012-0604-8
- [15] Burri M, Werk LP, Berchtold A, Pugliese M, Muschalla B. Mini-ICF-APP Interrater-Reliability and development of Capacity Disorders over the Course of a Vocational training Program – A Longitudinal Study. *J Psychosoc Rehabil Ment Health* 2021 online published. *shared first authorship
- [16] Linden M, Muschalla B, Baron S, Ostholt-Corsten M. Exploration mittels Mini-ICF-APP. Arbeits- und Leistungsfähigkeitsbeeinträchtigungen bei psychischen Erkrankungen. Ein Fallbeispiel. Berlin: Deutsche Rentenversicherung.; 2018 Online abrufbar unter https://www.deutsche-rentenversicherung.de/SharedDocs/Downloads/DE/Experten/infos_reha_einrichtungen/klassifikationen/minicf.html
- [17] DRV Leitlinien für die sozialmedizinische Begutachtung. Sozialmedizinische Beurteilung bei psychischen und Verhaltensstörungen. Berlin: Deutsche Rentenversicherung Bund; 2012
- [18] SGPP Qualitätsleitlinien für psychiatrische Gutachten in der Eidgenössischen Invalidenversicherung. Bern: Schweizerische Gesellschaft für Psychiatrie und Psychotherapie und Schweizerische Gesellschaft für Versicherungspsychiatrie, 2012, 2016
- [19] AWMF. Leitlinie zur Begutachtung bei psychischen und psychosomatischen Störungen. Guideline for social medicine assessment in mental and psychosomatic illness. Günstburg: Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften, 2019
- [20] Wiersma D, DeJong A, Kraaijkamp HJM, Ormel J. The Groningen Social Disability Schedule. Manual and Questionnaires. Second Version. University of Groningen: Department of Social Psychiatry 1990
- [21] WHO. International Classification of Functioning, Disability and Health. Geneva: World Health Organisation, 2001
- [22] French JRP, Jr. Person role fit. *Occup Ment Health* 1973; 3: 15–20
- [23] Edwards JR, van Harrison R. Job demands and worker health: three-dimensional reexamination of the relationship between person-environment fit and strain. *J Appl Psychol* 1993; 78: 628–648
- [24] Brage S, Donceel P, Falez F. Development of ICF core set for disability evaluation in social security. *Disabil Rehabil* 2008; 30: 1392–1396. doi:10.1080/09638280701642950
- [25] Buchholz A, Spies M, Brütt L. ICF-basierte Messinstrumente zur Bedarfserfassung und Evaluation in der Behandlung von Patienten mit psychischen Störungen – ein systematisches Review. *Rehabilitation* 2015; 54: 153–159