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## Research Article

# Self-rating of depression in elderly prisoners in North Rhine-Westphalia, Germany

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## Abstract

**Aim:** Against the background of the rising number of elderly people being incarcerated and the rare data on this special subgroup, the aim of our study was to collect first empirical data on the affective state of elderly prisoners in North Rhine Westphalia, Germany.

**Methods:** Data were collected in nine German prisons. We included elderly prisoners from pretrial prevention, penal sentences, open enforcement, preventive detention and from special detention units for elderly inmates. For the evaluation of the affective state, we used the Patient Health Questionnaire (PHQ-9). Sociodemographic and crime-related characteristics were documented.

**Findings:** In total, n=116 prisoners (91.4% male) were included. The age ranged from 53 to 91 years (65.6±6.3 years). In our sample, 48% reported at least mild depressive symptoms, which is a significantly higher prevalence of depressive symptomatology than in the general population aged 60 years and older. Differences were found with regard to the type of detention, as prisoners in open enforcement showed significantly less symptoms compared to those in pretrial prevention and preventive detention. The participants reported in general more somatic symptoms as sleep disturbances and fatigue compared to mood items as feelings of sadness.

**Originality:** It is the first study assessing the affective state of older prisoners in Germany. The high rate of depressive symptoms in our sample is in line with findings from international studies underlining the need for adequate diagnostics and therapy. In addition, in a previous study depression was indirectly linked with a greater risk of re-incarceration, fortifying the need for successful treatment of depression in prison both for the individual and for society.

## Background

The proportion of older prisoners compared to younger prisoners is growing [1] but data on special needs or characteristics of this group is still rare. Regarding the mental health of prisoners, studies point to an increased prevalence of psychiatric disorders in general and depressive symptoms in particular: For example, in a recent review from the United States, the prevalence of mental illnesses among prisoners older than 55 years was reported to be 8-19%, with anxiety disorders and depression being the most common diagnosis [2].

Fazel, et al. [3] evaluated 203 prisoners aged 60 years and

older in England and Wales and found a depressive disorder in 29.6%. The prevalence of depressive illness was five times higher for older inmates compared to younger adult prisoners and elderly people in the community. Another study conducted in the United Kingdom found moderate depressive symptoms in 48% of older prisoners (55 years and older) and major depressive symptoms in 3% using the age-specific Geriatric Depression Scale [4]. O'Hara, et al. [5] reported similar frequencies among prisoners aged 60 to 81 years in England with 55% of the sample showed depressive symptoms.

Especially in older prisoners, many studies described an association of depression with chronic physical illness [3-6].



In a group of 121 prisoners aged 50 years or older (mean age 58.4 years) from England and Wales, the extent of depressive symptoms was associated with the type of crime committed. Offenders of violent crimes were more likely to be depressed, whereas depression was less common among offenders of sexual offenses. Prisoners over 65 years of age were also more likely to be depressed than their younger fellow prisoners [7]. Associated factors of depression in elderly inmates were number of sentences [8], duration of incarceration (Alemayeu, et al. 2019)) and the somatic diseases [9]. Some studies point to a link of depressive symptoms and cognitive deficits in particular (Verhuelsdonk, et al. 2020) but these findings are heterogeneous as other studies did not [10].

Explanations for the impairment of mental health in older inmates include having to spend the rest of their lives behind bars and possibly dying there, poorer physical health state, victimization by other prisoners, and perceived greater social isolation [6,11]. Possible reasons for high depression rates in prison in general, include the stressful, threatening and monotonous environment, separation from loved ones, or acclimatization to a life in which they are no longer seen as a productive member of society and have to give up roles [12].

Taken together, the prevalence of depression among older inmates is increased in prisons.

For Germany, only scarce data exist on prisoners' mental health stage: Dudeck, et al. [13] studied male prisoners with short sentences (up to three years). The average age of the sample was 31.2 years. They found affective disorders in 6.9% of the 102 prisoners. The prevalence of major depression was 3.9%. Another study (Schönfeld, et al. 2006) of 76 male prisoners found a prevalence of major depression of 10.5%. The mean age of the sample was  $34.1 \pm 10.6$  years. In a study by Meier (2015) 167 prisoners aged 50 to 74 years have been queried regarding their health state. Around 20% of the inmates reported a mental disease, however the type of mental illness was not addressed in detail.

In summary, there are no studies on the affective state of elderly inmates in Germany. In order to be able to offer adequate diagnosis and treatment, empirical data are needed for the special group of elderly prisoners (O'Hara 2016, Fazal, 2004). Thus, the purpose of the study was to gather first empirical data on the depressive state of elderly prisoners in Germany. The aims were to I) assess the prevalence of depression under consideration of severity degree and symptom patterns, and II) to analyze the association between depression and sociodemographic, cognitive- as well as crime-related variables.

## Methods

### Study design, participants and procedure

The data collection took place in nine prisons in North Rhine-Westphalia, Germany between 05/2018 and 08/2019. The assessments were part of an epidemiological cross-sectional study on the prevalence of cognitive dysfunctions in older prisoners (Verhuelsdonk, et al. 2020). After a positive

vote by the Ethics Committee at the Medical Faculty of the Heinrich Heine University in Düsseldorf (study number 6126R / registration ID: 2017084423) and the approval of the Ministry of Justice of the State of North Rhine-Westphalia, the prison staff selected those prisoners who met the inclusion criteria of the study. Inclusion criteria were being at the age 60 or above or being placed in a special unit for elderly inmates due to somatic illnesses.

Inmates with lack of German language skills, severe sensual or motor impairment and a documented severe mental disability leading to mental retardation were excluded.

Prior to data assessment, all participants gave written informed consent. We included inmates in pretrial detention, penal sentence, in open enforcement, special units for elderly inmates (penal sentence) and in preventive detention. The research was conducted in accordance with the Declaration of Helsinki. The study was registered in the German Clinical Trials Register (DRKS; ID: DRKS00014646).

### Materials

The prisoners were interviewed with regard to socio-demographic and health and crime-related data. Afterwards the neuropsychological examinations including cognitive testing and depression questionnaire were performed.

The results of the cognitive assessment are reported elsewhere (Verhuelsdonk, et al. 2020), and included cognitive screenings on global cognition (*Mini-Mental-Status-Examination* (MMSE): by Folstein, 1978; German adaption Kessler et al., 2000 and the *DemTect* [14], frontal functions (*Frontal Assessment Battery* (FAB) [15], and visuomotor speed and cognitive flexibility (*Trail-Making Test A and B* [16]).

For the assessment of the affective state, the *Patient Health Questionnaire* [17] was used. The questionnaire consists of nine items concerning the affective state; each question focuses on one of the main symptoms of major depression according to the DSM-IV: (Loss of pleasure depressed mood, sleep disturbances, fatigue, change in appetite, feelings of worthlessness, loss of concentration, psychomotor agitation/reduced psychomotor speed, suicidal thoughts). The maximum score is 27 points with higher scores indicating more depressive symptoms (mild depression: 5–9 points; moderate depression: 10–14 points; moderately severe depression: 15–19 points; severe depression: 20–27 points). A result of < 10 points was defined as a cut-off score for clinically relevant depression. Total scores were calculated based on items actually answered..

### Statistics

The data were analyzed using SPSS 25, and the significance level was set at  $p < 0.05$ . Due to the exploratory nature of the study, no alpha-adjustment was calculated.

For the descriptive statistics of the sociodemographic, crime-related and health-related data (including cognitive and affective status) mean scores and standard deviations or frequencies with percentages were indicated, as appropriate.

Normal distribution was tested using Kolmogorv-Smorinoff-Test. The sample was divided into five groups based on their type of detention.

Age-, sex-, and education-corrected z-scores were calculated for the MMSE and the TMT (transformation via [www.memoryclinic.ch](http://www.memoryclinic.ch)), classified according to Berres, et al. (2006).

Spearman's Rho was calculated for testing statistical significant correlations between the affective, cognitive and socio-demographic and crime related parameters.

An ANCOVA was conducted to compare the PHQ-9 scores of the different groups. Based on previous findings we controlled for number of somatic diagnoses, duration of detention, and number of previous detentions. Pairwise comparisons were calculated to detect differences between the forms of detention.

## Results

The sample consisted of N=116 participants. A high number of prisoners refused to participate in the study. A high number of prisoners refused to participate in the study. Unfortunately, the exact number was not documented by prison staff and specific reasons for denying and subject characteristics were not assessed as well. In the period of data collection there were about 560 inmates 60 years or older in North Rhine Westphalia. After written consent, no participant wished to discontinue the study. However, some missing information occurred, e.g. because the individuals were not able to name all of their diagnoses and medications, declined to give information on prior sentences or drug misuse or did not answer single PHQ-9 items.

In the sample were 106 male prisoners and 10 incarcerated women. Age ranged from 53-91 years with a mean of 65.6 years. The sociodemographic, crime-related as well as health-related characteristics of the sample are presented in Table 1. The study participants were asked about somatic as well as psychiatric diseases/diagnoses and their current medication, if known. Due to the sometimes rather vague information, the diagnoses were combined into different diagnosis groups. The most frequent diagnosis was cardiovascular diseases. On average, the inmates had 2-3 somatic diagnoses and most frequently were taking medication to lower blood pressure, e.g. beta-blockers and anticoagulation.

N=18 (15.5%) of the interviewed offenders reported having no relevant or known disease/illness. A total of 63 subjects (54.3%) reported multiple diagnoses. A history of traumatic brain injury was reported by n=19 subjects (16.4%). Furthermore, cardiovascular risk factors were asked.:

The final analysis of the depressive symptoms we included 105 prisoners, as 9 prisoners did not complete the PHQ-9. The sample could be classified in terms of the severity of the affective symptoms: Subjects without depressive symptomatology, those with minimal symptom expression, subjects with moderate depression, subjects with moderate severe depression and those with a severe depression. Figure 1 shows the distribution

of depressive symptom classifications for the whole sample. Almost half of the prisoners experienced some form of depressive symptomatology. Overall, 28% of prisoners showed a moderate to severe depressive symptomatology in respect of a clinically relevant depression.

Additionally, the prevalence of depression varies among the different prison groups. Using the cut-off-value of >9 to divide between depressive and non-depressive prisoners, 50% of the prisoners in preventive detention were classified as depressive. For those in pretrial detention, a prevalence of 46.2% was found, in open enforcement only 6.10% were depressed. 35% of those in penal sentence, and 40% of those in special closed detention units for the elderly were grouped as depressive.

In a next step the sample was divided into five groups based on their type of detention. Of those, 13 were in pretrial detention, 33 in penal sentences, 8 in preventive detention, 32 in open enforcement and 19 in closed detention for elderly. The mean PHQ scores per group and significant differences between the groups are depicted in Figure 2. According to the mean score, prisoners in preventive detention ( $M = 10.11$ ,  $SD = 2.24$ ) showed the most depressive symptoms, followed by those in pretrial detention ( $M = 9.94$ ,  $SD = 1.56$ ). The least depressive symptoms were shown by those in open enforcement ( $M = 3.75$ ,  $SD = 0.1$ ).

In a further step An ANCOVA was conducted to compare the PHQ-9 scores of the different groups while controlling for number of diagnoses, duration of detention, and number of detentions. The ANCOVA revealed that the groups significantly differed ( $F(4, 97) = 4.732$ ,  $p = 0.002$ ) in their depressive symptomatology as measured with the PHQ-9. The analysis showed that the number of diagnoses significantly influenced the depressive symptomatology ( $F(1,97) = 12.124$ ,  $p = 0.001$ ) as more diagnosis are associated with a more depressive symptoms.. In addition, the months of detention ( $F(1,97) = 0.401$ ,  $p = 0.528$ ) and the number of prison detentions ( $F(1,97) = 0.152$ ,  $p = 0.697$ ) had no significant influence on the depressive symptomatology. To find out which of the groups differ exactly, a pairwise comparison was performed. Subjects in pretrial detention ( $M = 9.94$ ,  $SD = 1.56$ ) were found to differ significantly from those in open enforcement ( $M = 3.75$ ,  $SD = 0.1$ ). Another significant difference was found between subjects in penal sentence ( $M = 8.73$ ,  $SD = 0.96$ ) and those in open enforcement ( $M = 3.75$ ,  $SD = 0.1$ ). Prisoners in preventive detention had the highest scores, but the difference to the other groups was not significant.

Figure 3 shows the percentage of answers for each item of the PHQ-9 for all groups combined. Due to attentional deficits, feelings of shame or fear or symptom unawareness, not all participants were able to complete the full questionnaire or refused answering single questions (10% for the item "Suicidal thoughts"), which resulted in missing values. The two most prevalent depression symptoms that were reported for at least several days a week were fatigue (57%) and sleep problems (56%) due to affective/mood disturbances.

Table 2 shows the results of a correlation analysis which was performed to explore relationships between the total score of PHQ and the single items as well and other variables



**Table 1:** Sociodemographic, Health- and crime –related Characteristics.

Characteristics	N	%	M	SD
<i>Sociodemographic characteristics</i>				
Age			65.6	6.3
Range: 53-90				
Gender				
Male	106	91.4		
Female	10	8.6		
Education			12.4	3.0
Range: 2-16				
Living Situation before incarceration				
Alone	55	48.2		
With family members	52	45.6		
In assisted living	1	0.9		
Shared apartment	3	2.6		
Homeless	3	2.6		
missing	2	1.8		
Job before incarceration				
Unemployed	15	13.2		
Illegal employment	2	1.8		
Employee	53	46.5		
Self - employed	15	13.2		
Pension	27	23.7		
Executive	2	1.8		
missing	2	1.8		
Country of Birth				
Germany	82	73.7		
Other	18	16.2		
missing	16	14.1		
<i>Health-related characteristics</i>				
Diagnostic Groups				
Cardiovascular diseases	95	81.8		
Hypertension	40	34.6		
Cerebral ischemia	7	6.0		
Diabetes	28	24.1		
Malignant neoplasms (CA)	12	10.4		
COPD	9	7.7		
Thyroid disease	8	6.9		
Hepatitis C	4	3.4		
Muscular – skeletal diseases	30	25.8		
Psychiatric Illnesses				
None	1	0.9		
Unipolar depression	9	7.8		
Addiction	5	4.3		
Personality disorder	1	0.9		
PTSD	1	0.9		
Missing	99	85.3		
Cognition				
MMSE			27.33	2.30
DemTect			12.63	3.36

FAB			13.68	2.98
TMT-A			-0.24	1.36
TMT-B			-0.30	1.23
Medication				
Antidepressants	3	2.6		
Neuroleptics	2	1.7		
Sedatives	2	1.7		
Alcohol consumption (before incarceration)				
Yes	60	53.1		
No	53	46.9		
missing	3	2.7		
Drug consumption (before incarceration)				
No	102	92.7		
Cannabis	2	1.8		
Heroin	3	2.7		
Cocaine	1	0.9		
missing	8	7.2		
<i>Crime-related characteristics</i>				
Committed Crime				
Homicide	15	13		
Manslaughter	10	8.7		
Sexual offense	24	20.9		
Bodily harm	4	3.5		
Arson	1	0.9		
Theft	16	13.9		
Fraud	29	26.1		
Threats	7	6.1		
Drug assaults	7	6.1		
Hostage taking	1	0.9		
Incarcerated (in months)			61.2	106.3
Total time spend incarcerated (in months)			66.0	70.6

**Abbreviations:** COPD: Chronic Obstructive Pulmonary Disease; PTSD: Posttraumatic Stress Disorder, TBI: Traumatic brain injury; MMSE: Mini Mental state Examination; DemTect: Dementia Detection Test; FAB: Frontal Assessment Battery; TMT: Trail Making-Test  
 Values are presented as the mean ± standard deviation or frequency with percentages, as appropriate

(age, education, cognitive measures, health- and crime related variables). The total PHQ-9 score only correlated with the number of diagnoses ( $r(106) = .27, p < .01$ ). Further, the number of diagnoses was associated with the PHQ-9 items loss of pleasure ( $r(108) = .23, p < .05$ ), sleep ( $r(105) = .20, p < .05$ ) and fatigue ( $r(105) = .24, p < .05$ ). Worthlessness was associated with a longer period of incarceration ( $r(79) = .26, p < .05$ ), the total time spend incarcerated ( $r(100) = .25, p < .05$ ), and the number of prison sentences ( $r(100) = .22, p < .05$ ). Psychomotor agitation was correlated with total incarceration time ( $r(103) = .20, p < .05$ ) and TMTA ( $r(99) = -.21, p < .05$ ). Concentration problems were associated with worse results on the DemTect ( $r(101) = -.26, p < .01$ ) and MMSE ( $r(106) = -.20, p < .05$ ), both are measures of global cognition. Additionally it was found that suicidal thoughts were related to lower scores on the DemTect ( $r(99) = -.23, p < .05$ ).

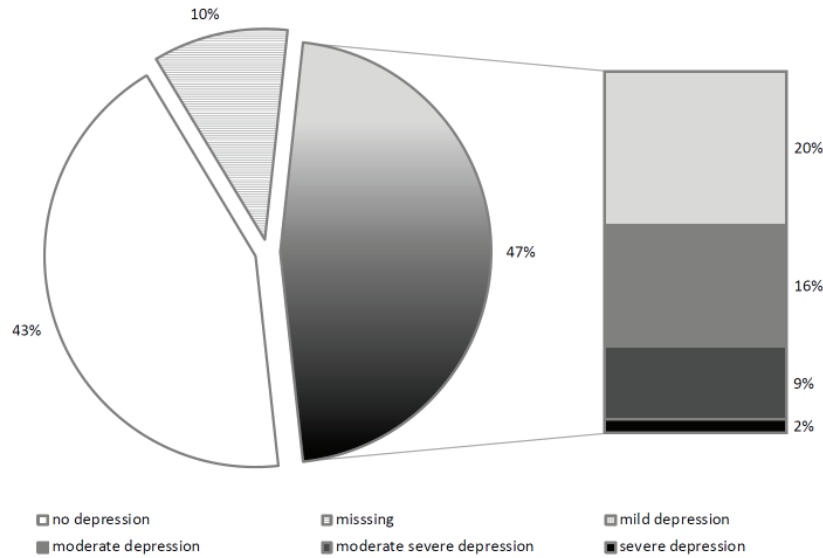


Figure 1: Distribution of depressive symptom classifications for the total sample.

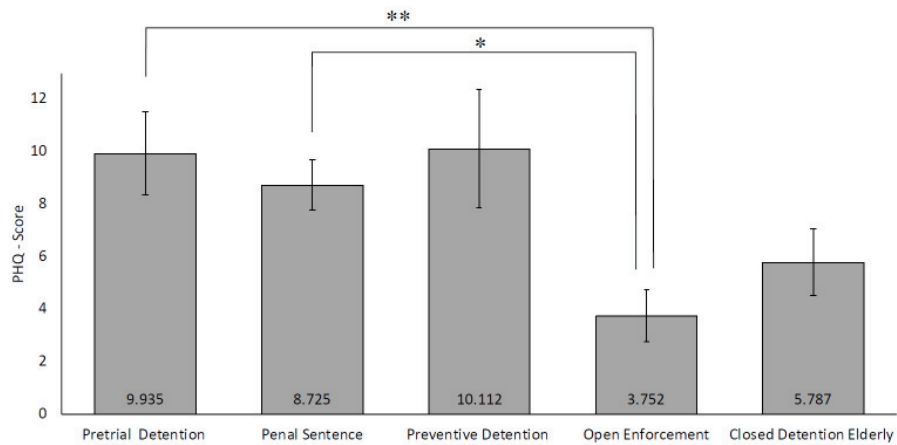


Figure 2: PHQ-9 scores per subgroup "type of detention"  
 Note: \*  $p < .05$ , \*\*  $p < .01$ .

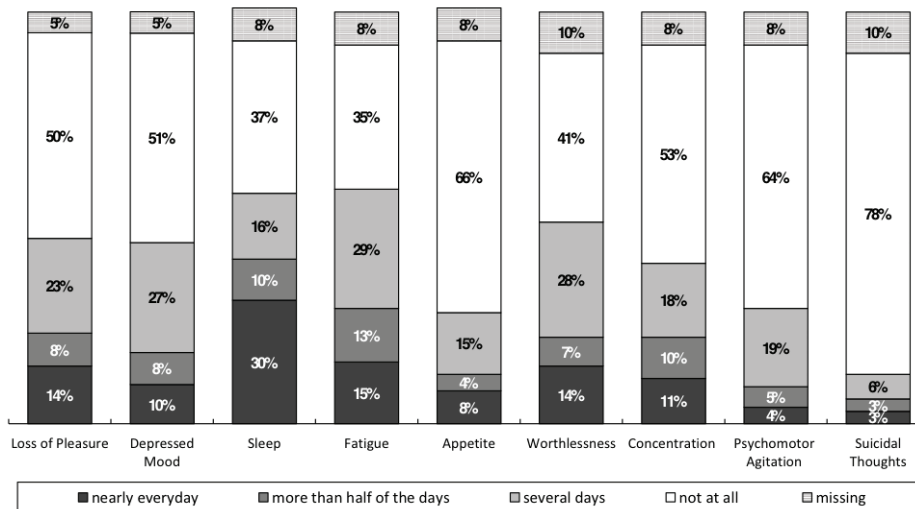


Figure 3: Percentage of answers for each item of the PHQ-9.

**Table 2:** Correlation analyses between the PHQ-9 and sociodemographic, crime-related and health-related variables.

Variable	Loss of Pleasure	Depressed Mood	Sleep	Fatigue	Appetite	Worthlessness	Concentration	Psychomotor Agitation	Suicidal Thoughts	PHQ Total
Age	.13	-.10	-.06	-.02	.09	-.12	-.07	-.07	.19	-.05
Duration of Incarceration	-.11	.11	-.05	.06	-.02	<b>.26*</b>	.14	.04	.06	.06
Incarcerated since months	-.08	.08	.01	.01	-.06	.15	.11	.15	-.07	.06
Total Incarceration Time	-.11	.04	-.04	-.08	.00	<b>.25*</b>	.17	<b>.20*</b>	-.07	.04
Education	.08	-.10	.05	.00	.12	-.18	-.11	-.17	-.12	-.06
FAB	.12	-.06	.13	-.01	.05	.14	-.03	-.09	-.08	.04
MMSE	.07	.10	.11	.03	.09	.14	<b>-.20*</b>	-.18	-.07	.05
TMTA	.04	.06	.07	-.05	-.17	.10	-.16	<b>-.21*</b>	.08	.01
TMTB	.02	.05	-.06	-.08	-.13	.17	-.18	-.17	.05	-.02
DemTect	-.04	-.13	-.07	-.13	-.04	.03	<b>-.26**</b>	-.19	<b>-.23*</b>	-.17
Number of Diagnoses	<b>.23*</b>	.14	<b>.20*</b>	<b>.24*</b>	.17	.03	.09	.10	.15	<b>.27**</b>
TBI	-.02	.00	.12	.00	-.10	.10	.01	.05	-.04	.08
Number of Prison Sentence	.00	.11	-.08	-.05	-.06	<b>.22*</b>	.06	.09	.00	.00

Note.\* p < .05; \*\* p < .01

**Abbreviations:** TBI: Traumatic Brain Injury; MMSE: Mini Mental State Examination; DemTect: Dementia Detection Test; FAB: Frontal Assessment Battery; TMT: Trail Making-Test

## Discussion

The purpose of the study was I) to collect first empirical data on the affective state of older prisoners in Germany and II) to detect associations of depression with single characteristics.

Taken together, the results demonstrate that nearly half of the study population showed depressive symptomatology to some extent, The PHQ-9 total score was only associated with the number of somatic diagnosis, while single items were correlated with crime characteristics and cognition, respectively.

## Prevalence

The main finding of the study was the high prevalence of depressive symptoms we found in our sample: This study found at least mild depressive symptomatology in 47% of the prisoners, according to the distinction of Kroenke, et al. [17].

It is also noteworthy that only 9.1% of those examined were without any depressive symptoms. 27% showed an at least moderate symptomatology, which is in line with other research in older prison population [4,5]. Additionally, the review of Kakoullis, et al. [18] pointed to a high frequency of depressive syndromes, which are diagnosed in up to 42% of the prisoners aged 50 and above.

We could also replicate a higher rate compared to the results of Kingston, et al. (2018) and Fitton, et al. [19], describing a higher prevalence of depression in inmates compared to the general population: The prevalence of depression for the German general population is given in the "Study on the Health of Adults in Germany" (DEGS1) - using also the PHQ-9 - as

varying from 4.2-4.5% for men aged 60 or above and 7.7-9.8% for women above the age of 60 [20]. Elderly people living in nursing homes or other institutions are even estimated to have a 12-month prevalence of 15-25 % [21].

The rate is also above the findings for younger inmates in prisons as reported by Kingston, et al. [7] and Dudeck, et al. [13]. A review of prisoner health by Fazel, et al. [22] reported a prevalence of depressive disorders of 10% for male prisoners in Western countries. A study of 8,574 prisoners in the state of Iowa [23] reported a prevalence of depression of 18%, and among prisoners aged 50 years and older, it was 20%.

In general the comparability of prevalence is limited due to different scales and cut-off-values used in the studies.

Nevertheless, a unified or prison-specific cut-off-value is missing: Barry, et al. [24] used a PHQ-9 cut of score of 15 and found 25% of older prisoners to be depressed.. Applying the cut-off score of 15 to the present study only 12% of prisoners were depressed, however some form of depressive symptomatology was found in almost half of the sample: A study in Ethiopia used the PHQ-9 with a cut-off-score of 5 and found a prevalence of depression in 45.5% of prisoners [25]. If we apply this cut-off value for our study sample to look for comparability between the Ethiopian and our sample, our population showed depressive symptoms in 47% of the prisoners, which is in line with the Ethiopian study results.

Only 7.8% of our sample reported having a depression diagnosis and only 2.6 were treated with an antidepressant, aligning with previous findings underlining that mental health issues among older prisoners are both underdiagnosed and undertreated as well [7].



In the present study, with a high incidence of depressiveness in the PHQ-9, suicidality, was the item with lowest scores in average. Nevertheless, 10% who openly admit to suicidal thoughts and in combination with the high number as missing values, which could be interpreted as an indication of a higher darkness rate, is a considerable proportion overall. A possible explanation for the high rate of missing data could be, that the prisoners may be reluctant to share these thoughts due to shame or fear of consequences (observation by officers).

An increased risk of suicide among prisoners has been demonstrated in many studies [26,27]. In Germany, from 2000 to 2013 suicide rates of elderly in prison exceeded the suicide rate of elderly living in the community and those of younger inmates [28]. They further revealed decreasing rates of suicide in this 13-year time period and identified being female and a lifelong sentence as risk factors for suicidality.

### Sociodemographic factors and depression

The second aim was to analyze possible factors associated with depression. We found no significant correlations between age and the PHQ-9 total score and the single PHQ-9 items. This contradicts the findings of Combalbert, et al. [10], who found lower depression with increasing age in a sample of older prisoners. Murdoch, et al. [4] also showed an association of age and depressive symptomatology, as determined by the Geriatric Depression scale (GDS), in their study of 121 prisoners over 55 years of age. In the general population, it could be observed that the prevalence of depressive symptomatology decreased with age [29]; in prisoners, it tended to be the other way around. This leads to the assumption that the development over life course in general could not be replicated for people in prison. Reasons can be suspected in the absence of protective factors, e.g. social relationships (Meltzer, et al. 1995; DeJong et al. 2007; Jacobi et al. 2014). It can be further assumed that the restrictive effects of imprisonment take impact in older people in particular and outweigh existing protective factors.

Against the findings of Baidawi & Trotter [1] we could not find an association of depression and level of education.

### Health-related characteristics and depression

Three quarters of the sample reported at least one physical illness. This is consistent with the poor health status of older offenders documented in international studies [2]. Also, a survey by Meier [30] could confirm, that three-quarters of the group reported at least one physical illness. Consistent with the results of other studies [2,5], cardiovascular diseases were reported in particular: in our sample n=95 prisoners reported having a cardiovascular disease (in most cases hypertension). The number of somatic diagnoses in total was the only parameter being significantly correlated with the severity of depressive symptoms. This is consistent with a study by [31] who found an association between depression and increased cardiovascular diseases in inmates. Chronic heart failure has shown to be a risk factor for the development of depression, and on the other hand many depressed patients exhibit an increased prevalence of chronic heart failure [32], which is

in line with our high rate of cardiovascular disease. The most common symptoms among prisoners in this study were sleep disturbance, and fatigue, both items were correlated with the number of somatic diseases.

Regarding association with global cognitive measures, we could not find a correlation between the PHQ-9 total score and the different cognitive measures, contradicting the findings of Murdoch, et al. [4].

Although there were no associations between the cognitive measures and the PHQ-9 total, there were some significant correlations with single items: The total score of the DemTect and the MMSE were significantly associated with loss of concentration. The items of the PHQ-9 "loss of concentration" and "psychomotor agitation" were significantly associated with the results of the TMT-A measuring psychomotor speed. A reduced psychomotor speed is known as typical symptom of a depressive disorder and an association was described in different studies [33].

### Crime-related factors and depression

Regarding the type of incarceration, we found significant differences in depression severity between inmates in open restriction, who showed significantly fewer depressive symptoms compared to penal sentences and pretrial detention. In general, external circumstances being associated with a restricted scope of action and/or feeling of loss of control are considered a risk for the development of a depressive disorder (Wittchen & Hoyer). This leads to the hypothesis that this caused the difference in our sample.

The current study found that prisoners in preventive detention have the highest depressive symptoms, followed by those in pretrial and those in penal sentence. This appears reasonable, as those in preventive detention face the lowest levels of freedom and the least chance of release. The lowest depressive scores were found in open enforcement, followed by those in closed detention units for older inmates. It can be hypothesized that those in open enforcement also benefit the greatest freedom compared to the other groups and can hope to live in freedom, resulting in the significantly lower depressive symptoms compared to those in pretrial detention and penal sentence. However, no significant difference could be found with those in preventive detention. In addition, the group was quite small (n = 8) which may increase the variability and thus, resulting in a difference. In the small subgroup of prisoners in preventive detention, n=4 (50%) scored above the cut-off for depression on the PHQ-9. This is in line with the result from a Norwegian study in preventive detention [34]. The author found 46.1% suffering from mild depression, but only when using the Montgomery Asberg Depression Rating Scale (with the Hamilton depression scale only 20% were classified as depressed) but study subjects, were of younger age compared to the prisoners in the current study

The symptom worthlessness was strongly associated with lifetime spent in prison and the duration of the sentence as well. This could be due to the fact, that many older prisoners

are balancing their own life, without having the possibility to change something (when spending the rest of life in prison).

### Limitations and strengths of the study

When considering the results some limitations have to be taken into account: First, there was a great heterogeneity in our sample regarding the detention related parameters. Additionally, the size of the subgroups was small. This may also explain the small differences regarding the type of detention. Future studies should include more prisoners in the single types of detention and larger sample size in total, respectively. On the other hand is the total size of the sample comparable to those of other studies. A possible bias could be that inmates with severe depression denied to participate due to reduced drive, so we found a mild depressive symptomatology in all subgroups.

Second, affective state was not evaluated with a clinical interview but only by a short questionnaire, which is unable to replace a clinical diagnosis. On the other hand, other studies use also only questionnaires, thus results can be easier compared.. Another critical aspect is the limited validity of self-rated information concerning the affective items of the PHQ-9, but also health status or the medication; many participants were unable to give precise answers as they could not name their medication and stated that they did not know the exact name of the diseases. This can lead to incompleteness and also incorrectness of the data. Future studies should try to get access to the official medical records of the prisoners.

Another limiting factor is the underrepresented number of women. However, this reflects the reality in prisons, and we decided to include this subgroup, especially because women generally receive little attention in the penal system and are in general at higher risk of depression [29]. Furthermore, women have a higher prevalence of depression in general. Although women are a minority in the special prison population, they should be studied more intensively in future studies.

Finally, data were based on the participants' self-reported information, so validity cannot be guaranteed. Especially, the answers to questions on misuse of drugs and alcohol in the past could be biased by social desirability [35].

One of the strengths of the study is the contribution it makes to the very limited number of studies on the topic in general and the complete lack of studies from Germany in particular.

### Implications for prison practice

Regarding the increased prevalence of depression, the question arises as to whether a depression existed already prior to incarceration and, if not, during what period of incarceration it manifested. Therefore, it would be helpful to examine the mental status of prisoners in detail before they enter prison, and observe the mental health status in the further course of their imprisonment using a longitudinal study design

This would allow conclusions as to whether the observed

accumulation is based on a selection of particularly vulnerable or already depressed individuals who may already be under stress, or whether depression is the result of everyday prison life.

In general, the time-economic PHQ-9 seems to be an adequate instrument to measure depression in jail as the items are globally formulated, and there are no explicit items regarding free time activities (as in the Geriatric Depression Scale for example). This instrument is easy to use and assesses the different symptoms of depression according to DSM-IV including suicidality as an important issue (although we had a lot of missing data concerning this item in our sample).

Another option could be the development of a diagnostic tool tailored to the specifics of prison life. Criteria that may be an indication or symptom of depression in people living in the community may also be an expression of lack of opportunities in prisons rather than depression. With respect to the restrictions of free time-activities or social contacts, the symptom "loss of pleasure" may be related to these decreased leisure activities, and "loss of appetite" may be related to loss of ability to choose what to eat, "psychomotor agitation" may also be created by decreased leisure and sports opportunities. However, these conditions could also increase the risk of developing a depressive disorder. To explore this, a more accurate and sensitive test is needed, which takes the specifics of the penitentiary system into account.

In this study, only three Prisoners declared being treated with antidepressants. An adequate treatment of depression includes a combination of behavioral therapies and medication and should be accessible for prisoners. Link, et al. [36] showed that restrictions in physical health had a significant impact on depression in prisoners and further that depression (at discharge) was indirectly linked to crime, financial problems and re-incarceration. This underscores the importance of adequate identification and treatment of depression in prisons but regarding the re-offending also - for society [37-44].

### Conclusion

In conclusion, in the prison population examined in this study, 48% of the subjects showed at least moderate depressive symptoms, which is a significantly higher prevalence of depressive symptoms than in the general elderly population. Differences were found in part with regard to the type of detention, as prisoners in open enforcement showed less symptoms compared to those in pretrial prevention and preventive detention. The participants reported in general more depression-related somatic symptoms (i.e., sleep disturbances and fatigue) compared to mood items as feelings of sadness.

In contrast to the high risk of suicidality in prisoners, only few prisoners indicated suicidal thoughts. Irrespective of this, it is important to provide mental health services for the prison population and the older prisoners in particular to detect and treat depression in jail. Next to pharmaceutical treatment strategies, psychosocial support should be offered. With special respect to the strong association of affective and





somatic syndromes there is also an urgent need for adequate therapy of somatic diseases [7].

This could not only improve the patients' well-being but also their affective state.

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