

10052

# Norwegian Validation of the Occupational Depression Inventory

Graduate thesis in Psychology

Supervisor: Renzo Bianchi

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PSY2900 Bachelor thesis in psychology

Trondheim, May 15, 2023

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## **Preface**

The ODI was created by Bianchi & Schonfeld (2020). The instrument itself was translated into Norwegian using a back-translation method; the remainder of the survey was translated by the students of our research group, resulting in nine individual surveys for data collection. The resulting data were pooled into one dataset, which we analysed individually. I have received feedback on my writing at two points during the semester – once regarding the Introduction and Methods sections, and once regarding the Results and Discussion sections. Feedback was provided by my supervisor, Prof. Dr. Renzo Bianchi. I would like to give thanks to the rest of my research group and my supervisor for all the help I have received with developing my survey, collecting, and analysing data, and writing the thesis.

## Abstract

Recent research on occupational health has expressed the need for new approaches to assessing work-related distress. In this context, the Occupational Depression Inventory (ODI) was created to assess depressive symptoms that people attribute to their work. The current study aimed to validate the ODI in Norway and explore the correlates of occupational depression in further detail. Our sample consisted of 485 employed individuals in Norway (68% female). We examined our dataset using common-practice factor analysis as well as correlation analysis using Pearson's  $r$ . The results indicated that the ODI has high factorial validity and strong reliability. Correlation analysis supported the concurrent and discriminant validity of the ODI. Occupational depression was associated, in the expected direction, with workplace violence, sick leave, workplace ostracism, and socioeconomic optimism, as well as measures of cause-neutral depression. We conclude that the ODI can be confidently used for assessing work-related distress in the Norwegian context.

*Keywords:*

*Occupational health*

*work-related distress*

*depression*

*factor analysis*

*correlation analysis*

Depression is one of the most common mental health issues worldwide. The World Health Organization (WHO) estimates that more than 300 million people, or 4.4% of the population, suffer from some form of depression. For the Norwegian population, these estimates are as high as 4.7% (World Health Organization, 2017). These numbers appear to be inclining (NHI, 2022); the worldwide prevalence of depression increased by 18.4% between 2005 and 2015 (World Health Organization, 2017). Depression is also the most widespread contribution to disability worldwide, and contributes greatly to the estimated 800 000 yearly suicides, which accounted for 1.5% of all deaths in 2015 (World Health Organization, 2017). Norsk Helseinformatikk (NHI) states that many people live with depression for a long time without proper treatment, and there is a high probability of relapse; one third of patients with depression will experience relapse within a year of ending treatment (NHI, 2022). It has also been estimated that only one fourth of depressed individuals get treatment at all (NHI, 2022).

The term depression refers to several different depressive disorders, which vary in severity and whether the depressive episode is recurring or not. Most of these disorders, such as major depressive disorder, have nine diagnostic criteria which are usually measured through self-reported questionnaires, where higher scores indicate more severe symptoms of depression. These nine criteria are as following: Depressed mood, loss of interest or pleasure in most activities (also known as anhedonia), significantly decreased or increased appetite, insomnia or hypersomnia, slowed thinking and physical movement, fatigue or loss of energy, feelings of worthlessness or guilt, inability to concentrate, and suicidal ideation. The symptoms must have been present for most of the day, almost every day for an extended period of time (APA, 2013, p. 160-161). Self-reported questionnaires, such as the PHQ-9, a depression subscale of the Patient Health Questionnaire (PHQ), scores each of the DSM-5's diagnostic criteria for depression on a scale from 0 ("Not at all") to 3 ("Nearly every day"). Thus, the final score between 0 and 27 indicates the severity of depressive symptoms

(Kroenke, et al., 2001). Using a diagnostic algorithm, a diagnosis of Major Depressive Disorder is produced if one reports a score of 2 (“More than half of the days”) or more on at least 5 out of the 9 symptoms. One of these symptoms must be anhedonia or depressed mood. The symptom regarding suicidal ideation counts toward a diagnosis if present at all, regardless of severity (Kroenke, et al., 2001).

The feelings described in the DSM-5’s criteria for depressive disorders can undoubtedly have a sizeable effect on many aspects of life, in the context of socializing, personal development, pursuing one’s interests, and positive experiences at work. A study by Statistics Norway (Statistisk Sentralbyrå) found depression to be one of the greatest threats to quality of life, among health conditions (Statistisk Sentralbyrå, 2020). The Norwegian Institute of Public Health (Folkehelseinstituttet/FHI) considers depression to be the 6<sup>th</sup> most widespread reason for non-lethal loss of health in Norway. This especially applies to people of working age. Mental illness costs Norway 70 billion NOK annually; depression alone accounts for around half of this cost (NHI, 2022) It is assumed that depression will be one of the most impactful factors for economic consequences within the next 20 years (NHI, 2022). Indeed, already in 2019 and 2020, mental illness accounted for 17% of total sick leave in Norway; 87% of these instances were due to common mental disorders, including depression (Folkehelseinstituttet, 2023). The Norwegian Labour and Welfare Administration (NAV) reports that sick leave due to mental illness is also the cause of the longest periods of sick leave, on average 73.9 days (NAV, 2022).

Aside from high levels of comorbidity with other mental illnesses, the most common being anxiety disorders (Hagen & Kennair, 2016, p. 124-125), long-lasting depression could also have negative implications for one’s physical health; research indicates depression has high comorbidity rates with several chronic health conditions, such as arthritis, hypertension, diabetes, and heart problems, as well as increasing mortality rates in patients with diseases

such as cancer or cardiovascular disease (Cassano & Fava, 2002). Arguably the most grave consequence of depression is suicide. The Norwegian Institute of Public Health reports approximately 650 suicides in Norway annually (Folkehelseinstituttet, 2022). This also bears consequences for those who are left behind after a suicide occurs. On average, 10 people will be greatly affected after each completed suicide, this means that approximately 6500 people in Norway will experience the death of a loved one due to suicide annually (Folkehelseinstituttet, 2022). These people are at a significantly higher risk of developing mental illnesses such as Post Traumatic Stress Disorder (PTSD), depression, anxiety, or suicidal ideation as a result of the trauma of losing someone to suicide (Folkehelseinstituttet, 2022). The aforementioned physical health conditions commonly associated with such mental illnesses also apply here. It is estimated that depressed individuals account for around two thirds of all suicides (Cassano & Fava, 2002). Preventing sick leave due to depression, ensuring that people affected by depression are able to work at all, and perhaps most importantly, preventing suicide, is therefore an important implication for research on depression in the context of work.

In the context of distress related to work, it has been common to discuss the topic of burnout. Burnout is defined as a syndrome in which the person affected experiences exhaustion, poor work performance, and negative feelings toward their work. This syndrome might be developed as a response to stress at work in relation to factors within the work environment, such as workload, control, or demands, resulting in a poor fit between the worker and their work or their workplace. The term was first used in the 1970's, and there are several instruments for identifying the phenomenon today (Maslach & Leiter, 2016). There is an ongoing debate as to whether or not depression and burnout have so many overlapping qualities that they should be considered to be the same, or rather, that burnout could be considered as a dimension of depression (Bianchi & Cavalcante, et al., 2023; Schonfeld &

Bianchi, 2022; Sowden, et al., 2022). Burnout as a construct is also difficult to use for diagnostic purposes or for prevalence estimation (Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2020; Bianchi & Verkuilen, et al., 2023), as it is not recognised as a medical condition, only as an ‘occupational phenomenon’ (World Health Organization, 2019). This is especially problematic seeing as some studies have found that the stressors of burnout measurements do not always necessarily relate to one’s occupation (Bianchi & Schonfeld, 2020). Instruments for measuring or identifying burnout seem to suffer from the uncertainty surrounding this construct. In relation to research, specifically occupational health research, these issues have negative implications for, among other things, the discriminant validity of such instruments. If measures of burnout explicitly assess symptoms of distress specifically related to one’s occupation but tends to overlap with stressors that can be attributed to other areas of life, then we have no way of accurately relying on the concept of burnout when attempting to identify factors that contribute to such stressors. This calls for new approaches to research on the topic of work-related distress.

The Occupational Depression Inventory (ODI) was developed to assess the extent of work-related distress in the aspects where measures of burnout might fall short. Whereas the most commonly used burnout measures, such as the Maslach Burnout Inventory (MBI), include some items that relate to one’s occupation, as well as some that assess stress factors on a more general basis, the ODI is a nine-item scale consisting explicitly of work-related questions (Bianchi & Schonfeld, 2020). The items included reference the diagnostic criteria for major depressive disorder in the DSM-5. Thus, we have reason to believe the ODI is efficient at assessing symptoms of depression that one would specifically attribute to their work. The items measure different aspects of distress at the workplace, as well as a single item for assessing suicidality, meaning the ODI can help identify workers in need of immediate help. The ODI also includes a subsidiary question regarding whether the distress

encountered at work has led to the respondent considering quitting their current job (Bianchi & Schonfeld, 2020). Bianchi & Schonfeld (2020) also provided an algorithm for establishing provisional diagnoses of occupational depression, developed similarly to instruments for diagnosing cause-neutral depression, specifically the PHQ-9, thus establishing both clear diagnostic criteria for job-scribed depression as well as a method for prevalence estimation. In other words, the ODI can approach work-attributed depressive symptoms in both a dimensional and a categorical manner (Bianchi & Schonfeld, 2020).

The ODI was initially tested in the USA, France, and New Zealand, and has since been studied and validated in numerous different countries. These validations have found the ODI to be a unidimensional measure exhibiting strong reliability and factorial validity, as well as discriminant and criterion validity (Bianchi & Cavalcante, et al., 2023; Bianchi & Fiorilli, et al., 2022; Bianchi & Manzano-Garcia, et al., 2022; Hill, et al., 2021). Further research has also suggested the ODI to be associated with other relevant factors such as turnover intention (Bianchi & Schonfeld, 2020), and objective cognitive performance (Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2021; Bianchi & Schonfeld, 2022). This means that the ODI could help identify workers who are considering leaving their jobs as a result of work-related distress, as well as workers who have suffered from worsened performance at work due to occupational depression. Other variables of relevance that the ODI has been linked to in past research include a history of diagnosed depressive disorders and antidepressant intake (Bianchi & Fiorilli, et al., 2022), work engagement (Bianchi & Schonfeld, 2020; Hill, et al., 2021), and several variables measuring quality of life both in the context of work and outside of work (Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2020), thus linking the ODI to important characteristics surrounding working environment, as well as health factors, and overall life satisfaction.

This study aimed to validate the ODI in Norway and to further research on occupational depression and work-related stress. More specifically, we explored the reliability and validity of the ODI and inquired as to whether and how this measure suits the Norwegian population. However, seeing as the ODI has been validated in several other countries already (specifically other Western countries), we hypothesized that the ODI's Norwegian version would exhibit satisfactory psychometric and structural properties. In addition to this, we hypothesized that the ODI would have significant associations with variables relating to stressors at work (e.g., physical aggression, verbal abuse, and sick leave and workplace ostracism), findings that would support the criterion validity of the ODI, and also show a degree of discriminant validity when compared to a measure of cause-neutral depression. Based on a report from 2020, that found stress at work to correlate with lower quality of life (Statistisk Sentralbyrå, 2020), there is also reason to believe that higher levels of stress at work should indicate higher scores on scales measuring depressive symptoms. Thus, we expected links to emerge between the ODI and work-related aspects of stress, but also in regard to general depression.

## **Methods**

### **Study Sample and Recruitment Procedure**

The data were collected by nine students, including myself, in January and February 2023. Participants were recruited through personal networks, announcements on social media platforms, and establishing connections with organisations. No compensation was offered for participation. The criteria for being eligible to participate in the study were to have a job and be at least 18 years old. The survey included an attention-check item to detect careless respondents ("For this question, choose the "I disagree" option to show that you are paying

attention.”). 547 participants initially completed the survey, of which 62 (11%) were identified as inattentive, and thus excluded. The final sample involved 485 employed individuals (68% female). Of the 485 participants, 209 (43%) were aged 18-34 (early career), 120 (25%) were aged 35-49 (mid-career), and 156 (32%) were aged 50+ (late career).

We used a back-translation method to translate the ODI into Norwegian. First, the English version was translated into Norwegian by two native Norwegian speakers fluent in English. Second, the Norwegian version was translated back into English by two different Norwegian speakers fluent in English. Neither the English-to-Norwegian nor the Norwegian-to-English translators were familiar with the measure before taking part in the translation process. Third, we compared the English version derived from the back-translation with the original English version. We did not identify any problematic discrepancies. The remainder of the survey was translated by the aforementioned nine students, and the final product was uploaded to nettskjema.no, a platform for sharing surveys developed by the University of Oslo (UiO). The study was conducted in accordance with the guidelines of the Norwegian Center for Research Data.

## **Measures of Interest**

### **ODI**

The ODI items were measured using a four-point scale, indicating how often participants had encountered the issues assessed in the items during the last two weeks (0 = “Never or almost never”, 1 = “Only a few days”, 2 = “More than half of the days”, 3 = “Almost every day”). Note that the item relating to suicidal ideation does not pose an iatrogenic risk (Bianchi & Schonfeld, 2020). For the subsidiary item regarding turnover intention, there were three response options provided: “Yes”, “No”, and “I don’t know”.

Details of the ODI items and their relation to diagnostic criteria for major depressive disorder in the DSM-5, along with their Norwegian translation can be found in Table 1.

Table 1

*Occupational Depression Inventory (with Norwegian translation).*

Symptoms	Occupational Depression Inventory	Norwegian translation
1. Anhedonia	“My work was so stressful that I could not enjoy the things that I usually like doing.”	«Mitt arbeid var så stressende at jeg ikke kunne glede meg over ting jeg vanligvis liker å gjøre.»
2. Depressed mood	“I felt depressed because of my job.”	«Jeg følte meg deprimert på grunn av jobben min.»
3. Sleep alterations	“The stress of my job caused me to have sleep problems (I had difficulties falling asleep or staying asleep, or I slept much more than usual).”	«Stress relatert til jobben min førte til søvnproblemer (jeg hadde vanskelig for å sovne eller sove uforstyrret, eller jeg sov mye mer enn vanlig).»
4. Fatigue/loss of energy	“I felt exhausted because of my work.”	«Jeg følte meg utmattet på grunn av arbeidet mitt.»
5. Appetite alterations	“I felt my appetite was disturbed because of the stress of my job (I lost my appetite, or the opposite, I ate too much).”	«Jeg følte at appetitten min ble forstyrret på grunn av jobbstress (jeg mistet appetitten min, eller det motsatte, jeg spiste for mye).»
6. Feelings of worthlessness	“My experience at work made me feel like a failure.”	«Min opplevelse på jobb fikk meg til å føle meg mislykket.»
7. Cognitive impairment	“My job stressed me so much that I had trouble focusing on what I was doing (e.g., reading a newspaper article) or thinking clearly (e.g., to make decisions).”	«Jobben min stresset meg så mye at jeg hadde problemer med å fokusere på det jeg gjorde (f.eks. å lese en avisartikkel) eller å tenke klart (f.eks. å ta beslutninger).»
8. Psychomotor alterations	“As a result of job stress, I felt restless, or the opposite, noticeably slowed down – for example, in the way I moved or spoke.”	«Som et resultat av jobbstress følte jeg med rastløs, eller det motsatte, alt gikk saktere – for eksempel i måten jeg beveget meg eller snakket på.»
9. Suicidal ideation	“I thought that I’d rather be dead than continue in this job.”	«Jeg tenkte at jeg heller ville dø enn å fortsette i denne jobben.»
Turnover intention (subsidiary question)	If you have encountered at least some of the problems mentioned above, do these problems lead you to consider leaving your current job or position?	Dersom du har støtt på noen av problemene nevnt ovenfor, fører disse problemene til at du vurderer å slutte i din nåværende jobb eller stilling?

### **Additional measures**

We used the depression subscale of the Hospital Anxiety and Depression Scale (HADS-D), a commonly used measure of depression (Snaith, 2003), to assess symptoms of depression which cannot be attributed to any specific area of life. The HADS-D included seven items which were measured on a five-point Likert scale (“I strongly disagree”, “I disagree”, “I neither agree nor disagree”, “I agree”, and “I strongly agree”). Participants were asked to choose the option that best described their feelings during the past week.

Work ostracism was assessed using the Ostracism Short Scale (Rudert & Keller, et al., 2020). This measure included four items regarding situations at work in which one would be ignored or otherwise ostracized. The items were presented in a matrix and measured on a five-point scale, the response options were “Never”, “Rarely”, “Sometimes”, “Often”, and “Always”, and covered the course of the past two months.

For the sake of brevity in the questionnaire, we used one-item measures for assessing physical abuse, verbal abuse, sick leave, and job promotion. Participants were asked whether they had encountered physical abuse or verbal abuse at work during the past six months, the response options for these items were “Yes”, “No”, and “I don’t know”. We asked whether participants had been promoted, resulting in higher status and/or income, or had been on sick leave, over the course of the last six months, response options were “Yes” and “No”.

Socioeconomic optimism was also measured in a single item: “Are you optimistic about the socioeconomic future of Norway in the decades to come?”. Participants were asked to respond according to how optimistic they were, on a five-point scale (“Extremely optimistic”, “Very optimistic”, “Moderately optimistic”, “A little optimistic”, and “Not optimistic at all”).

The final survey thus included the nine items of the ODI, the supplementary question about turnover intervention, two questions relating to physical and verbal abuse at work, questions regarding sick leave and promotion, the seven-item depression subscale from the Hospital Anxiety and Depression Scale (HADS-D), the attention-check item to detect careless respondents, four items regarding workplace ostracism (Ostracism Short Scale), sociodemographic information (age, sex, and occupation), and a measure of socioeconomic optimism.

### **Data Analyses**

Data analyses were conducted using SPSS version 28. Factor validity was assessed using factor analysis with the Maximum Likelihood extraction method, rotated with Promax. We assessed whether the data were suitable for factor analysis using Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy. We used Kaiser's criterion as a cut-off for retaining factors based off their eigenvalues. Seeing as the ODI was developed to measure the construct of occupational depression, we expect there to be only a single factor, with factor loadings well above .30. The factor loading of item 9 (assessing suicidal ideation) might be lower than the others, due to the extreme nature of the symptom assessed and the item's low frequency of endorsement.

Two items from the HADS measurement were negatively worded, as opposed to the others, and were thus reversed for the reliability analysis. The two items in question are item 4 («Jeg føler meg som om alt går langsommere.»), and item 5 («Jeg bryr meg ikke lenger om hvordan jeg ser ut.»). We used Cronbach's  $\alpha$  and McDonald's  $\omega$  to compute the internal consistency of the multi-item scales. This analysis was applied to the nine ODI items, seven HADS items (with the scores of items 4 and 5 reversed), and four items from the Ostracism

Short Scale. Although many cite .70 as a universal cut-off criterion for reliability measurements, there is evidence that values above .80 is a better fit for basic research, and that applied research should aim for a reliability of at least .90 (Lance, et al., 2006). For the purposes of this study, we considered  $\alpha$  and  $\omega$  values between .70 and .80 as borderline acceptable, between .80 and .90 as good, and values above .90 to reflect an excellent reliability of these scales.

We used Pearson's correlation to test both the (concurrent) criterion validity and the discriminant validity of the ODI. Criterion validity is demonstrated through the correlation between our measure of interest and other related variables that measure the same concept (DePoy & Gitlin, 2016, p. 238). A significant correlation with an adequate effect size reinforces the view that we have indeed measured what we intended to measure. In our case, if there is an association between the ODI and other indicators of negative work experiences, such as ostracism at work, physical or verbal abuse at work, or sick leave, then this would support the ODI's criterion validity. The discriminant validity is examined through the correlation between the ODI items and the depression subscale of HADS. We expect there to be some positive correlation, seeing as both measures are related to the topic of depression, although a very high correlation would suggest that there is too much overlap between the two, and that discriminant validity is problematic.

The correlation analysis included all main variables of the study; the mean scores of the ODI (occupational depression), physical abuse, verbal abuse, sick leave, job promotion, the mean scores of the HADS-D scale (general depression), the mean scores of the Ostracism Short Scale (workplace ostracism), age, sex, and socioeconomic optimism. This analysis intended to explore the correlates between occupational depression and other factors related to workplace environments, in addition to assessing the discriminant and criterion validity of the ODI.

## Results

### Descriptive Statistics

Table 2

*Descriptive statistics for the Occupational Depression Inventory. (N =485)*

	Minimum	Maximum	<i>M</i>	<i>SD</i>
ODI1	0	3	0.75	0.82
ODI2	0	3	0.60	0.80
ODI3	0	3	0.84	0.90
ODI4	0	3	1.03	0.91
ODI5	0	3	0.57	0.84
ODI6	0	3	0.65	0.79
ODI7	0	3	0.55	0.73
ODI8	0	3	0.59	0.82
ODI9	0	3	0.10	0.40

The mean scores for the ODI revealed that 365 respondents (75.3%) scored an average between 0.00 and 0.99. 105 respondents (21.6%) scored on average between 1.00 and 1.99. 15 respondents (3.1%) had an average score between 2.00 and 3.00 across all ODI items. Regarding the turnover intention item, 149 participants (30.7%) had considered leaving their current job, as a result of the issues they had encountered at their work. 34 (7%) had encountered physical aggression, 135 (27.8%) had experienced verbal abuse. 112 participants (23.1%) reported having recently been on sick leave, 95 (19.6%) had recently been promoted.

Table 3

*Descriptive statistics and correlations among the main variables of the study.*

	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Occupational depression	485	0.63	0.58	-								
2. Physical aggression	481	0.07	0.26	.09*	-							
3. Verbal abuse	469	0.29	0.45	.22***	.33***	-						
4. Sick leave	485	0.23	0.42	.26***	.02	.06	-					
5. Job promotion	485	0.20	0.40	-.07	-.06	-.02	-.04	-				
6. General depression	485	2.09	0.66	.66***	.02	.09	.25***	-.10*	-			
7. Workplace ostracism	485	1.59	0.69	.42***	.01	.19***	.15**	-.05	.41***	-		
8. Age	485	-	-	-.13**	-.19***	-.18***	.05	-.12*	-.11**	.03	-	
9. Sex	480	0.31	0.47	-.19***	-.01	-.02	-.13**	.40	-.08	-.02	.05	-
10. Socioeconomic optimism	485	2.46	0.86	-.31***	-.03	-.22***	-.15**	.05	-.32***	-.24***	-.01	.07

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

### Factor Analysis

Bartlett's Test of Sphericity for the factor analysis was statistically significant ( $p < .001$ ),

KMO Measure of Sampling Adequacy was .92. Both measures indicated that the dataset is suitable for factor analysis. The variance of the ODI items accounted for 49% of the total

variance explained ( $M = .69$ ,  $SD = .12$ , range = .38). Details of the factor analysis are found in Table 4.

Table 4

*Factor loadings for the Occupational Depression Inventory. (N = 485)*

	Occupational Depression	Communalities
ODI1	.78	.61
ODI2	.72	.52
ODI3	.72	.52
ODI4	.79	.62
ODI5	.66	.44
ODI6	.64	.41
ODI7	.77	.60
ODI8	.73	.53
ODI9	.41	.17
Eigenvalue	4.89	
% of variance	49	

Extraction method: Maximum Likelihood. Only one factor emerged, and thus the solution could not be rotated.

### **Total-score Reliability**

Cronbach's  $\alpha$  for the ODI was .89; McDonald's  $\omega$  was .90. For the HADS-D, these values were .85 for both indicators. For the Ostracism Short Scale, Cronbach's  $\alpha$  was .85 and McDonald's  $\omega$  was .86. This indicates good internal consistency across all three multi-item scales.

### **Concurrent Validity and Discriminant Validity**

There was a significant correlation between occupational depression and all four variables assessing criterion validity. In the case of workplace ostracism, there was a moderate to high, positive association with occupational depression ( $r = .42, p < .001$ ). For verbal abuse ( $r = .22, p < .001$ ) and sick leave ( $r = .26, p < .001$ ), there was a small to moderate, positive correlation. Physical aggression had a small, positive association with occupational depression ( $r = .09, p = .047$ ). The correlation between occupational depression and the depression subscale of HADS was also significant, with a large, positive correlation ( $r = .66, p < .001$ ).

### **Discussion**

The ODI was developed to assess depressive symptoms specifically ascribed to one's work. The aim of this study was to validate the ODI in Norway, and to further research on the correlates of occupational depression. We used factor analysis to assess the factorial validity, Cronbach's  $\alpha$  and McDonald's  $\omega$  for reliability analysis, and Pearson's  $r$  to assess the criterion and discriminant validity of the ODI. The study sample involved 485 individuals employed in Norway.

### **Main Findings**

The ODI was found to exhibit satisfactory internal consistency in our sample, as indicated by Cronbach's  $\alpha$  and McDonald's  $\omega$  for the ODI items being well over the threshold for acceptable values of these measurement. Note that it has been stated that one should aim for even higher values of  $\alpha$  and  $\omega$  when assessing the reliability of measures in applied research

(Lance, et al., 2006). That being said, cut-off values of reliability measures should take in to account the context of what is being measured.

Factorial analysis resulted in a one-factor solution, supporting the hypothesis that the ODI measures a unitary construct, occupational depression. This finding is consistent with previous validations of the ODI in other countries (Bianchi & Cavalcante, et al., 2023; Bianchi & Fiorilli, et al., 2022; Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2020; Bianchi & Verkuilen, et al., 2023; Hill, et al., 2021).

The statistically significant correlations between the mean score of the ODI and our survey's variables measuring different stressors at work (e.g., physical aggression, verbal abuse, workplace ostracism, and sick leave), support the criterion validity of the ODI. As expected, these correlations were positive, indicating that the more one has experienced such stressors at work, the higher one's ODI score would be. This means that our findings suggest that the ODI does indeed measure work-related stress.

As for discriminant validity, our findings also support this. There was a significant, positive association between the mean score of the ODI and the mean score of HADS-D, the measure assessing cause-neutral depression. We expected some overlap between the two variables due to their similarities in measuring depressive symptoms. However, seeing as the ODI's instructions and items specify that these depressive symptoms must have been experienced in relation to one's occupation, the effect size of this correlation was still low enough to show a degree of discriminant validity.

### **Further discussion**

As expected, the ODI item regarding suicide ideation had a much lower factor loading than all other items, likely due to the severity of the item compared to the others. The suicide

ideation item is also the least commonly endorsed item in our survey, much like it is in several other validation studies on the ODI (Bianchi & Cavalcante, et al., 2023; Bianchi & Fiorilli, et al., 2022; Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2020; Bianchi & Verkuilen, et al., 2023). 33 (6.8%) of our participants reported at least a score of 1 (Only a few days) on this item. Note that symptoms of depression and suicidal ideation can occur independently of one another (Batterham, et al., 2019), thus, it is possible that a number of our respondents are experiencing symptoms of occupational depression, without suicidal ideation. The most commonly endorsed item of the survey is item 4 (“I felt exhausted because of my work”), as has also been the case of other validation studies (Bianchi & Cavalcante, et al., 2023; Bianchi & Fiorilli, et al., 2022; Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Schonfeld, 2020; Bianchi & Verkuilen, et al., 2023). Fatigue or loss of energy should be considered fairly common at work regardless of whether other symptoms of (occupational) depression are present, and while this symptom is a more common occurrence towards the more severe end of the ODI scale, this could be an explanation for why item 4 has been reported more frequently in our survey.

Using the SPSS syntax provided in the original article describing the Occupational Depression Inventory (see Supplementary Material 6 in Bianchi & Schonfeld, 2020), we found that 11 respondents (2.3%) fit within the criteria for a diagnosis for occupational depression; a number close in proximity to the amount of respondents in our sample with an average score between 2.00 and 3.00, though slightly lower than the findings in Bianchi & Schonfeld (2020).

Occupational depression has a significant correlation with all main variables, except job promotion (see Table 3 for details). In Norway, job promotions, or even opportunities for promotions, might not have such a large impact on people’s attitudes toward their work, compared to elsewhere (Kalleberg & Mastekaasa, 2001, p. 7). This could help explain why

job promotion has such little effect on occupational depression in this sample, although there is a small, negative correlation between job promotion and general depression. Another possible explanation is that the positive outcomes of, or feelings toward, being promoted at work, are simply not enough, or rather last long enough, to outweigh the negative outcomes of occupational depression. The absence of a link between occupational depression and job promotion has also been found in another ODI study (Bianchi & Fiorilli, et al., 2022).

Physical aggression, verbal abuse, sick leave, and workplace ostracism correlated positively with occupational depression. This association was small in the case of physical aggression, for verbal abuse and sick leave, the correlation was moderate. Once again, these findings are similar to that of Bianchi & Fiorilli, et al. (2022). In the case of workplace ostracism, the correlation was moderate to large. The correlations between these four variables and occupational depression support the criterion validity of the ODI.

Such correlations should be expected, as abuse, be it physical or verbal, will undoubtedly have consequences for one's mental health, also in a work environment. Verbal abuse also correlates with workplace ostracism, further supporting this view. The effect size of the correlation between occupational depression and physical aggression is somewhat smaller than the others. It should be noted that physical aggression in some professions is expected, such as work in certain mental institutions or in prisons. Workplace factors such as physical aggression, verbal abuse, or workplace ostracism can be said to be related to the broader category of workplace bullying. Several studies have in the past linked workplace bullying to psychological distress and mental illness. In fact, some studies have found that not only is workplace bullying a predictor of mental distress, but also vice versa, that high levels of mental distress in the long run can be a predictor of workplace bullying (Finne, et al., 2011; Nielsen, et al., 2012; Vartia, 2001). Similar findings have been present in studies on

ostracism, that ostracism is linked to depression (Rudert & Janke, et al., 2020), and also the other way around, that depression is a predictor of ostracism (Rudert, et al., 2021).

There is also no surprise that there is a significant correlation between occupational depression and sick leave. As previously stated, mental illness, with depression being one of the most common, is the primary reason for not only a large amount of sick leave in Norway (Folkehelseinstituttet, 2023), but also very long periods of sick leave (NAV, 2022). The issues surrounding sick leave due to mental health reasons are not a recent phenomenon. One study found depressive conditions to be by far the most common cause of sick leave due to mental illness in Norway between 1997 and 1998 (Nystuen, et al., 2001). Comparing these statistics to more recent ones (Folkehelseinstituttet, 2023; NAV, 2022), the issue has only grown larger with time.

As expected, there is a sizeable, positive correlation between occupational depression and general depression, as they both measure depressive symptoms. This correlation was expected because individuals experiencing symptoms of occupational depression are also likely to experience symptoms of cause-neutral depression. On the other hand, only some individuals with cause-neutral depression would also meet the criteria for occupational depression (Bianchi & Schonfeld, 2020). The association between these two variables not high enough, in our case, to suggest a significant overlap, indicating that the discriminant validity of occupational depression is adequate. This was also the case for several other ODI studies, both in the case of samples utilizing the depression subscale of HADS (Bianchi & Schonfeld, 2020), and in the case of samples relying on other scales for measuring cause-neutral depression (Bianchi & Cavalcante, et al., 2023; Bianchi & Schonfeld, 2020; Hill, et al., 2021).

Age and sex had a negative, small association with occupational depression. This means that there is a slightly larger prevalence of occupational depression among younger individuals as well as females, in our sample. Our sample is somewhat overrepresented by both females and younger individuals, however. In regard to sex, our findings are consistent with prevalence estimation on depressive disorders by the World Health Organization, which states that depressive disorders occur more often in females than in males. On the other hand, these estimates indicate that depressive disorders are more common in older individuals (World Health Organization, 2017). Previous validations of the ODI have found mixed results regarding correlations involving age and sex, although measurement invariance in said studies indicate that scores of the ODI are comparable across these two variables (Bianchi & Cavalcante, et al., 2023; Bianchi & Fiorilli, et al., 2022; Bianchi & Manzano-Garcia, et al., 2022; Bianchi & Verkuilen, et al., 2023; Hill, et al., 2021).

There was a moderate, negative association between occupational depression and socioeconomic optimism. There was also a similar correlation between socioeconomic optimism and general depression. Such feelings of hopelessness regarding the future relates to symptoms of depressed mood as categorised in the DSM-5's diagnostic criteria for major depressive disorder (APA, 2013, p. 160), which the ODI also assesses, in item 2 ("I felt depressed because of my job"). Individuals seeing little reason to be optimistic about the socioeconomic future of their country may worry about their career perspectives or job security in the long run.

### **Limitations of the study**

There are a few limitations of note in this study. First, we utilised a non-probability sampling method for recruiting participants, relying on convenience sampling initially, and then

encouraging participants to forward the survey to others (snowball method), which makes the representativeness and generalisability of the study unclear. Second, the survey was translated into Norwegian to test the ODI on the Norwegian population. However, since our survey was only available in Norwegian, we have not had the opportunity to reach workers in Norway who are not fluent in Norwegian. Finally, our sample was surveyed using self-report measures, meaning the results could be prone to some level of response bias. Specifically, there might be some degree of social desirability bias, meaning participants responded in favour of social norms rather than their genuine experiences, present in our data.

Furthermore, recall bias might have also had an effect here, as some items, specifically those asking participants to estimate the frequency of occurrence regarding certain feelings or experiences, come with a risk of over- or underestimation. We note that steps have been taken to limit the risk and effects of such response biases, however. For instance, our survey was anonymous and only available through an online platform, thus lessening the risk of social desirability bias, and included clear instructions for which timeframes different items applied to, for the sake of limiting the risks of misattributions or over/underestimation.

## **Conclusion**

Our study found the ODI to exhibit high factorial validity and a unidimensional structure, with decent internal consistency as well as encouraging concurrent and discriminant validity. As was the case in other validation studies, our findings suggest that the ODI is a valid and reliable instrument for assessing work-attributed depressive symptoms, separately from general depressive symptoms that cannot be attributed to one's workplace. This supports the suggestions of earlier research on the matter, that the ODI can be used to identify workers who are suffering from symptoms of occupational depression. The results of this study

suggest that these findings also extend to the Norwegian context. The limitations of this study imply that further research is needed to support this view, both in Norway and in other countries. For instance, longitudinal studies should be conducted to examine the ODI's test-retest reliability as well as how occupational depression changes in individuals over time. In addition to this, the ODI should be translated into even more languages and be further tested across other countries and cultures. In Norway specifically, studies examining the ODI's generalizability to linguistic and cultural minorities, such as immigrant workers or workers of Norway's Sami population, could benefit the research on occupational depression in this manner. On that same note, research on the ODI's properties across different organizational categories as well as within specific organizational sectors could also further expand the generalizability of the instrument and help identify sectors of the workforce where occupational depression is more prevalent than elsewhere.

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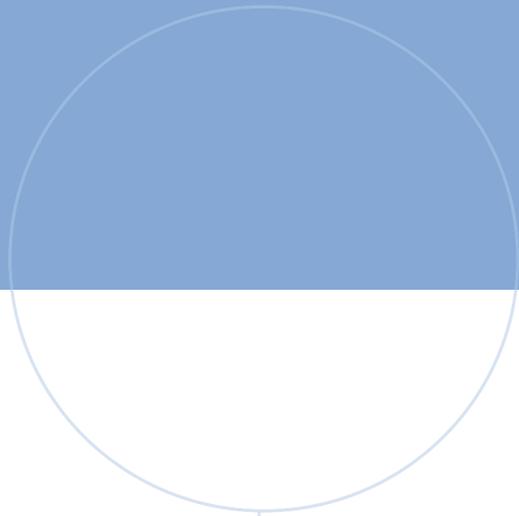
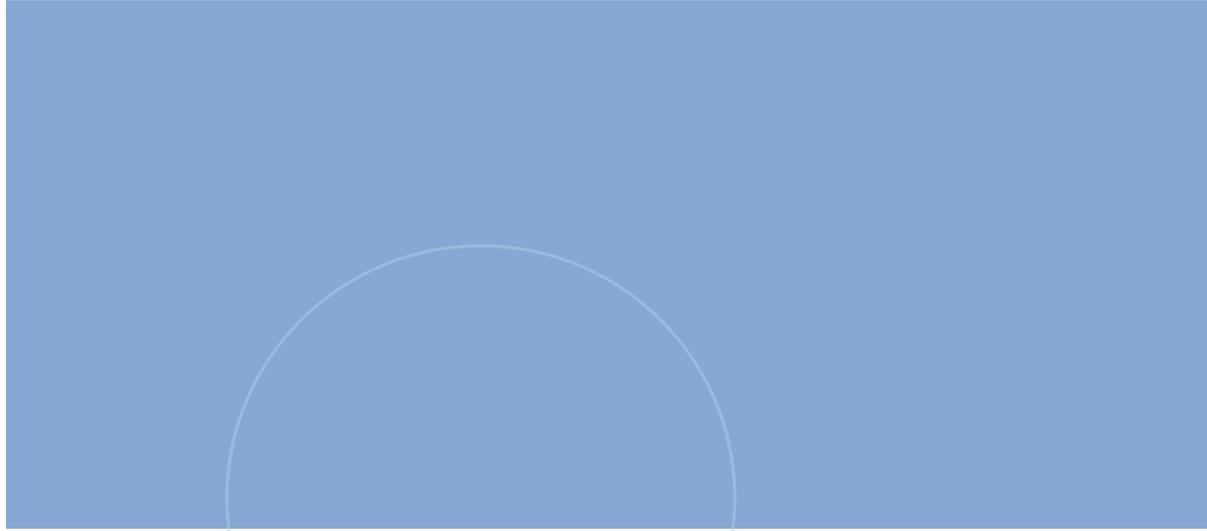
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