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Norwegian Version of the Occupational Depression Inventory

Validity, Reliability and Associations with Work Stressors and Work-Life Characteristics

Bachelor's thesis in Psychology
Supervisor: Renzo Bianchi
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Preface

The research presented in this thesis was conducted in the Department of Psychology of the Norwegian University of Science and Technology (NTNU), under the supervision of Professor Renzo Bianchi. I thankfully acknowledge the assistance and encouragement of my supervisor.

Prof. Renzo Bianchi conceived and planned the study. Data was collected by nine students, myself included. The student group further contributed with discussions and support through the writing process. I performed the literature review, analyzed data, interpreted findings, and wrote the thesis. Literature search was conducted through Google Scholar and PsycInfo. I gratefully point out that Prof. Renzo Bianchi contributed to preparation of the data and the revision process.

Finally, an acknowledgement to my family and my partner. I am deeply grateful for their love and support throughout the course of this work.

Abstract

The Occupational Depression Inventory (ODI) aims to measure depressive symptoms that individuals specifically attribute to their work. As such, the instrument may provide a useful tool in efforts of preventing and treating job-related distress. The instruments contains of nine symptom items with reference to DSM-5 diagnostic criteria of major depressive disorder. This study aimed to validate a Norwegian version of the ODI.

Data was collected from a Norwegian sample of 485 adults in the workforce. Structural and psychometric properties of the Norwegian version of the ODI were examined, based on common-practice factor analysis, reliability analysis and correlation analysis. The ODI exhibited strong factorial validity and reliability and exhibited a degree of convergent validity and a degree of discriminant validity against the Hospital Anxiety and Depression Subscale, HADS-D. Results further substantiate the concurrent criterion validity of the ODI, through significant correlations with the work stressors of ostracism, verbal abuse and physical aggression, as well as socioeconomic optimism, sick leave, sex and age. No significant correlation was found with job promotion.

Keywords: *occupational health; work stress; workplace violence; depression; burnout*

Norwegian Version of the Occupational Depression Inventory: Validity, Reliability and

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Mental health is increasingly recognized as having an important role in the workforce and in the workplace. At the same time, a growing body of research suggest job stress and other psychosocial working conditions are linked to common mental disorders (Harvey et. al., 2017; LaMontagne et. al., 2010). As such, the topic of occupational health may be central in efforts towards preventing and treating mental health problems in the population. A recently developed instrument, the *Occupational Depression Inventory* (*ODI*; Bianchi & Schonfeld, 2020) was designed to assess work-related distress and serve as a useful tool to occupational researchers, health specialists, and decision makers. This thesis will present a study aiming to validate a Norwegian version of the ODI, and an overview on related and central topics within occupational health psychology: depression, stress, and burnout.

Depression in the Norwegian Population

Depression is an affective disorder, characterized by persistent feelings of sadness, loss of interest in activities once enjoyed, and disruptions to several aspects of daily functioning (American Psychiatric Association, 2013). Depression is a risk factor of suicide (Chesney et. al., 2014) and is associated with loss of quality of life (Hansson, 2009). Furthermore, depression is associated with immune dysregulation, directly influencing an array of conditions including cardiovascular disease, osteoporosis, arthritis, diabetes, certain cancers, periodontal disease, frailty, prolonged infection and delayed wound healing (Kiecolt-Glaser & Glaser, 2002).

The worldwide average prevalence of depressive disorders is estimated at 4.4%. The prevalence in Norway is slightly higher at 4.7% (World Health Organization, 2017). Depression is the second most common mental health disorder in Norway, only surpassed by anxiety disorders (Norwegian Institute of Public Health, 2018). The high prevalence of

depression, and the resulting impaired functioning of individuals, account for significant economic losses. Depression is among the top ten disorders causing disability in the Norwegian population (Institute for Health Metrics and Evaluation, 2016), and twenty percent of sickness benefit recipients have a mental disorder as the reason for sick leave (Brage & Nossen, 2017). The societal cost of mental health disorders in Norway, including disease burden, health service, and loss of production is estimated at 280 billion NOK. This cost accounts for around 15% of the total costs of all disease groups and exceeds the cost of disease groups such as cancer and muscular/skeletal disorders (Norwegian Directorate of Health, 2015). Negative outcomes of mental health disorders and depression are present at both individual, organizational, and societal levels.

The above-mentioned prevalence and societal cost estimates were prior to the covid-19 pandemic, raising the concern of mental health effects of infection control measures. A 2021 report found that although there was an increase in mental health distress in the early stages of the pandemic, there is little indication of a lasting mental health deterioration in the Norwegian population (Norwegian Institute of Public Health, 2021).

Stress

While a variety of definitions for *stress* have been proposed, the concept can be explained as a dynamic interplay of time, external challenges and coping resources, and perceptions of these challenges and coping resources (Monroe, 2008).

An underlying principle of stress include the regulatory concept of homeostasis, a stability of key biological functions. Activation of the regulatory system can be adaptive short term, but maladaptive over longer periods as the cumulative burden on bodily systems can contribute to disorder and disease. Stress reactivity can be permanently altered through frequent stress responses, particularly in childhood when the brain is developing (Gunnar & Quevedo, 2007). The stress response is thought to contribute to immune dysregulation and

excessive inflammation, thereby inducing depressive symptoms and several of the co-occurring physical diseases (Slavich & Irwin, 2014; Liu et. al., 2017).

Responses to environmental challenges involves individual differences in personal dispositions, resources, and cognitive processes such as appraisals and coping (Paris, 2000; Park, 1998). Although most episodes of major depression are preceded by stressful events, most people do not become depressed after a stressful event (Hammen, 2005; LaMontagne & Keegel, 2010). Research further suggest that uncontrollable, negative changes are linked to an increased likelihood of depression and other types of psychopathology, based on how central the changes are to the individuals goals, values and usual activities (Dohrenwend, 2000). It has been suggested that enduring, undesired changes in people's roles and self-concept induce stress and leave individuals particularly vulnerable to depression (Pearlin et. al., 1981). Indeed, several theories postulate a link between well-being and aspects of one's sense of self, for instance self-esteem (Leary, 1999), self-definition (Blatt & Zuroff, 1992) or the psychological needs of competence, relatedness and autonomy (Deci & Ryan, 2000; Kopala-Sibley & Zuroff, 2020).

Ultimately, there is robust evidence of a causal relationship between stress and depression (Hammen, 2005). In relation to workplace stressors, different models have placed emphasis on high job demands, low job control and low social support (Karasek, 1979), effort-reward imbalance (Siegrist, 1996), and organizational injustice (Greenberg, 1990). Additional stressors associated with poor mental health include organizational change, job insecurity, temporary employment status, atypical working hours, bullying, and role stress (Harvey et. al, 2017).

Burnout

In the field of occupational health, the *burnout* syndrome has been a topic of substantial research. Burnout is conceptualized as a psychological response to prolonged

exposure to chronic emotional and interpersonal job stressors. The syndrome is characterized by exhaustion, resentfulness and withdrawal from work, and a sense of ineffectiveness and lack of accomplishment (Maslach et. al., 2001). However, the burnout construct has showed several weaknesses.

The aim of the burnout construct has been to examine suffering that individuals specifically attribute to their work. However, burnout symptoms are found to be related to problems in several life domains outside of work. The basic conceptualization and operationalization of burnout is unclear, with resulting inconsistent research practices and findings. There are no commonly shared, clinically valid diagnostic criteria for burnout, meaning cases of burnout cannot be identified, and leading to an absence of reliable prevalence estimates. Interventions aiming to help individuals with symptoms of burnout are therefore of limited relevance. Finally, the burnout construct refers to symptoms that are commonly found in depression, which also shares the etiological pathway of stress. Insufficient discriminant validity between burnout and depression has led to a lack of consensus on whether burnout is a unique condition, or one that reflects a depressive response to insurmountable job stress (Bianchi et. al., 2019). Focusing on burnout therefore constitutes a risk of leaving depressive episodes untreated and overlooking critical signs of suffering such as suicidal ideation (Bianchi et. al., 2021).

Depression is, in contrast to burnout, a clinical disorder recognized in *The Diagnostic and Statistical Manual of Mental Disorders*, (5th ed.; *DSM-5*; American Psychiatric Association, 2013), with more solid grounding, methods of measurements, and empirically proven approaches to treatment (Schwenk & Gold, 2018). It is therefore argued that a shift in focus from burnout to depression may be beneficial. By focusing on depression when monitoring occupational health, specialists could apply clear and shared diagnostic criteria to inform interventions and policy decisions (Bianchi et. al., 2021).

Occupational Depression Inventory

Until recently, no nosologically-grounded tool existed for assessing occupational depression (Hill et. al., 2021). This gap is addressed by the Occupational Depression Inventory. The ODI is an instrument designed to assess depressive symptoms that are specifically attributed to work, such as "My experience at work made me feel like a failure", and explicit attributions to work stress, such as. "My work was so stressful that I could not enjoy the things that I usually like doing". The instrument is developed with reference to the nine core symptoms of major depressive disorder, as described in DSM-5 (American Psychiatric Association, 2013). Job-related distress is approached both dimensionally and categorically, meaning it can assess work-attributed depressive symptoms as well as identify likely cases of occupational depression. As such, the ODI aims to aid occupational health specialists in addressing job-related distress (Bianchi & Schonfeld, 2020).

In-depth validity and reliability analyses have consistently indicated that the ODI exhibits robust psychometric and structural properties. The ODI has exhibited strong factorial validity and reliability, indicating the ODI can be employed as a unidimensional measure (Bianchi & Schonfeld, 2020). The instrument has further shown a degree of both convergent and discriminant validity against classical, attribution-free depression scales. In terms of criterion validity, the ODI is correlated in the expected direction with variables such as work engagement, work satisfaction, social support at work, job autonomy, trait anxiety, general health status, and objective cognitive performance (Bianchi et. al., 2022a; Bianchi & Schonfeld, 2022). To date, the ODI has been validated in Australia, Brazil, France, Italy, New Zealand, South Africa, Spain, Sweden, Switzerland, and the USA (Hill et. al., 2021; Bianchi et. al 2022a; 2022b; 2022c; 2023). Until this study, the instrument had not been employed and examined in Norway.

Objective

The objective of this study was to validate the ODI in Norway and to learn more about the correlates of occupational depression. Structural and psychometric properties of the ODI were examined, including factorial validity and reliability, and convergent validity and discriminant validity in relation to a cause-neutral measure of depressive symptoms. Concurrent criterion validity of the ODI was investigated in relation to work stressors, socioeconomic optimism, job promotion, sick leave, sex and age.

We decided to examine the ODI's concurrent criterion validity based on the work stressors of workplace ostracism, verbal abuse and physical aggression. Substantial research suggests that social relationships are important to mental and physical well-being across the lifespan. Perceived social isolation has been linked to adverse health effects, including impaired immune function, cardiovascular function, cognitive function, sleep quality, and an increased likelihood of depression (Cacioppo & Cacioppo, 2014; Hawkley & Capitanio, 2015). Ostracism, defined as perceived exclusion, ignorance, and disrespectful treatment (Ferris et. al., 2008), has correspondingly been found to be a predictor of depression (Rudert et. al., 2021). In relation to organizational psychology, workplace ostracism has been related to anxiety and depression, as well as job attitudes, job performance and job withdrawal (Ferris et. al., 2008). Workplace harassment, a social stressor which can include physical assault, threats, yelling and belittling has also been found to negatively correlate with psychological health outcomes (Bowling & Beehr, 2006). Previous studies examining the concurrent criterion validity of the ODI have similarly found significant correlations with verbal abuse and physical aggression (Bianchi et. al., 2022a).

Based on the reviewed information, the following hypotheses were formulated and tested:

H1. The ODI has an essentially unidimensional structure.

H2. The ODI exhibits high total-score reliability.

H3. The ODI shows both a degree of convergent and discriminant validity with a measure of cause-neutral depressive symptoms.

H4. The ODI is positively correlated with the work stressors of workplace ostracism, physical aggression and verbal abuse.

H5. The ODI is negatively correlated with socioeconomic optimism, a macro-indicator that touches upon people's confidence in the prosperity of their country.

Methods

Study Sample and Recruitment Procedure

We relied on convenience sampling. The data were collected by nine students, myself included, in January and February 2023. We recruited participants by leveraging personal networks, making announcements on social media platforms (e.g., Facebook, LinkedIn), and establishing connections with organizations. Participation in the study was voluntary and confidential.

To be eligible for participation in the study, an individual had to be (a) employed and (b) aged at least 18. The survey included an attention-check item devised to detect careless respondents. Of the 547 participants who initially completed the survey, 62 (11%) were identified as inattentive and excluded. The final sample thus 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). The study was conducted in accordance with the guidelines of the Norwegian Center for Research Data.

Measures

The ODI.

The ODI was the main measure of interest. With reference to the DSM-5 diagnostic

criteria for major depressive disorder (American Psychiatric Association, 2013), the instrument comprises nine symptom items covering anhedonia, depressed mood, sleep alterations, fatigue/loss of energy, appetite alterations, feelings of worthlessness, cognitive impairment, psychomotor alterations, and suicidal ideation. The symptoms are assessed within a two-week time frame. The respondents were asked to select how often they had experienced symptoms that were specifically attributed to their work. Items were rated on a four-point Likert-type scale, ranging from 0 (*never or almost never*) to 3 (*nearly every day*). The instrument contains a supplementary item dedicated to turnover intention. This question offers the responses "yes", "no", and "I don't know". A provisional diagnosis of job-ascribed depression is produced if an individual exhibits a score of 3 on at least five of the ODIs nine symptom items, which must include anhedonia (item 1) or depressed mood (item 2). For suicidal ideation (Item 9), scores of 1 or 2 are also included (Bianchi & Schonfeld, 2020). Criteria for provisional diagnosis are exhibited in figure 1.

Figure 1

Occupational Depression Inventory Criteria of Provisional Diagnosis.
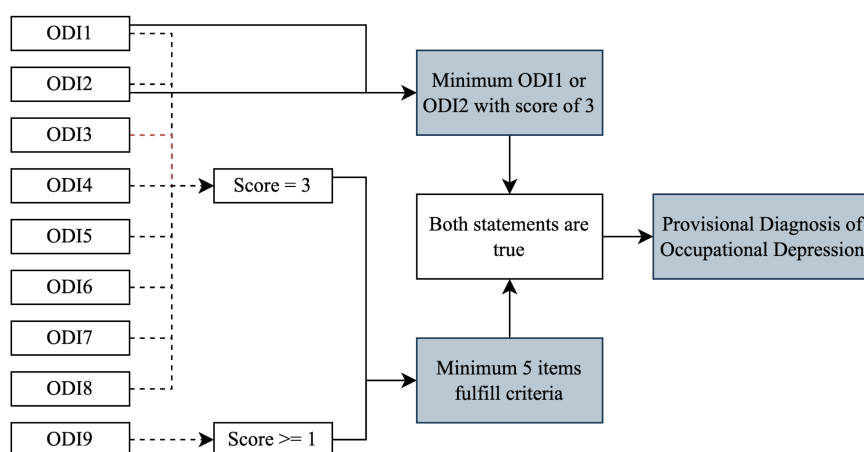
Notes. ODI1: anhedonia; ODI2: depressed mood; ODI3: sleep alterations; ODI4: fatigue/loss of energy; ODI5: appetite alterations; ODI6: feelings of worthlessness; ODI7: cognitive impairment; ODI8: psychomotor alterations; ODI9: suicidal ideation. Items are scored 0,1,2 and 3, respectively, for the responses of Never or almost never, Only a few days, More than half of the days, and Almost every day.

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 items of the ODI translated in Norwegian, with their English counterparts are displayed in Table 1.

Table 1

Norwegian Version of the Items of the Occupational Depression Inventory (ODI)

Items	Symptoms	Statements
1	Anhedonia	Arbeidet mitt var så stressende at jeg ikke kunne glede meg over ting jeg vanligvis liker å gjøre.
		My work was so stressful that I could not enjoy the things that I usually like doing.
2	Depressed mood	Jeg følte meg deprimert på grunn av jobben min.
		I felt depressed because of my job.
3	Sleep alterations	Stress relatert til jobben førte til søvnproblemer (jeg hadde vanskelig for å sovne eller sove uforstyrret, eller jeg sov mye mer enn vanlig).
		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).
4	Fatigue/loss of energy	Jeg følte meg utmattet på grunn av arbeidet mitt.
		I felt exhausted because of my work.
5	Appetite alterations	Jeg følte at appetitten min ble forstyrret på grunn av jobbstress (jeg mistet appetitten min, eller det motsatte, jeg spiste for mye).
		I felt my appetite was disturbed because of the stress of my job (I lost my appetite, or the opposite, I ate too much).
6	Feelings of worthlessness	Min opplevelse på jobb fikk meg til å føle meg mislykket.
		My experience at work made me feel like a failure.
7	Cognitive impairment	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).
		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).
8	Psychomotor alterations	Som et resultat av jobbstress følte jeg meg rastløs, eller det motsatte, alt gikk saktere–for eksempel i måten jeg beveget meg eller snakket på.
		As a result of job stress, I felt restless, or the opposite, noticeably slowed down—for example, in the way I moved or spoke.
9	Suicidal ideation	Jeg tenkte at jeg ville heller være død enn å fortsette i denne jobben.
		I thought that I'd rather be dead than continue in this job.
SQ	Turnover intention	Dersom du har støtt på minimum noen av problemene nevnt ovenfor, fører disse problemene til at du vurderer å slutte i din nåværende jobb eller stilling?
		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?

Notes. SQ = Supplementary question. Items 1-9 are scored 0,1,2 and 3, respectively, for the responses of Never or almost never, Only a few days, More than half of the days, and Almost every day.

Workplace Ostracism

The Ostracism short scale was used, adapted for the workplace (Rudert et. al, 2020). The scale consists of four items: "others ignored me", "others shut me out from the conversation", "others treated me as if I wasn´t there" and "others did not invite me to

activities. The scale measures the subjective frequency of feeling ostracized, asking the participants to indicate how often they had experienced such occurrences in context of their work during the last two months. Items are rated on a five-point Likert scale, ranging from 1 (*never*) to 5 (*always*).

Depressive Symptoms

A seven-item depression subscale of the Hospital Anxiety and Depression Scale (HADS-D; Wu et. al., 2023; Haug et. al., 2021). The HADS-D measures depressive symptoms that are cause neutral, and not necessarily attributed to the workplace. Participants were asked to indicate if they had experienced symptoms within a one-week timeframe. The seven items were rated on a five-point Likert scale, ranging from 1 (*I strongly disagree*) to 5 (*I strongly agree*).

Attention-Check Item

One attention-check item was included to help detect careless responders. Participant were asked to select the "I disagree"- response option to show that they were attentive. Participants who selected other alternatives were disqualified from the study.

Workplace Violence

The questionnaire included two workplace violence items, one for verbal abuse and one for physical aggression (Bianchi et. al., 2022a). Participants were asked to answer whether they had experienced verbal abuse or physical aggression in context of their work during the past six months. Response options for the items were "yes", "no", and "I'm not sure".

Sick Leave and Job Promotion

The questionnaire included one sick leave and one job promotion item (Bianchi et. al., 2022a). Participants were asked to indicate if they had been on sick leave or had received a

promotion, as reflected in higher status and income, during the past six months. Items were measured with a binary yes/no response.

Socioeconomic Optimism

Socioeconomic optimism was measured with a single item, asking respondents: "are you optimistic about the socioeconomic future of Norway in the decades to come?". The item was rated on a 5-point likert scale, ranging from 1 (*not optimistic at all*) to 5 (*extremely optimistic*).

Data Analyses

Analyses were conducted with SPSS version 28. First, the factorial validity of the ODI was examined through common-practice factor analysis. Factors were extracted using the Maximum Likelihood method with an oblique promax rotation. This extraction method produces parameter estimates, such as factor loadings and variance, that are most likely to produce the observed values in the correlation matrix. Factorial validity and unidimensionality was examined based on the produced factor loadings and explained variance.

 The reliability of all multi-item scales were examined. This includes the ODI with 9 items, the HADS-D with 7 items, and the Ostracism Short Scale with 4 items. Total-score reliability was estimated using Cronbach's alpha (α) and McDonald's omega (ω). Cronbachs alpha is a function of the average of intercorrelation of items and the number of items in the scale, while Mcdonalds omega is based on less restrictive assumptions, with fewer risks of overestimation or underestimation of reliability (Kimberlin & Winterstein, 2008; Dunn et. al., 2013). Based on the assumption that items measuring the same construct should correlate, internal consistency is a prerequisite for unidimensionality (Cortina, 1993).

Relationships between the ODI and other measures of interest were examined through correlation analysis using the correlation coefficient Pearsons *r*. Convergent validity and

discriminant validity of the ODI was examined based on correlation with the HADS-D. Concurrent criterion validity of the ODI was examined by investigating correlations between the ODI and ostracism, verbal abuse, physical aggression, socioeconomic optimism, job promotion, sick leave, sex and age.

Results

The distribution of mean ODI scores were positively skewed (skewness = 1.206, standard error = 0. 111), which is unsurprising given our focus on a non-clinical sample less likely to follow a normal distribution. ODI mean scores ranged from 0.00 to 3.00. Of the 485 participants, 75.3% (n = 365) scored between 0.00 and 0.88, 21.7% (n = 105) scored between 1.00 and 1.88, and 3.1% (n = 15) scored between 2.00 and 3.00. The most frequently endorsed ODI item was fatigue/loss of energy (item 4), and the least frequently endorsed item was suicidal ideation (item 9). Among the participants, 2.3% (n = 11) met the criteria for a provisional diagnosis of job ascribed depression. An examination of the turnover intention item of the ODI revealed that 31% (n = 149) indicated that they were considering leaving their current job or position due to job-related distress. Descriptive statistics for the 9 items of the ODI are summarized in table 2.

Table 2

Descriptive Statistics for the Items of the Occupational Depression Inventory

Indicators	ODI1	ODI2	ODI3	ODI4	ODI5	ODI6	ODI7	ODI8	ODI9
Mean	0.75	0.60	0.84	1.03	0.57	0.65	0.56	0.59	0.10
Median	1	0	1	1	0	0	0	0	0
Mode	0	0	0	1	0	0	0	0	0
Standard deviation	0.82	0.80	0.90	0.91	0.84	0.79	0.73	0.82	0.40
Skewness ($SE = 0.111$)	0.94	1.32	0.81	0.65	1.41	1.22	1.14	1.34	4.95
Kurtosis ($SE = 0.221$)	0.36	1.22	-0.24	-0.32	1.18	1.12	0.59	1.12	27.10
Minimum	0	0	0	0	0	0	0	0	0
Maximum	3	3	3	3	3	3	3	3	3

Notes. SE = standard error; ODI1: anhedonia; ODI2: depressed mood; ODI3: sleep alterations; ODI4: fatigue/loss of energy; ODI5: appetite alterations; ODI6: feelings of worthlessness; ODI7: cognitive impairment; ODI8: psychomotor alterations; ODI9: suicidal ideation. Items are scored 0,1,2 and 3, respectively, for the responses of Never or almost never, Only a few days, More than half of the days, and Almost every day. There are no missing values ($N = 485$).

Factor Analysis

Results are summarized in Table 3. The Kaiser-Meyer-Olkin (KMO) measure indicated a satisfactory sampling adequacy with a value of .92, "marvellous" according to Hutcheson & Sofroniou (1999). Bartletts test of sphericity was significant ($p < .001$), indicating that the correlation structure is adequate for factor analysis. The Maximum Likelihood factor analysis with the Kaiser criterion of eigenvalues greater than 1 yielded a one-factor solution as a best fit for the data. The nine items of the ODI loaded significantly on the one factor, with values ranging from .41 to .79 ($M = .69$, $SD = .12$). The extracted factor accounted for 49% of the variance. Factor analysis results are in support of H1.

Table 3

*Summary of Exploratory factor analysis of the ODI (*N*=485)*

	Occupational Depression Inventory	
Item	Factor loading	Communality
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	
Total variance	4.41	

Notes. Maximum likelihood extraction with Promax rotation. Factor loadings above .3 are marked in bold. Items of the ODI are coded ODI1 to ODI9.

Reliability

The reliability analysis indicated that ODI is a highly reliable measure with good internal consistency, Cronbach's $\alpha = .89$ and McDonald's $\omega = .90$. The Ostracism short scale ($\alpha = .85$, $\omega = .86$) and HADS-D ($\alpha = .85$, $\omega = .85$) also exhibited high reliability. Results from reliability analysis of the ODI are in support of H2.

Convergent and Discriminant Validity

The ODI correlated positively and substantially with the HADS-D, $r = .66$, $p < .001$. This result, which suggests both a degree of convergent validity and a degree of discriminant validity, supports H3.

Criterion Validity

The ODI correlated in the expected direction with our other variables of interest. Small to moderate positive correlations were observed with workplace ostracism ($r = .42$, $p < .01$), sick leave ($r = .26$, $p < .001$) verbal abuse ($r = .22$, $p < .01$) and physical aggression ($r = .09$, p

< .05) . The ODI exhibited small to moderate negative correlations with socioeconomic optimism (r = .-31, p < .01), sex (r = -.19, p < .01), age (r = -.13, p < .01) and finally, a small and statistically nonsignificant negative association with job promotion (r = -.07, p = .12). The observed correlations with work stressors and socioeconomic optimism are in support of H4 and H5. Results are summarized in Table 4.

Table 4

*Pearson Correlations Among Study Variables (*N=485)

	M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. ODI (0-3)	0.63	0.58	-								
2. HADS-D (1-5)	2.09	0.66	.66**	-							
3. Workplace ostracism (1-5)	1.59	0.69	.42**	.41**	-						
4. Socioeconomic optimism (1-5)	2.46	0.86	-.31**	-.32**	-.24**	-					
5. Verbal abuse (0/1)	0.29	0.45	.22**	.09	.19**	-.22**	-				
6. Physical aggression (0/1)	0.07	0.26	.09*	.02	.01	-.03	.33**	-			
7. Sick leave (0/1)	0.23	0.42	.26**	.25**	.15**	-.15**	.06	.02	-		
8. Job promotion (0/1)	0.20	0.40	-.07	-.10*	-.05	.05	-.02	-.06	-.04	-	
9. Age groups (1-3)	1.89	0.86	-.13**	-.11*	.03	.00	-.18**	-.19**	.05	-.12**	-
10. Sex (0/1)	0.31	0.47	-.19**	-.08	-.02	.07	-.02	-.01	-.13**	.04	.05

Notes. *p < 0.05, **p < 0.01. Age group 1 = 18-34, 2 = 35-49, and 3 = 50 and over. Sex 0 = female, 1 = Male. For items 5 to 8, 0 = no and 1 = yes.

Discussion

The objective of this study was to validate the ODI in Norway and investigate correlates of occupational depression. Building on previous research substantiating the robust structural and psychometric properties of the ODI, this study hypothesized that the ODI has an essentially unidimensional structure (H1). In support of this hypothesis, common-practice factor analysis of the nine ODI items yielded a one-factor solution as the best fit for the data. Further, all items of the ODI were expected to measure aspects of the same construct and

exhibit high total-score reliability (H2). Reliability analysis indicated satisfactory internal consistency.

As the ODI aims to measure depressive symptoms that are specifically related to work, the instrument was expected to correlate substantially, though not too highly, with a measure of general, work-unrelated depression. Pearson correlation suggested satisfactory convergent and discriminant validity of the ODI against the HADS-D (H3).

Concurrent criterion validity of the ODI was investigated through correlation analysis. Pearson correlations provided support for the hypotheses that the ODI is positively correlated with the job stressors of workplace ostracism, physical aggression and verbal abuse (H4), and negatively correlated with socioeconomic optimism (H5). Finally, we investigated the associations of the ODI with other measures of interest. We found a significant positive correlation with sick leave, and no significant correlation with job promotion. Negative correlations with the variables age and sex indicate that younger individuals and women tended to score slightly higher on the ODI.

Main Findings

Factorial Validity

Results from this study indicate a one-factor solution of the ODI items account for 49% of the variance. As a point of reference, factor solutions that account for around 60% of the variance are generally considered satisfactory in social sciences (Hair et. al., 2014). The sample of this study generally exhibited low endorsement of item 9 (suicidal ideation), which may be reflected in the communality of the item and the variance explained. Factor loadings for all items were above the .3 cutoff point for sample sizes above 350 (Hair et. al., 2014), indicating that one latent factor account for the inter-item association in the data. These findings comport with those of previous studies of the ODI's dimensionality (e.g., Bianchi et al., 2023). Past research indeed indicated that the measure can be regarded as essentially

unidimensional, a prerequisite for the use of a scale's total score to be warranted. Previous studies of the ODI's dimensionality relied on exploratory structural equation modeling bifactor analysis to examine the factorial structure of the scale, thus allowing "factorial complexity" to be modeled. Although our modeling techniques were more limited, results are compatible with the notion that the ODI reflects a unitary construct of occupational depression (H1).

Reliability

The ODI exhibited high reliability, $\alpha = .89$ and $\omega = .90$, in support of H2. It is of note that a threshold of .70 is often considered sufficient for a scale to be considered reliable in psychological research. However, this view distorts the prescriptions of psychometricians, who recommend a reliability threshold of at least .80 for scales meant to be used in basic research. The Norwegian version of the ODI employed in this study meets this requirement. For application in clinical settings, a reliability threshold of .90 is recommended (Nunnally & Bernstein, 1994). Results from this study regarding the reliability of the ODI is consistent with previous findings. For instance, Cronbach's alphas and McDonalds omegas of around .90 were observed in several ODI studies (Bianchi et al., 2022b; Bianchi & Schonfeld, 2020; Hill et al., 2021), and the ODI has also exhibited high reliability based on other indexes such as Guttman's lambda-2 and the Molenaar-Sijtsma statistic (Bianchi et.al., 2022c).

Construct Validity

The ODI exhibited an expectedly large association with the HADS-D ($r = .66$, $p < .01$). Consistent with H3, the ODI exhibited a degree of convergent validity and a degree of discriminant validity against the HADS-D.

A quality criteria of construct validity include predefined, theoretically derived hypotheses with at least 75% of results in correspondence with the hypotheses (Terwee et. al., 2007). The hypothesis that the ODI assess and reflect something different, but not unrelated

from classical, work unrelated depression scales, is derived from the notion that all individuals identified with job-ascribed depression should meet the criteria of cause-neutral depression, however only some of the individuals identified with cause-neutral depression should meet the criteria of job-ascribed depression (Bianchi & Schonfeld, 2020). Previous ODI studies have similarly found support for this notion using other measures of general depression. To illustrate, the ODI has been found to exhibit a degree of convergent validity and a degree of convergent validity with the 10-item version of the Center for Epidemiologic Studies-Depression scale (CES-D), $r = .671$ (Hill et. al., 2021), and with the Depression subscale of the Depression Anxiety Stress Scales-21 (DASS -21), $r = 653$ (Bianchi et. al., 2022b)

Work Stressors

Occupational depression was positively correlated with a six-month history of verbal abuse and physical aggression, and a two-month history of workplace ostracism. This study thus found evidence in support of H4 and substantiates the concurrent criterion validity of the ODI. Results are consistent with previous findings which suggests the ODI is correlated in the expected direction with a variety of job-related and context-free stressors. This includes workplace verbal abuse, workplace physical aggression, lack of money for leisure activities, household financial strain (Bianchi et.al, 2022a), interpersonal conflict at work, job incivility, unreasonable work tasks, work overload, job autonomy, skill development, job meaningfulness (Bianchi et. al., 2022b) and social support in work life (Bianchi & Shonfeld, 2020).

Interestingly, ODI scores exhibited a stronger association with workplace ostracism ($r = .42$, $p < .01$, moderate association) than with verbal abuse ($r = .22$, $p < .01$, moderate association) and physical aggression ($r = .09$, $p < .05$, small association). A similar pattern was also found for cause-neutral depressive symptoms. This finding highlights the critical role

of positive social interactions and relational bonds for our wellbeing. It has been suggested that the need to belong is a powerful, fundamental, and pervasive human motivation that, if unfulfilled, causes physical and psychological suffering (Baumeister & Leary, 1995). Additionally, ostracism is suggested to impact the psychological needs of self-esteem, control and meaningful existence. Despite the absence of verbal derogation and physical assault, ostracism is experienced as pain, and long-term exposure can lead to alienation, helplessness, unworthiness, and depression (Williams & Nida, 2011). Following this line of reasoning, ostracism may threaten existential needs in specific ways compared to other forms of mistreatment and bullying (Williams & Nida, 2009).

Finally, as this study investigates correlations of subjective ostracism, individual scores may reflect underlying social-cognitive processes such as rejection sensitivity. Such traits constitute a risk factor for depression (Liu et. al., 2014; Howard et. al., 2020), possibly accounting for some of the positive correlation between ostracism and occupational depression. On a more general note, this dynamic interplay between internal dispositions and external conditions is central to the etiology of depression (Wichers, 2014). The ODI intentionally assesses the emerging symptoms of work-attributed depression, without presuppositions of preceding internal or external processes (Bianchi & Schonfeld, 2020).

Socioeconomic Optimism

The study found the ODI to be negatively correlated with socioeconomic optimism (r = -31, $p < .01$, moderate association), in support of H5. The correlation indicates that individuals who reported higher socioeconomic optimism tended to experience less depressive symptoms in relation to their work. The result was similar for case-neutral depressive symptoms, $r = -.32$, $p < .01$.

A general tendency to expect good outcomes across life domains is described as dispositional optimism. The construct has been found to significantly predict both positive

physical health outcomes (Rasmussen et. al., 2009) and future depressive symptoms (Vickers & Vogeltanz, 2000). Findings further suggest that dispositional optimism is associated with greater coping efforts in the face of adversity (Nes & Segerstrom, 2006). Individuals with lower levels of dispositional optimism have more dysfunctional or harmful expectations about their future, leading to more severe depressive symptoms (Uribe et. al., 2022). In relation to the workplace, hope and optimism have shown associations with work-related outcomes. This includes job performance, job satisfaction, work happiness and organizational commitment (Youssef & Luthans, 2007).

In line with these findings, the results of this study may suggest that a favorable orientation toward the future, such as socioeconomic optimism, represents a factor of personal resilience, leading individuals to be less susceptible to symptoms of depression and more likely to thrive in the workplace. Finally, the fact that pessimism and hopelessness are characteristics of depression may account for some of the negative correlation between occupational depression and socioeconomic optimism.

Job Promotion and Sick Leave

Other measures of interest included a six-month history of job promotion and sick leave. We found a significant positive association between ODI scores and sick leave ($r = .26$, $p < .01$, moderate association), and a small statistically nonsignificant negative association with job promotion. For cause-neutral depressive symptoms, there was a significant positive association with both sick leave ($r = .25$, $p < .01$, moderate association) and job promotion ($r = .10$, $p < .05$, small association).

As 20% of sickness benefit recipients in Norway have a mental disorder as the reason for sick leave (Brage & Nossen, 2017), a positive association is expected between sick leave and depressive symptoms, both work-related and cause-neutral. This finding substantiates the concurrent criterion validity of the ODI, and is in line with previous findings. For instance,

Bianchi et. al (2022a) similarly found the ODI to be positively correlated with sick leave, and a meta-analysis by Amiri & Behnezad (2021) found that symptoms of depression increased the risk of sick leave by more than 1.5 times.

In theory, job promotion may be reflected in higher job satisfaction and, in turn, lower symptoms of depression. A meta-analysis did find job satisfaction to be associated with depression (Faragher et. al., 2005). However, job promotion has been found to have a lingering but diminishing association with job satisfaction. This suggests that, similar to following increases in pay, individuals grow accustomed to new environments. Findings further suggest that the expectation that a promotion is possible in the future has a stronger impact on job satisfaction (Kosteas, 2011). Moreover, it can be theorized that actual promotions are associated with an increase in job stressors such as authority, job pressure, role-stress, and work-family conflict (Badawy & Schieman, 2021), thereby diminishing the positive effects of higher income and status. Ultimately, this study did not find sufficient evidence to substantiate an association between job promotion and occupational depression.

Sex and Age

Correlation between the ODI and sex ($r = -.19$, $p < .01$, moderate association) suggest that women tend to score slightly higher on occupational depression. Similar findings are presented in previous ODI research (Bianchi et. al., 2022b) and are recurrent in depression research. Although this study did not find a statistically significant correlation between sex and cause-neutral depression, previous studies have shown that the lifetime prevalence of major depression in women (21.3%) is almost twice than for men (12.7%). Contributors to the increased vulnerability of women is thought to involve several biological processes and psychosocial events, including genetically determined vulnerability, hormonal fluctuations, role-stress, internalizing coping style, victimization, sex-specific socialization and disadvantaged social status (Noble, 2005). The workplace environment may also expose

women to unique stressors, leading to gender differences in occupational stress (Gyllensten & Palmer, 2005), and gender differences in occupational depression.

The correlation between the ODI and age ($r = -.13$, $p < .01$, small association) further suggest that younger individuals tend to score slightly higher on the ODI. Findings on the intrinsic relationship between age and depression are equivocal, however the relationship is thought to be influenced by life-cycle gains and losses, for instance in education, economic well-being, employment, marital status, social support, life events and somatic health status (Stordal et. al., 2003; Jorm, 2000). Such risk and protective factors may provide explanation of the lower ODI scores in older age groups found in this study.

Strengths and Limitations

The present study is not devoid of limitations. The study sample was one of convenience and voluntary response, inviting individuals who were over the age of 18 and currently employed to participate. Although the sample was relatively large ($N = 485$), and included individuals displaying various ODI scores, the representativeness of the sample in relation to the Norwegian workforce is unclear, and findings may need further replication. For instance, our study may have unproportionally attracted individuals with strong opinions on the subject.

The sample in this study was relatively healthy: While 2.3% met the criteria for job-ascribed depression in this study, previous studies on the ODI have found percentages of 1.8 - 17% (Bianchi et. al., 2022a; 2023). All participants in this study were currently employed, and the healthy worker effect should be considered. As an individual must be relatively healthy to be employable in the workforce, morbidity rates within the workforce are usually lower than in the general population (Li & Sung, 1999). Estimates from this study of occupational depression should be compared with caution to general depression prevalence

estimates in Norway and should not be generalized to the entire Norwegian working population.

As this study was cross-sectional, it is not possible to determine causality. Longtudinal studies may be beneficial in examining predictors of occupational depression. Follow-up studies are also needed for the purpose of examining the test-retest reliability and sensitivity to change of the Norwegian version of the ODI. However, several items were retrospective in nature, linking what has happened in the past to present time variables. Assuming accurate report from participants, the informativeness of the cross-sectional design is strengthened (Spector, 2019).

Finally, self-reported measures are subject to response biases such as social desirability bias. Causal attributions to work-related symptoms also come with a risk of misattributions, although participants were guided to reflect on the causes of their symptoms. However, self-report measures and causal attributions are employed in the assessment and diagnosis of several disorders described in the DSM-5 (American Psychological Association, 2013), and in a variety of clinical and health research areas (Chan, 2010). Further, self-reported measures are shown to be predictive of objective outcomes. For instance, perceived occupational stress (Kachi et. al., 2020) and turnover intention (Sun & Wang, 2017) has been found to be associated with actual turnover, and questionnaire-evaluated suicidal ideation is associated with attempted and completed suicides (Simon et. al., 2013). Self-report data can be essential in behavioral and medical research, providing knowledge that is otherwise unavailable through technology or observation (Baldwin, 1999).

Conclusion

Results from this study indicated that the Norwegian version of the ODI exhibits robust structural and psychometric properties. Findings suggest that the instrument can be used as a unidimensional measure, exhibiting satisfactory reliability and construct validity. ODI scores

were significantly correlated with the work stressors ostracism, verbal abuse, and physical

aggression, as well as socioeconomic optimism, sick leave, age and sex. These findings

substantiate the criterion validity of the ODI and provides insights to the correlates of

occupational depression. The ODI may serve as a useful tool to occupational health

researchers and practitioners in identifying, monitoring, and treating job-ascribed depression.

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