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Discrimination in the workplace, reported by people with major depressive disorder:

Cross-sectional study in 35 countries.

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Abstract

Objective

Whereas employment has shown to be beneficial for people with Major Depressive Disorder (MDD), across different cultures, employers' attitudes have shown to be negative towards workers with MDD. This may form an important barrier to work participation. Today, little is known about how stigma and discrimination affect work participation of workers with MDD, especially from their own perspective. We aimed to assess, in a working age population including respondents with MDD from 35 countries: (1) if people with MDD anticipate and experience discrimination when trying to find or keep paid employment; (2) if participants in high, middle and lower developed countries differ in these respects; and (3) if discrimination experiences are related to actual employment status (i.e. having a paid job or not).

Method

Participants in this cross-sectional study (N=834) had a diagnosis of MDD in the previous 12 months. They were interviewed using the Discrimination and Stigma Scale (DISC-12). ANOVAS and generalized linear mixed models were used to analyze the data.

Results

Overall, 62.5% had anticipated and/or experienced discrimination in the work setting. In very high-developed countries almost 60% of respondents had stopped themselves from applying for work, education or training because of anticipated discrimination. Having experienced discrimination was independently related to unemployment.

Conclusions

Across different countries and cultures, people with MDD very frequently reported discrimination in the work setting. Effective interventions are needed to enhance work participation in people with MDD, focusing simultaneously on decreasing stigma in the work environment and on decreasing self-discrimination by empowering workers with MDD.

Keywords: discrimination, stigma, depression, mental, employment, work, workplace, human development index

Strengths and limitations

- Depression is the leading cause of disability worldwide, and for this study respondents with major depressive disorder from as many as 35 countries were interviewed.
- This study is examines the under-researched yet substantial problem of discrimination as a barrier for work participation of people with MDD.
- Interviews were used to gather direct self-reports rather than hypothetical scenarios or vignettes, which is often done in research on stigma and discrimination
- Limitations are the cross sectional design of the study, and the fact purposive sampling was used to recruit participants, which limits the generalizability of the results.

Introduction

Employment has many benefits that can contribute to the recovery of people with mental health problems [1, 2]. However, in many countries participation and re-integration of people with mental health problems in the workforce is problematic [3, 4]. Several factors cause this, some of which are related to the individual, and some to the environment. An important barrier for full occupational participation and successful vocational integration is the stigma that is associated with mental health problems[5]. Stigma is a mark or sign of disgrace usually eliciting negative attitudes to its bearer and can be seen as a problem associated with knowledge (ignorance), attitudes (prejudice) and behavior (discrimination)[6]. Several studies have shown that although some cultural differences may exist[7], overall employers in many countries commonly express a range of concerns about hiring a potential employee with mental health problems [8-10]. Concerns reported include the belief that people with mental health problems have limited productivity and job performance, especially in tasks requiring cognitive skills [8, 11], that they are unreliable and might pose threats to the safety of other employees, customers or themselves[11], or behave in a strange and unpredictable manner, and that there is potential for symptom relapse [8]. In addition, the anticipation of discrimination by people with MDD may lead them not to apply for a job, in the expectation of failure or rejection.

Whereas most studies on mental health problems and discrimination in the workplace have focused on severe mental disorders such as schizophrenia, very few have focused on major depressive disorder (MDD)[5]. This is remarkable, as MDD is one of the leading causes of the global burden of disease[12]. It is one of the most prevalent of all causes of disability [13, 14] and therefore an important public health problem. Across different

countries and cultures stigma and discrimination form an important barrier to work reintegration, although this topic has hardly been studied. In this context, the aim of this study was to assess: (1) if people with MDD of working age anticipate and experience discrimination because of their mental health problems when trying to find or keep paid employment; (2) if people with MDD of working age from high, middle and lower developed countries differ in this respect; and (3) if discrimination experiences when trying to find or keep paid employment are related to present work status (i.e. having a paid job) in working aged people with MDD.

Methods

Study design

Data were gathered as part of a larger study by the European Commission funded ASPEN (Anti Stigma Program European Network) study and the INDIGO (International Study of Discrimination and Stigma for Depression) research network[15]. In a cross-sectional survey, people with a clinical diagnosis of major depressive disorder were interviewed in 35 countries. The ASPEN countries included Belgium, Bulgaria, England, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, The Netherlands, Portugal, Romania, Scotland, Slovakia, Slovenia, Spain and Turkey. The countries participating through the INDIGO network included Australia, Brazil, Canada, Croatia, Czech Republic, Egypt, India, Japan, Malaysia, Morocco, Nigeria, Pakistan, Serbia, Sri Lanka, Taiwan, Tunisia and Venezuela.

The design of this study was intentionally pragmatic so that as many as possible low- and middle-income countries could participate using only locally available resources, because no external funding was available. Participants were recruited through local

research staff, who were asked to identify people attending specialist mental health services (either outpatient or day care in the public and private sectors) in the local area with a clinical diagnosis of major depressive disorder in the previous 12 months. Each site was asked to recruit at least 25 participants with MDD. As the present study focused on the working age population, students (N=72) and retired respondents (N=168) were excluded from the analyses. Full details of the method have been previously published[15].

Procedure

Data were gathered during face-to-face interviews in 2010, between January 1st and December 31st. Inclusion criteria were (1) a clinical diagnosis of major depressive disorder during the previous 12 months (single episode or recurrent), as based on the DSM-IV criteria; (2) ability to speak and understand the main local language; and (3) aged 18 years or older. Individuals who were receiving psychiatric in-patient care during recruitment were excluded. The study was approved by the appropriate ethical review board at each study site. After complete description of the study to the subjects, written informed consent was obtained.

Measures

Participants were assessed face-to-face by independent researchers not involved in the care process using the standardized Discrimination and Stigma scale (version 12), a structured interview for recording the discrimination experienced by an individual with a mental health problem [16, 17]. The DISC-12 interview starts with the statement "Discrimination and stigma occur when people are treated unfairly because they are seen as being different from others.

This interview asks about how participants have been affected by discrimination and stigma because of mental health problems". The instrument consists of 32 questions, assessing discrimination in several life domains, such as marriage, parenting, housing, and leisure. For the present paper, only the items were that referred to discrimination in the work environment are reported upon. For anticipated discrimination, the items used in this study were: "Because of how others might respond to your mental health problem, *have you stopped yourself from applying for work?*" and "Because of how others might respond to your mental health problem, *have you stopped yourself from applying for education and training?*". For experienced discrimination, the items used were "Because of how others might respond to your mental health problem, have you been treated unfairly *in finding a job?*" and "Because of how others might respond to your mental health problem, *have you been treated unfairly in keeping a job?*'. All questions were answered on a 4-point Likert scale (0= not at all, 1= a little, 2=moderately, and 3= a lot).

For the second research question, consistent with the methodology of a previous ASPEN/INDIGO paper[18] , countries were divided into groups according to the Human Development Index (HDI). The HDI is a summary measure of human development established by the United Nations[19], which measures the average achievements of a country in three basic dimensions of human development: (a) long and healthy life (operationalized as life expectancy at birth), (b) access to knowledge, (i.e the mean number of years of schooling), and (c) standard of living, (i.e. gross national income per capita). As data were gathered in 2010, the HDI statistic of that year was used. Countries with a very high HDI score were England, Australia, Finland, Germany, Canada, Italy, Portugal, Belgium, France, Japan, Greece, The Netherlands, Scotland, Slovakia, Slovenia, Spain, Czech Republic, Taiwan and Hungary. Countries with a high HDI score were Turkey, Malaysia, Brazil, Serbia, Bulgaria,

Venezuela, Tunisia, Lithuania, Romania, and Croatia. As few countries had a low HDI, the medium low and low HDI group were taken together as one group for the analyses. This medium/low HDI group included Egypt, India, Morocco, Nigeria, Pakistan, and Sri Lanka.

Internalized stigma, one of the independent variables included in the analyses for the third research question, was measured with the Internalized Stigma of Mental Illness Scale (ISMI)[20]. Internalized stigma refers to the inner subjective experience of stigma and its psychological effects resulting from applying negative stereotypes and stigmatizing attitudes to oneself. The ISMI is a 29-item instrument for self-rated assessment of the subjective experience of stigma, with higher scores indicating higher internalized stigma. Here, the total score on the ISMI was used.

Statistical analyses

All analyses were performed using SPSS 19. All p values were two-tailed with an accepted significance level of 0.05. For the first research question, percentages of anticipated and experienced discrimination were reported per country. For the second research question, two separate ANOVAS were conducted, the first of which with anticipated discrimination as the dependent variable and HDI level as the independent variable. A second ANOVA analysis was conducted with experienced discrimination as the dependent variable and HDI level as the independent variable. For the first and second research questions, answers to the questions on anticipated and experienced discrimination were dichotomized into 'No' ("not at all") and 'Yes' ("a little", "moderately", "a lot"). For the third research question, multivariable logistic regression analysis was performed, using work status as the dependent variable, (defined as 0=no paid employment and 1=employed), and ten

independent variables, including experienced discrimination. First, univariate analyses were conducted including the following independent variables that were expected to be related to job outcome: experienced discrimination, gender, age, ethnicity (i.e. belonging to an ethnic minority), level of education, marital status, previous psychiatric treatment, age of first contact with mental health services, internalized stigma (ISMI total score), and HDI. Second, all variables that showed a significant relationship with the dependent variable on a univariate level ($P<0.05$) were included in the multivariable logistic regression analysis.

Results

A total of 834 people with major depressive disorder across 35 different countries were individually interviewed for this study. About half of all participants were married or cohabiting, and two thirds of the participants were women. Characteristics of the sample are shown in Table 1.

(Please insert Table 1 about here)

As shown in Table 2, for each separate question, about 40-50% of the participants indicated that discrimination was *not* a problem for them. However, when looking at the 4 items combined, about two thirds (62.5%) of the total sample reported anticipated and/or experienced discrimination in the work setting due to their mental health problem. Almost one third of participants indicated to have stopped themselves from applying for work because of anticipated discrimination.

(Please insert Table 2 about here)

Regarding the second research question, significant differences were found between the groups with different HDI levels. Specifically, participants in countries with a very high HDI reported significantly more often anticipated (X^2 = 26.01 (df=2), p<0.01) and also experienced (X^2 = 7.25 (df=2), p<0.05) discrimination than participants in countries with moderate/low HDI (see Figure 1). As can also be seen from this Figure, in all three groups the anticipated discrimination scores were higher than the experienced discrimination scores.

(Please insert Figure 1 about here)

Concerning the third research question, as can be seen in Table 3, several variables were not related to work status on a univariate level (i.e. 'belonging to an ethnic minority', 'marital status', 'age of first contact with mental health services' and 'HDI'). Results from the multilevel logistic regression analysis showed that experienced discrimination was independently and positively related to unemployment (0.61, 95% CI= 0.43-0.86). Other variables that were significantly related to unemployment were 'low educational level' (0.48, 95% CI= 0.34-0.69) and 'having ever been admitted to psychiatric treatment' (0.55, 95% CI= 0.38-0.79).

(Please insert Table 3 about here)

Discussion

The results of this study show that as many as 62.5% of participants reported to have anticipated and/or experienced discrimination in the work setting. Anticipated discrimination was reported more often than experienced discrimination. Participants from countries with a very high HDI reported significantly more often anticipated and experienced discrimination, although even in the medium/low HDI group, about one third of participants reported discrimination in the work setting. Regarding the third research question, it was found that experienced discrimination was indeed independently related to unemployment.

These findings show that discrimination in the workplace is a common problem in many countries worldwide. Considering that inpatients were excluded from the study, for the total group of people with MDD these percentages may be even much higher. These findings are consistent with those of a large Australian study on the experiences and perspectives of people with MDD[21]. Here, participants indicated that stigma was a considerable problem, particularly regarding employment. In a similar German study, 81.5% of the 55 participants who had experienced a depressive episode anticipated stigmatization in the occupational setting[22]. These studies from the depressed individual's perspective are in line with results of studies on employers' perspectives. Such studies have shown that employers tend to have negative attitudes towards people with mental health problems [(5-7).]

An important finding of the present study was that participants anticipated discrimination more often than that they had actually experienced it. In another study, Ucok et al. 8 found that anticipated discrimination was not necessarily associated with experienced discrimination. Similar to our results, Angermeyer et al[5] also found anticipated discrimination to be higher than experienced discrimination, and suggest it could result in

the tendency to avoid situations with a high risk of stigma. Corrigan and colleagues described this "why try" effect as an overarching phenomenon encompassing self-stigma, followed by low self-esteem and self-efficacy, and a diminished behavior to pursue life goals[23]. However, not only people with mental ill health themselves anticipate to be discriminated in the workplace. A recent population-based survey of working adults in Canada showed that a third of workers would not tell their managers if they experienced mental health problems, mostly for fear of damaging their careers[24]. Hence, findings from these studies and this present study underline the clear need for interventions focusing on the empowerment of people with MDD in the work environment. Peer support plays an important role in enhancing empowerment and decreasing self-stigma [20] and may be useful in such programs.

Because mental health problems are highly prevalent [13, 25], but people with these disorders are often reluctant to disclose their condition[21, 22], employers often are not aware of the fact that many of their employees have mental health problems. Although this is a major impediment for work adaptations, authors of a recent vignette study concluded that concealment of mental health problems may actually be wise, as employers tended to think more negatively about a worker with depression than with a physical disorder under the exact same circumstances [(26)]. Recently, a decision aid for employees on whether or not to disclose their mental health problems to an employer has been developed [27-28], that has shown to effectively reduce decisional conflict in employees with mental health problems[27]. Future programs aimed at reducing stigma and discrimination, should also involve employers and occupational health professionals as they play a major role in whether or not temporary workplace reasonable adjustments or accommodations are made. Boot et al. showed that workplace adjustments are associated with a reduction in sick leave duration

and that 43% of workers with mental health problems reported a need for work adjustments[29].

Results of the present study indicated that in very highly developed countries, significantly higher percentages of discrimination were reported as compared to countries with a low/medium developmental score (research question 2). These findings differ from those of an intercultural study on employers' attitudes towards hiring and accommodating a person with disabilities at work[10]. Here, it was found that Chinese employers were less likely to endorse hiring people with psychiatric disabilities than employers from the US or Hong Kong. However, it should be noticed that within one HDI group, many different countries and cultures are represented which limits generalizability.

Whereas the size of the present study, including 35 countries, is a considerable strength, the number of people interviewed per country was too small to draw any conclusions at country level. Nevertheless, the results indicated that even in countries with a medium to low developmental score, about one third of participants reported discrimination in the work setting. Future research should focus on differences between countries, and study for instance the effects of legislation. However, legislation will not entirely solve the problem, as it does not address self-stigma.

We also found that experienced discrimination was significantly related to unemployment (research question 3). These findings are similar to those of a large household interview survey in six European countries. Specifically, they found that in participants with a mental health problem, perceived stigma was not only significantly associated with being unemployed, but also with a decreased quality of life, higher work and role limitations and higher social limitations[30]. An explanation for the finding that experienced discrimination was independently related to unemployment is that the social

stigma attached to mental health problems amongst employers may hinder them to hire an employee with MDD[11,26]. Alternatively this finding may be explained by the fact that during job interviews, applicants with MDD may not get the position because MDD is characterized by a variety of symptoms that may be disadvantageous during job interviews, such as markedly diminished interest in activities, impaired ability to think, concentrate or make decisions, fatigue, increased irritability, and low self-worth[20]. These symptoms may influence both applicants' verbal and nonverbal behavior, thereby diminishing their chances of being appointed.

When considering the results of this study, several limitations need to be taken into account. First, apart from the four items on the DISC questionnaire that measured anticipated and experienced discrimination, little additional information was available on how participants perceived their work setting and why they felt discriminated. Future qualitative and longitudinal studies are needed to address this in more detail, focusing on the role of stakeholders such as supervisors, employers, colleagues and occupational health professionals. A second limitation is that the design of the study was cross sectional, for which reason no causality can be assumed. Hence, discrimination may lead to unemployment, but unemployment may also lead to feelings of being discriminated against. Third, purposive sampling was used to recruit participants. This limits the generalizability of the results, as participants do not necessarily represent true prevalent cases in the community.

In conclusion, the results suggest that anticipated and experienced discrimination in the workplace is a highly common phenomenon in higher as well as in lower developed countries across the world. The topic of overcoming stigma and discrimination has been

under-researched so far[31] but may offer new ways to improve work participation of people with MDD. In many countries mental health problems such as MDD are associated with high costs for society, due to unemployment, absences and at work performance deficits [32-34]. Previous studies have called for research addressing workplace environment issues to improve work participation of people with MDD[32,34]. Stigma and work place discrimination are such issues and there is a clear need for effective interventions.

Table 1. Characteristics of the sample (N=834)

Demographic characteristics	
Age (mean, SD)	42.7 (11.9)
Female gender (%)	66.9
Education (%)	
None, primary (age ≤12), secondary (≤15-16 years), or vocational qualification	43.8
Diploma, degree, or postgraduate qualification	56.2
Marital status (%)	
Married or cohabiting	52.2
Single or non-cohabiting partner	25.9
Widowed, separated, divorced	21.7
Belongs to ethnic minority (%)	8.2
Human Development Index score[1]	
	47.0
Very high HDI countries	28.2
High HDI countries	14.0
Medium HDI countries	10.8
Low HDI countries	
Mental health characteristics	
Ever admitted for psychiatric care (%)	36
Age first contact with mental health services (mean, SD)	33.6 (11.8)
Internalized stigma total score[2] (mean, SD)	2.4 (0.55)

Work related characteristics	
Employment	
Full-time or part-time	51.2
Volunteer, or working in a sheltered accommodation or at home	13.1
Looking for a job	14.4
Unemployed, not looking for a job[3]	21.3

[1]HDI, United Nations Development Programme [19]

[2]Total score on the Internalized Stigma of Mental Illness scale [20]. Scale ranges from 1-4, higher scores indicating higher internalized stigma.

[3]Combination of 'Would like to work but afraid to loose benefits', 'unable to work', 'choose not to work'.

Table 2. Responses to the DISC-12[1] questions related to employment (N=834)

		N (%)
Anticipated discrimination		
…have you stopped yourself from applying for work?		
	not at all	338 (40.5)
	a little	63 (7.6)
	moderately	65 (7.8)
	a lot	109 (13.1)
	not applicable	239 (28.7)
…have you stopped yourself from applying for education or training courses?		
	not at all	373 (44.7)
	a little	72 (8.6)
	moderately	39 (4.7)
	a lot	67 (8.0)
	not applicable	262 (31.4)
Experienced discrimination		
… have you been treated unfairly in finding a job?		
	not at all	402 (48.2)
	a little	41 (4.9)
	moderately	35 (4.2)

	a lot	45 (5.4)
	not applicable	307 (36.8)
… have you been treated unfairly in keeping a job?		
	not at all	423 (50.7)
	a little	61 (7.3)
	moderately	57 (6.8)
	a lot	77 (9.2)
	not applicable	213 (25.5)

[1]Discrimination and Stigma Scale. [17]

Figure 1. Percentages of respondents who reported to have anticipated and experienced discrimination in the work setting, in very high, high, moderately and lower developed countries.

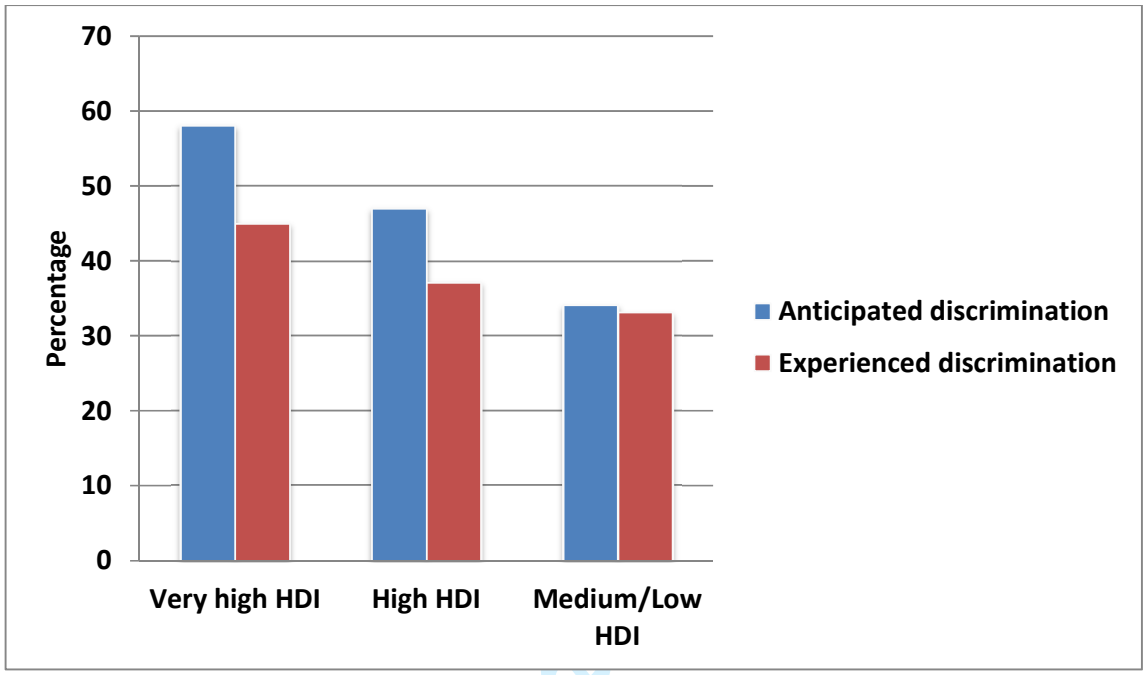

Table 3. Multivariable logistic regression analysis work status. Dependent variable was work status.

	Univariable models	Multivariable model
	Odds ratios (95% CI)	Odds ratios (95% CI)
Experienced discrimination	0.63 (0.45-0.88)**	0.61 (0.43-0.86)**
Female gender	0.68 (0.50-0.92)*	0.79 (0.55-1.14)
Age	0.99 (0.97-1.00)*	0.99 (0.98-1.01)
Ethnic minority	0.88 (0.50-1.55)	-
Low level of education	0.44 (0.33-0.59)**	0.48 (0.34-0.69)**
Marital status		
Married or cohabiting	Ref	-
Single or non-cohabiting partner	0.72 (0.50-1.03)	
Widowed, separated, or divorced	0.86 (0.61-1.21)	
Ever admitted for psychiatric treatment	0.61 (0.45-0.84)**	0.55 (0.38-0.79)**
Age first contact with mental health services	1.00 (0.99-1.01)	-
ISMI total	0.66 (0.50-0.86)**	0.72 (0.52-1.00)
HDI		
Low / Medium HDI countries	Ref	-
High HDI countries	1.43 (0.71-2.85)	
Very High HDI countries	1.34 (0.71-2.50)	

* p<0.05

** p<0.01

Contributorship statement: The original study design and protocol were written by AL, TVB, and GT. AL, TVB, CB, KW, CVA, JVW, IM and GT coordinated data gathering in the participating sites. EB, JvW, JM AL and CB participated in the data analysis and interpretation. The report was written by EB, JVW, JM, TVB GT and was edited by all authors, who also approved of the final version.

Competing interests: none

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Data sharing statement: The data were gathered by a consortium. Additional information can be obtained by contacting dr Tine Van Bortel (PhD) tv250@medschl.cam.ac.uk

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7/8
Bias	9	Describe any efforts to address potential sources of bias	*14*
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	10
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	17
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	19
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
		(*b*) Report category boundaries when continuous variables were categorized	7
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	23

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Discrimination in the workplace, reported by people with major depressive disorder: Cross-sectional study in 35 countries.

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Secondary Subject Heading:	Occupational and environmental medicine
Keywords:	Depression & mood disorders < PSYCHIATRY, OCCUPATIONAL & INDUSTRIAL MEDICINE, discrimination, stigma, work, human development index

Discrimination in the workplace, reported by people with major depressive disorder:

Cross-sectional study in 35 countries.

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Abstract

Objective

Whereas employment has shown to be beneficial for people with Major Depressive Disorder (MDD), across different cultures, employers' attitudes have shown to be negative towards workers with MDD. This may form an important barrier to work participation. Today, little is known about how stigma and discrimination affect work participation of workers with MDD, especially from their own perspective. We aimed to assess, in a working age population including respondents with MDD from 35 countries: (1) if people with MDD anticipate and experience discrimination when trying to find or keep paid employment; (2) if participants in high, middle and lower developed countries differ in these respects; and (3) if discrimination experiences are related to actual employment status (i.e. having a paid job or not).

Method

Participants in this cross-sectional study (N=834) had a diagnosis of MDD in the previous 12 months. They were interviewed using the Discrimination and Stigma Scale (DISC-12). ANOVAS and generalized linear mixed models were used to analyze the data.

Results

Overall, 62.5% had anticipated and/or experienced discrimination in the work setting. In very high-developed countries almost 60% of respondents had stopped themselves from applying for work, education or training because of anticipated discrimination. Having experienced workplace discrimination was independently related to unemployment.

Conclusions

Across different countries and cultures, people with MDD very frequently reported discrimination in the work setting. Effective interventions are needed to enhance work participation in people with MDD, focusing simultaneously on decreasing stigma in the work environment and on decreasing self-discrimination by empowering workers with MDD.

Keywords: discrimination, stigma, depression, mental, employment, work, workplace, human development index

Strengths and limitations

- Depression is the leading cause of disability worldwide, and for this study respondents with major depressive disorder from as many as 35 countries were interviewed.
- This study examines the under-researched yet substantial problem of discrimination as a barrier for work participation of people with MDD.
- Interviews were used to gather direct self-reports rather than hypothetical scenarios or vignettes, which is often done in research on stigma and discrimination
- Limitations are the cross sectional design of the study, and the fact purposive sampling was used to recruit participants, which limits the generalizability of the results.

Introduction

Employment has many benefits that can contribute to the recovery of people with mental health problems [1, 2]. However, in many countries participation and re-integration of people with mental health problems in the workforce is problematic [3, 4]. Several factors cause this. Some are related to the individual, and some to the environment. An important barrier for full occupational participation and successful vocational integration is the stigma that is associated with mental health problems[5]. Stigma is a mark or sign of disgrace usually eliciting negative attitudes to its bearer and can be seen as a problem associated with knowledge (ignorance), attitudes (prejudice) and behavior (discrimination)[6]. Several studies have shown that although some cultural differences may exist[7], overall employers in many countries commonly express a range of concerns about hiring a potential employee with mental health problems [8-10]. Concerns reported include the belief that people with mental health problems have limited productivity and job performance, especially in tasks requiring cognitive skills [8, 11], that they are unreliable and might pose threats to the safety of other employees, customers or themselves[11], or behave in a strange and unpredictable manner, and that there is potential for symptom relapse [8]. In addition, the anticipation of discrimination by people with MDD may lead them not to apply for a job, in the expectation of failure or rejection.

Whereas most studies on mental health problems and discrimination in the workplace have focused on severe mental disorders such as schizophrenia, relatively few have focused on major depressive disorder (MDD)[5]. This is remarkable, as MDD is one of the leading causes of the global burden of disease[12]. It is one of the most prevalent of all causes of disability [13, 14] and therefore an important public health problem. Across different

countries and cultures stigma and discrimination form an important barrier to work reintegration, although this topic has hardly been studied. In this context, the aim of this study was to assess: (1) if people with MDD of working age anticipate and experience discrimination because of their mental health problems when trying to find or keep paid employment; (2) if people with MDD of working age from high, middle and lower developed countries differ in this respect; and (3) if discrimination experiences when trying to find or keep paid employment are related to present work status (i.e. having a paid job) in working aged people with MDD.

Methods

Study design

Data were gathered as part of a larger study by the European Commission funded ASPEN (Anti Stigma Program European Network) study and the INDIGO (International Study of Discrimination and Stigma for Depression) research network[15]. In a cross-sectional survey, people with a clinical diagnosis of major depressive disorder were interviewed in 35 countries. The ASPEN countries included Belgium, Bulgaria, England, Finland, France, Germany, Greece, Hungary, Italy, Lithuania, The Netherlands, Portugal, Romania, Scotland, Slovakia, Slovenia, Spain and Turkey. The countries participating through the INDIGO network included Australia, Brazil, Canada, Croatia, Czech Republic, Egypt, India, Japan, Malaysia, Morocco, Nigeria, Pakistan, Serbia, Sri Lanka, Taiwan, Tunisia and Venezuela.

The design of this study was intentionally pragmatic so that as many as possible low- and middle-income countries could participate using only locally available resources, because no external funding was available. Participants were recruited through local

research staff, who were asked to identify people attending specialist mental health services (either outpatient or day care in the public and private sectors) in the local area with a clinical diagnosis of major depressive disorder in the previous 12 months. They were asked to all apply the DSM-IV criteria in the same, traditional way. Within centers, site directors were asked to identify a minimum of 25 participants who were, in their judgment, reasonably representative (as a group) of all people with a diagnosis of MDD attending specialist mental health services (either outpatient or day-care in both the public and private sectors in the local area). The minimum number of 25 for each site was defined for feasibility issues, particularly for non-European sites with no grant support. This method was intended to allow local staff to take into account the specific local service configuration and to draw participants from the whole range of appropriate local services. Staff at each site ensured that the sample had a spread across adult age range [young people (18-25), working years (25-65), older adults (≥65)] and clear representation of female participants as MDD is twice as prevalent in women as men. Response rates were unknown. As the present study focused on the working age population, students (N=72) and retired respondents (N=168) were excluded from the analyses. Full details of the method have been previously published[15].

Procedure

Data were gathered during face-to-face interviews in 2010, between January 1st and December 31st. Inclusion criteria were (1) a clinical diagnosis of major depressive disorder during the previous 12 months (single episode or recurrent), as based on the DSM-IV criteria; (2) ability to speak and understand the main local language; and (3) aged 18 years or older. Individuals who were receiving psychiatric in-patient care during recruitment were excluded.

The study was approved by the appropriate ethical review board at each study site. After complete description of the study to the subjects, written informed consent was obtained.

Measures

Participants were assessed face-to-face by independent researchers not involved in the care process using the standardized Discrimination and Stigma scale (version 12), a structured interview for recording the discrimination experienced by an individual with a mental health problem [16, 17]. The DISC-12 interview starts with the statement "Discrimination and stigma occur when people are treated unfairly because they are seen as being different from others. This interview asks about how participants have been affected by discrimination and stigma because of mental health problems". The instrument consists of 32 questions, assessing discrimination in several life domains, such as marriage, parenting, housing, and leisure. For the present paper, only the items were that referred to discrimination in the work environment are reported upon. For anticipated discrimination, the items used in this study were: "Because of how others might respond to your mental health problem, *have you stopped yourself from applying for work?*" and "Because of how others might respond to your mental health problem, *have you stopped yourself from applying for education and training?*". For experienced discrimination, the items used were "Because of how others might respond to your mental health problem, have you been treated unfairly *in finding a job?*" and "Because of how others might respond to your mental health problem, *have you been treated unfairly in keeping a job?*'. All questions were answered on a 4-point Likert scale (0= not at all, 1= a little, 2=moderately, and 3= a lot).

For the second research question, consistent with the methodology of a previous ASPEN/INDIGO paper[18] , countries were divided into groups according to the Human Development Index (HDI). The HDI is a summary measure of human development established by the United Nations[19], which measures the average achievements of a country in three basic dimensions of human development: (a) long and healthy life (operationalized as life expectancy at birth), (b) access to knowledge, (i.e the mean number of years of schooling), and (c) standard of living, (i.e. gross national income per capita). As data were gathered in 2010, the HDI statistic of that year was used. Countries with a very high HDI score were England, Australia, Finland, Germany, Canada, Italy, Portugal, Belgium, France, Japan, Greece, The Netherlands, Scotland, Slovakia, Slovenia, Spain, Czech Republic, Taiwan and Hungary. Countries with a high HDI score were Turkey, Malaysia, Brazil, Serbia, Bulgaria, Venezuela, Tunisia, Lithuania, Romania, and Croatia. As few countries had a low HDI, the medium low and low HDI group were taken together as one group for the analyses. This medium/low HDI group included Egypt, India, Morocco, Nigeria, Pakistan, and Sri Lanka.

Internalized stigma, one of the independent variables included in the analyses for the third research question, was measured with the Internalized Stigma of Mental Illness Scale (ISMI)[20]. Internalized stigma refers to the inner subjective experience of stigma and its psychological effects resulting from applying negative stereotypes and stigmatizing attitudes to oneself. The ISMI is a 29-item instrument for self-rated assessment of the subjective experience of stigma, with higher scores indicating higher internalized stigma. Here, the total score on the ISMI was used.

Statistical analyses

All analyses were performed using SPSS 19. All p values were two-tailed with an accepted significance level of 0.05. For the first research question, percentages of anticipated and experienced workplace discrimination were reported per country. For the second research question, two separate ANOVAS were conducted, the first of which with anticipated workplace discrimination as the dependent variable and HDI level as the independent variable. A second ANOVA analysis was conducted with experienced workplace discrimination as the dependent variable and HDI level as the independent variable. For the first and second research questions, answers to the questions on anticipated and experienced workplace discrimination were dichotomized into 'No' ("not at all") and 'Yes' ("a little", "moderately", "a lot"). For the third research question, multivariate logistic regression analysis was performed, using work status as the dependent variable, (defined as 0=no paid employment and 1=employed), and ten independent variables, including experienced workplace discrimination. First, univariate analyses were conducted including the following independent variables that were expected to be related to job outcome: experienced workplace discrimination, gender, age, ethnicity (i.e. belonging to an ethnic minority), level of education, marital status, previous psychiatric treatment, age of first contact with mental health services, internalized stigma (ISMI total score), and HDI. Second, all variables that showed a significant relationship with the dependent variable on a univariate level (P<0.05) were included in the multivariable logistic regression analysis.

Results

A total of 834 people with major depressive disorder across 35 different countries were individually interviewed for this study. About half of all participants were married or cohabiting, and two thirds of the participants were women. Characteristics of the sample are shown in Table 1. Although there were differences in employment rate across sites, the employment rates per HDI group did not differ significantly.

(Please insert Table 1 about here)

As shown in Table 2, for each separate question, about 40-50% of the participants indicated that discrimination was *not* a problem for them. However, when looking at the 4 items combined, about two thirds (62.5%) of the total sample reported anticipated and/or experienced discrimination in the work setting due to their mental health problem. Almost one third of participants indicated to have stopped themselves from applying for work because of anticipated discrimination.

(Please insert Table 2 about here)

Regarding the second research question, significant differences were found between the groups with different HDI levels. Specifically, participants in countries with a very high HDI reported significantly more often anticipated (X^2 = 26.01 (df=2), p<0.01) and also experienced (X^2 = 7.25 (df=2), p<0.05) discrimination than participants in countries with moderate/low HDI (see Figure 1). As can also be seen from this Figure, in all three groups the anticipated workplace discrimination scores were higher than the experienced workplace discrimination scores.

(Please insert Figure 1 about here)

Concerning the third research question, as can be seen in Table 3, several variables were not related to work status on a univariate level (i.e. 'belonging to an ethnic minority', 'marital status', 'age of first contact with mental health services' and 'HDI'), for which reason they were not included in the multivariable model. Results from the multilevel logistic regression analysis showed that experienced workplace discrimination was independently and positively related to unemployment (0.61, 95% CI= 0.43-0.86). Other variables that were significantly related to unemployment were 'low educational level' (0.48, 95% CI= 0.34-0.69) and 'having ever been admitted to psychiatric treatment' (0.55, 95% CI= 0.38-0.79).

(Please insert Table 3 about here)

Discussion

The results of this study show that as many as 62.5% of participants reported to have anticipated and/or experienced discrimination in the work setting. Anticipated workplace discrimination was reported more often than experienced workplace discrimination. Participants from countries with a very high HDI reported significantly more often anticipated and experienced workplace discrimination, although even in the medium/low HDI group, about one third of participants reported discrimination in the work setting.

Regarding the third research question, it was found that experienced workplace discrimination was indeed independently related to unemployment.

These findings show that discrimination in the workplace is a common problem in many countries worldwide. Considering that inpatients were excluded from the study, for the total group of people with MDD these percentages may be even much higher. These findings are consistent with those of a recent review[21] and that of a large Australian study on the experiences and perspectives of people with MDD[22]. Here, participants indicated that stigma was a considerable problem, particularly regarding employment. In a similar German study, 81.5% of the 55 participants who had experienced a depressive episode anticipated stigmatization in the occupational setting[23]. These studies from the depressed individual's perspective are in line with results of studies on employers' perspectives. Such studies have shown that employers tend to have negative attitudes towards people with mental health problems [(5-7).]

An important finding of the present study was that participants anticipated workplace discrimination more often than that they had actually experienced it. In another study, Uçok et al. [8] found that anticipated discrimination was not necessarily associated with experienced discrimination. Similar to our results, Angermeyer et al[5] also found anticipated discrimination to be higher than experienced discrimination, and suggest it could result in the tendency to avoid situations with a high risk of stigma. Corrigan and colleagues described this "why try" effect as an overarching phenomenon encompassing self-stigma, followed by low self-esteem and self-efficacy, and a diminished behavior to pursue life goals[24]. However, not only people with mental ill health themselves anticipate to be discriminated in the workplace. A recent population-based survey of working adults in Canada showed that a third of workers would not tell their managers if they experienced

mental health problems, mostly for fear of damaging their careers[25]. Hence, findings from these studies and this present study underline the clear need for interventions focusing on the empowerment of people with MDD in the work environment. Peer support plays an important role in enhancing empowerment and decreasing self-stigma [20] and may be useful in such programs.

Because mental health problems are highly prevalent [13, 26], but people with these disorders are often reluctant to disclose their condition[21, 22, 27, 28], employers often are not aware of the fact that many of their employees have mental health problems. Although this is a major impediment for work adaptations, authors of a recent vignette study concluded that concealment of mental health problems may actually be wise, as employers tended to think more negatively about a worker with depression than with a physical disorder under the exact same circumstances [29]. Recently several studies have been conducted on the topic of disclosure of mental illness in the workplace [21, 27,28,30.] For instance, a decision aid for employees on whether or not to disclose their mental health problems to an employer has been developed [31-32], that has shown to effectively reduce decisional conflict in employees with mental health problems[31]. The findings of the present and other studies [21,25] suggest that future programs aimed at reducing stigma and discrimination, should also involve stakeholders from the environment such as employers and occupational health professionals as they play a major role in for instance whether or not temporary workplace reasonable adjustments or accommodations are made. Boot et al. showed that workplace adjustments are associated with a reduction in sick leave duration and that 43% of workers with mental health problems reported a need for work adjustments[33].

Results of the present study indicated that in very highly developed countries, significantly higher percentages of workplace discrimination were reported as compared to

countries with a low/medium developmental score (research question 2). These findings differ from those of an intercultural study on employers' attitudes towards hiring and accommodating a person with disabilities at work[10]. Here, it was found that Chinese employers were less likely to endorse hiring people with psychiatric disabilities than employers from the US or Hong Kong. However, it should be noticed that within one HDI group, many different countries and cultures are represented which limits generalizability.

Whereas the size of the present study, including 35 countries, is a considerable strength, the number of people interviewed per country was too small to draw any conclusions at country level. Nevertheless, the results indicated that even in countries with a medium to low developmental score, about one third of participants reported discrimination in the work setting. Future research should focus on differences between countries, and study for instance the effects of legislation. However, legislation will not entirely solve the problem, as legislation does not address self-stigma, and also in countries with more advanced equality legislation experienced workplace discrimination rates were still high.

We also found that experienced workplace discrimination was significantly related to unemployment (research question 3). These findings are similar to those of a large household interview survey in six European countries. Specifically, they found that in participants with a mental health problem, perceived stigma was not only significantly associated with being unemployed, but also with a decreased quality of life, higher work and role limitations and higher social limitations[34]. An explanation for the finding that experienced workplace discrimination was independently related to unemployment is that the social stigma attached to mental health problems amongst employers may hinder them to hire an employee with MDD[11,29]. Alternatively this finding may be explained by the fact

that during job interviews, applicants with MDD may not get the position because MDD is characterized by a variety of symptoms that may be disadvantageous during job interviews, such as markedly diminished interest in activities, impaired ability to think, concentrate or make decisions, fatigue, increased irritability, and low self-worth[20]. These symptoms may influence both applicants' verbal and nonverbal behavior, thereby diminishing their chances of being appointed.

When considering the results of this study, several limitations need to be taken into account. First, apart from the four items on the DISC questionnaire that measured anticipated and experienced workplace discrimination, little additional information was available on how participants perceived their work setting and why they felt discriminated. Future qualitative and longitudinal studies are needed to address this in more detail, focusing on the role of stakeholders such as supervisors, employers, colleagues and occupational health professionals. A second limitation is that the design of the study was cross sectional, for which reason no causality can be assumed. Hence, workplace discrimination may lead to unemployment, but unemployment may also lead to feelings of being discriminated against. Third, purposive sampling was used to recruit participants. This limits the generalizability of the results, as participants do not necessarily represent true prevalent cases in the community.

In conclusion, the results suggest that anticipated and experienced discrimination in the workplace is a highly common phenomenon in higher as well as in lower developed countries across the world. The topic of overcoming stigma and discrimination has been under-researched so far[35] but may offer new ways to improve work participation of people with MDD. In many countries mental health problems such as MDD are associated with high

costs for society, due to unemployment, absences and at work performance deficits [36-38]. Previous studies have called for research addressing workplace environment issues to improve work participation of people with MDD[36,38]. Stigma and workplace discrimination are such issues and there is a clear need for effective interventions.

Table 1. Characteristics of the sample (N=834)

Demographic characteristics	
Age (mean, SD)	42.7 (11.9)
Female gender (%)	66.9
Education (%)	
None, primary (age ≤12), secondary (≤15-16 years), or vocational qualification	43.8
Diploma, degree, or postgraduate qualification	56.2
Marital status (%)	
Married or cohabiting	52.2
Single or non-cohabiting partner	25.9
Widowed, separated, divorced	21.7
Belongs to ethnic minority (%)	8.2
Human Development Index score[1]	
Very high HDI countries	47.0
High HDI countries	28.2
Medium HDI countries	14.0
Low HDI countries	10.8
Mental health characteristics	
Ever admitted for psychiatric care (%)	36
Age first contact with mental health services (mean, SD)	33.6 (11.8)
Internalized stigma total score[2] (mean, SD)	2.4 (0.55)
Work related characteristics	

Employment	
Full-time or part-time	51.2
Volunteer, or working in a sheltered accommodation or at home	13.1
Looking for a job	14.4
Unemployed, not looking for a job[3]	21.3

[1]HDI, United Nations Development Programme [19]

[2]Total score on the Internalized Stigma of Mental Illness scale [20]. Scale ranges from 1-4, higher scores indicating higher internalized stigma.

[3]Combination of 'Would like to work but afraid to loose benefits', 'unable to work', 'choose not to work'.

Table 2. Responses to the DISC-12[1] questions related to employment (N=834)

		N (%)
Anticipated discrimination		
…have you stopped yourself from applying for work?		
	not at all	338 (40.5)
	a little	63 (7.6)
	moderately	65 (7.8)
	a lot	109 (13.1)
	not applicable	239 (28.7)
…have you stopped yourself from applying for education or training courses?		
	not at all	373 (44.7)
	a little	72 (8.6)
	moderately	39 (4.7)
	a lot	67 (8.0)
	not applicable	262 (31.4)
Experienced discrimination		
… have you been treated unfairly in finding a job?		
	not at all	402 (48.2)
	a little	41 (4.9)
	moderately	35 (4.2)

	a lot	45 (5.4)
	not applicable	307 (36.8)
… have you been treated unfairly in keeping a job?		
	not at all	423 (50.7)
	a little	61 (7.3)
	moderately	57 (6.8)
	a lot	77 (9.2)
	not applicable	213 (25.5)

[1]Discrimination and Stigma Scale. [17]

Figure 1. Percentages and 95% Confidence Intervals of respondents who reported to have anticipated and experienced discrimination in the work setting, in very high, high, moderately and lower developed countries.

Table 3. Multivariable logistic regression analysis work status. Dependent variable was work status, defined as working fulltime or parttime versus all other groups (looking for a job, not looking for a job, volunteer work).

	Univariable models	Multivariable model

	Odds ratios (95% CI)	Odds ratios (95% CI)
Experienced discrimination		
No	Ref	Ref
Yes	0.63 (0.45-0.88)**	0.61 (0.43-0.86)**
Sex		
Male	Ref	Ref
Female	0.68 (0.50-0.92)*	0.79 (0.55-1.14)
Age	0.99 (0.97-1.00)*	0.99 (0.98-1.01)
Belongs to ethnic minority		-
No	Ref	
Yes	0.88 (0.50-1.55)	
Education		
Diploma, degree, or postgraduate qualification	Ref	Ref
None, primary (age ≤12), secondary (≤15-16 years), or vocational qualification	0.44 (0.33-0.59)**	0.48 (0.34-0.69)**
Marital status		
Married or cohabiting	Ref	-
Single or non-cohabiting partner	0.72 (0.50-1.03)	
Widowed, separated, or divorced	0.86 (0.61-1.21)	
Ever admitted for psychiatric treatment		
No	Ref	Ref

Yes	0.61 (0.45-0.84)**	0.55 (0.38-0.79)**
Age first contact with mental health services	1.00 (0.99-1.01)	-
ISMI total	0.66 (0.50-0.86)**	0.72 (0.52-1.00)
HDI		
Low / Medium HDI countries	Ref	-
High HDI countries	1.43 (0.71-2.85)	
Very High HDI countries	1.34 (0.71-2.50)	

* p<0.05

** p<0.01

Contributorship statement: The original study design and protocol were written by AL, TVB, and GT. AL, TVB, CB, KW, CVA, JVW, IM and GT coordinated data gathering in the participating sites. EB, JvW, JM AL and CB participated in the data analysis and interpretation. The report was written by EB, JVW, JM, TVB GT and was edited by all authors, who also approved of the final version.

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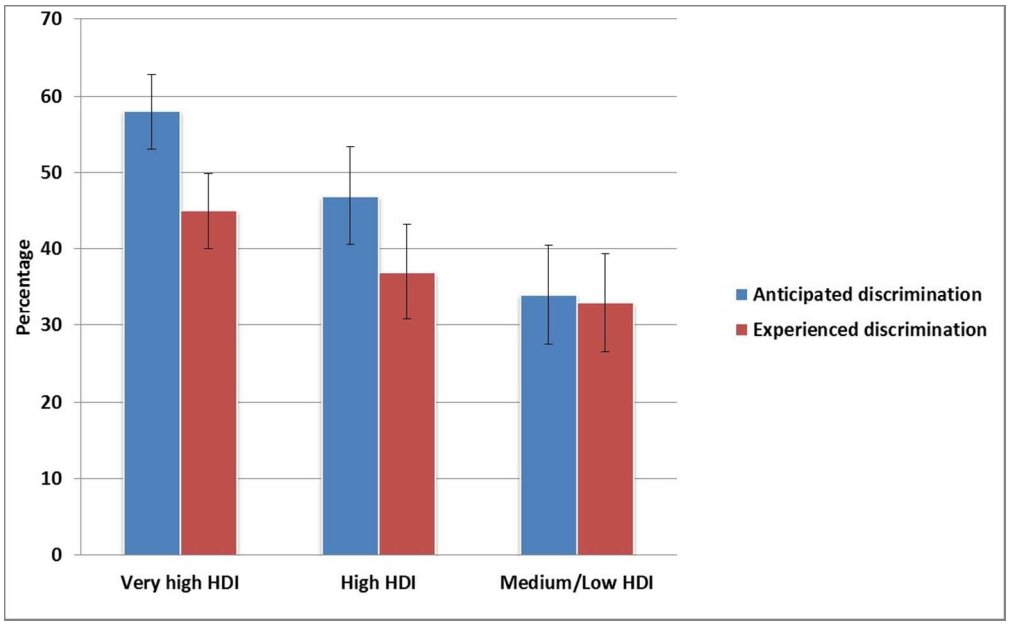

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7/8
Bias	9	Describe any efforts to address potential sources of bias	*14*
Study size	10	Explain how the study size was arrived at	7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	9
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	10
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	10
		(b) Give reasons for non-participation at each stage	7
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	17
		(b) Indicate number of participants with missing data for each variable of interest	7
Outcome data	15*	Report numbers of outcome events or summary measures	19
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	7
		(*b*) Report category boundaries when continuous variables were categorized	7
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	11
Discussion			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	15
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15
Generalisability	21	Discuss the generalisability (external validity) of the study results	15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	23

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.