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Impact of major depressive disorder, distinct subtypes, and symptom severity on lifestyle in the BiDirect Study

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ABSTRACT

The aim of this study was to examine associations of major depressive disorder (MDD), its distinct subtypes, and symptom severity with the individual lifestyle factors smoking, diet quality, physical activity, and body mass index as well as with a combined lifestyle index measuring the co-occurrence of these lifestyle factors. A sample of 823 patients with MDD and 597 non-depressed controls was examined. The psychiatric assessment was based on a clinical interview including the Mini International Neuropsychiatric Interview and the Hamilton Depression Rating Scale. Each lifestyle factor was scored as either healthy or unhealthy, and the number of unhealthy lifestyle factors was added up in a combined lifestyle index. Cross-sectional analyses were performed using alternating logistic regression and ordinal logistic regression, adjusted for socio-demographic characteristics. After adjustment, MDD was significantly associated with smoking, low physical activity, and overweight. Likewise, MDD was significantly related to the overall lifestyle index. When stratifying for subtypes, all subtypes showed higher odds for an overall unhealthier lifestyle than controls, but the associations with the individual lifestyle factors were partly different. Symptom severity was associated with the lifestyle index in a dose-response manner. In conclusion, patients with MDD represent an important target group for lifestyle interventions.

1. Introduction

Major depressive disorder (MDD) is a highly prevalent psychiatric disorder and strongly contributes to the global disease burden with serious consequences for both affected individuals and society (Lépine and Briley, 2011; Ferrari et al., 2013). Notably, depression shows strong associations with increased mortality and morbidity of common somatic diseases, in particular with cardiovascular disease (CVD) and type 2 diabetes mellitus (Nicholson et al., 2006; Cuijpers et al., 2013; Rotella and Mannucci, 2013; Vancampfort et al., 2016). Underlying mechanisms, which are supposed to link depression and somatic diseases, involve biological and behavioral pathways (Lett et al., 2004; Kuehl et al., 2012). In this context, prior research reported that individuals with depression tend to develop unfavorable lifestyle habits, such as poor diet, physical inactivity, smoking, risky alcohol consumption, and obesity (Bonnet et al., 2005; Kilian et al., 2006; Strine et al., 2008). Since these lifestyle factors are well-established cardiovascular risk factors, it is likely that individuals with depression are at greater risk for the development and progression of CVD (Whooley et al., 2008; Ye et al., 2013; Rutledge et al., 2014).

Although several previous studies showed associations between depression and lifestyle factors, most of the existing studies have methodological shortcomings. Firstly, the majority of previous studies examined the relationship between depression and individual lifestyle factors rather than overall lifestyle. This approach does not take into account that lifestyle factors are correlated within the same individual, since health behaviors often co-occur in clusters (de Vries et al., 2008; Noble et al., 2015). Secondly, previous studies most of all applied depression scales, which assess current depressive symptoms rather than a proper diagnosis of MDD. Thirdly, depression was commonly conceived as a homogeneous disease entity, although there is accumulating evidence that it actually is a very heterogeneous disease with distinct

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subtypes (Baumeister and Parker, 2012). In particular, the atypical subtype seems to be characterized by a cluster of unfavorable lifestyle factors and anthropometric characteristics, which are associated with a higher risk of metabolic disturbances and diseases (Lamers et al., 2010; Lasserre et al., 2014). However, it is still unclear, if patients with specific symptom profiles or subtypes of depression vary in terms of their lifestyle patterns and if depression severity influences this relationship.

The aim of this study was to examine if MDD, its distinct subtypes, and symptom severity are related to lifestyle. For this purpose, the associations of MDD (as one disease entity), distinct subtypes (melancholic, atypical, mixed, and undifferentiated depression), and symptom severity levels (remission, mild, moderate, and severe) with, first, the individual lifestyle factors smoking, diet quality, physical activity, and body mass index and, second, a combined lifestyle index measuring the co-occurrence of multiple unhealthy lifestyle factors were analyzed.

2. Methods

2.1. Study population

The BiDirect Study is a longitudinal cohort study, which aims to establish the bidirectional relationship between depression and (subclinical) arteriosclerosis. Details on rational and design were published previously (Teismann et al., 2014). In brief, the BiDirect Study integrates the identical examination of three cohorts in one study: patients with a present depressive episode, who were recruited in regional psychiatric departments and practices (cohort 1), patients with an acute manifestation of CVD, who were recruited in regional cardiology departments and rehabilitation facilities (cohort 2), and controls from the general population, who were randomly drawn from the population register of the city of Münster, Germany (cohort 3). The BiDirect Study was approved by the ethics committee of the University of Münster and the Westphalian Chamber of Physicians in Münster, Germany. All participants provided written informed consent.

During the baseline recruitment (2010–2013), in total 2258 participants aged 35–65 years were initially enrolled. The present analysis includes only the cohorts of patients with depression (cohort 1, n=999) and controls (cohort 3, n=912). Further, we restricted the depression cohort to patients with an admission diagnosis of MDD according to the ICD-10 diagnoses F32 (depressive episode) or F33 (recurrent depression) and excluded those with other psychiatric diagnoses (e.g., bipolar disorders) (n=77). Among controls, we excluded participants who either reported a previous physician-diagnosed depression, screened positive for a current depressive episode during the interview, had current depressive symptoms according to the self-report Center for Epidemiologic Studies Depression Scale (CES-D, score $\geq$16), or reported to take antidepressant medication (n=288, 31.6% of the controls). Additionally, all participants with missing data on psychiatric characteristics (n=78), lifestyle factors (n=39), or relevant covariates (n=9) were excluded (in total: n=126). Thus, the final study sample included 1420 participants (823 patients with MDD and 597 controls). In an additional analysis with further adjustment for comorbidities (namely, hypertension, myocardial infarction, heart disease, stroke, diabetes mellitus, cancer, kidney disease, and pulmonary disease), we excluded participants with missing data on the presence of these comorbidities, resulting in a sample size of n=1415.

2.2. Data assessment

2.2.1. Psychiatric assessment

Patients with depression passed through an extensive psychiatric assessment, which included a structured clinical interview conducted by trained study psychologists during recruitment. The clinical interview was based on the Mini International Neuropsychiatric Interview (M.I.N.I., German version 5.0.0) with its modules A (major depressive episode) and A' (major depressive episode with melancholic features) (Sheehan et al., 1998; Ackenheil et al., 1999). The interview also included six items of the Inventory of Depressive Symptomatology (IDS) on atypical features (Rush et al., 1986). The 'melancholic' and 'atypical' subtypes were classified according to DSM-IV criteria using a hierarchical approach (American Psychiatric Association, 2000): For melancholic depression, patients had to meet one of the core criteria (either loss of pleasure in all/almost all activities or lack of reactivity to usually pleasurable stimuli) plus at least three of the following additional symptoms: distinct quality of depressed mood, depression worse in the morning, early morning awakening, psychomotor retardation or agitation, decreased appetite or weight loss, and excessive or inappropriate feelings of guilt. For atypical depression, patients had to meet the core criterion (mood reactivity) plus at least two of the following additional symptoms: increased appetite or weight gain, hypersomnia, leaden paralysis, or interpersonal rejection sensitivity. Patients who did neither meet the criteria for melancholic nor for atypical depression were classified as 'undifferentiated'. In turn, patients reporting both melancholic and atypical symptoms were classified as 'mixed'; this 'mixed' subtype is also called 'combined' in other studies (Glaus et al., 2013; Lasserre et al., 2014). The subtype classification referred to the patients' current depressive episode. The clinical interview also included the Hamilton Depression Rating Scale (HAM-D, 17-items version) to assess symptom severity of the current depressive episode (Hamilton, 1960). Severity categories were classified according to recommended cut-offs: 0–7 (remission), 8–16 (mild), 17–23 (moderate), and $\geq$24 (severe) (Zimmerman et al., 2013).

The psychiatric assessment of the controls was conducted by trained study nurses during a computer assisted personal interview. If controls showed symptoms of current depression according to M.I.N.I. screening questions, their psychiatric assessment was continued by study psychologists. Controls were also asked to report on previous physician-diagnosed psychiatric disorders and on their current medication (including antidepressants). In addition to the interviews, both cohorts answered the self-report CES-D scale (Radloff, 1977).

2.2.2. Assessment of lifestyle

Information on smoking, diet, and physical activity were obtained during the personal interview. The participants answered questions on their current smoking status (current, former, or never smoker). Dietary intake was measured using a validated food frequency questionnaire (FFQ), which assesses the usual intake frequency of 18 food items over the last year (Winkler and Döring, 1998). Subsequently, overall diet quality scores (DQS) were calculated according to a validated scoring matrix applied to this FFQ (Winkler and Döring, 1995). The DQS ranges from 0 (low diet quality) to 30 (high diet quality) and reflects the adherence to the nutritional recommendations of the German Nutrition Society. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ), which assesses the time spent for walking, moderate, vigorous, and sedentary activities over the last week (Craig et al., 2003). Weight and height were measured using a calibrated measuring station. Participants wore light clothes and no shoes during measurement. Body mass index (BMI) was