

# Change in depressive symptoms and mental health-related quality of life in northeast Germany between 1997–2001 and 2008–2012

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## Abstract

**Objectives** Little is known about changes in depression and quality of life in East Germany. We examined changes in the prevalence of lifetime and current depressive symptoms and mental health-related quality of life among adults in northeast Germany between 1997–2001 and 2008–2012.

**Methods** Population-based data were drawn from two repeated cross-sectional surveys conducted 11 years apart within the Study of Health of Pomerania project (Ns of 4,228 and 4,251). Assessments included screening items for lifetime depressive symptoms from the Munich Composite International Diagnostic Interview (M-CIDI), the Depression and Exhaustion Scale (DEEX), and the Short Form Health Survey (SF-12).

**Results** Lifetime depressive symptoms rose from 13.2 to 27.8 %. The increase was stronger in men than in women and in individuals aged 35–64 years. No substantial changes occurred in the overall prevalence of current depressive symptoms (DEEX) and mental health-related quality of life

(SF-12). A small decrease in current depressive symptoms was observed in middle-aged men and older women and small improvements in mental health-related quality of life in young adults.

**Conclusions** Higher reporting of lifetime depressive symptoms might reflect methodological influences as well as lower stigmatization and higher awareness, while the current burden seems similar.

**Keywords** Depressive symptoms · Health-related quality of life · Trend · Germany

## Introduction

Depressive disorders are both common and costly to society. There is substantial regional variation of mood disorders around the world (Steel et al. 2014). Countries in Eastern Europe display higher lifetime and current prevalence of depression than Western European countries (Bromet et al. 2011; Ferrari et al. 2013). Popular perception and media often portray a steady increase in mental disorders during recent decades (Baxter et al. 2014b). However, findings from population-based studies investigating trends among adults show a mixed picture (Baxter et al. 2014b; Richter and Berger 2013). Studies mostly reported an increase of major depressive disorders during the immediate post-war period and a decrease or stable estimates between the mid-1960s and 2000 (Andersen et al. 2011; Baxter et al. 2014b; de Graaf et al. 2012; Richter and Berger 2013; Wittchen et al. 2011). Findings from the United States indicate a raise in prevalence for major depressive disorder between 1990–1991 and 2001–2003 (Compton et al. 2006; Kessler et al. 1994, 2005; Narrow et al. 2002). In contrast, representative data from Germany

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do not suggest substantial change during the past two decades (Jacobi et al. 2014; Richter and Berger 2013). The German National Health Interview and Examination Survey 1998 (GNHIES-98) revealed a 12-month prevalence of unipolar depressive disorder among adults of 10.7 % (Jacobi et al. 2004b) and the German National Health Survey for Adults 2010 (DEGS-2010) found a 12-month prevalence of 7.7 %, which was not significantly different from GNHIES-98 (Jacobi et al. 2014). However, as the authors compared crude prevalence estimates without taking methodological differences and change in population parameters into account, caution against early conclusions regarding a stable prevalence of depression over the past decade in Germany is warranted (Jacobi et al. 2014).

Although, compared to West Germany, the East still lags behind in terms of living standards and life expectancy (Goebel et al. 2009; Myrskylä and Scholz 2013), findings from GNHIES-98 suggested a lower prevalence of unipolar depression and better quality of life in East than in the West (Jacobi et al. 2004a). Knowledge regarding the distribution of mental disorders by region and demographic factors and whether these distributions are actually changing is essential information for those planning mental health services and funding allocation. We used representative data from two independent, repeated cross-sectional studies conducted in northeast Germany in 1997–2001 and 2008–2012 to examine change in lifetime and current depressive symptoms and mental health-related quality of life by sex and age group.

## Methods

### Repeated cross-sectional surveys

The Study of Health in Pomerania (SHIP) consists of two independent population-based samples of adults aged 20–81 from West Pomerania, a northeastern German region of approximately 220 thousand inhabitants. The first sample (SHIP-0) was surveyed between 1997 and 2001; the second study (SHIP-Trend) was conducted between 2008 and 2012. Details on the study design, recruitment and procedures of the two repeated cross-sectional surveys have been published (Volzke et al. 2011). In brief, SHIP-0 was a stratified cluster-random sample of 7,008 individuals; a net sample (without migrated or deceased persons) of 6,265 eligible individuals; and 4,308 (thereof 2,192 women) who participated (response 68.8 %). For SHIP-Trend, a stratified sample of 10,000 individuals (net sample size of 8,826) was drawn and 4,420 (thereof 2,275 women) participated (response 50.1 %). All participants gave written informed consent and the local Ethics Committee of the University of Greifswald approved the study protocol.

After exclusion of missing values and restricting SHIP-0 to the SHIP-Trend age range of 20–81 years, 4,228 SHIP-0 participants and 4,251 SHIP-Trend participants were analyzed. Weighting was used to adjust for bias due to differences in responses, probabilities of selection, and discrepancies between data from official statistics and our samples with regard to demographic and geographical distributions (Schmidt et al. 2011).

### Measurements

Data were collected using self-report paper–pencil questionnaires and computer-assisted personal interviews. The Composite International Diagnostic Screener (CID-S) was used to screen for lifetime depressive symptoms according to Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and the International Classification of Diseases (ICD-10) in both studies (Wittchen et al. 1999). The performance of the CID-S has been shown to be good (sensitivity = 81 %, negative predictive value = 85 %) (Wittchen et al. 1999). In SHIP-0, a self-report paper–pencil questionnaire was used to collect CID-S data. In SHIP-Trend, lifetime depression was measured in the computer-assisted interview with the M-CIDI stem items, from which the CID-S items were derived (Wittchen et al. 1999). While one of the two lifetime depression items remained unchanged, the wording of the other item changed between the two surveys. The Depression and Exhaustion (DEEX) Scale combines eight items (irritability, inner tension, loss of energy, difficulty in concentrating, nervousness, fatigability, tiredness, anxiety) from the Zerssen affective symptom check list (Ladwig et al. 2004; Zerssen 1976). The internal consistency of the subscale was high (Cronbach's alpha = 0.88). Subjects in the top tertile were classified as showing “current depressive symptoms” (Ladwig et al. 2004). Intake of antidepressant medication during the past 7 days was classified according to an Anatomical Therapeutic Chemical (ATC) classification code N06A. Mental health-related quality of life was measured using the Short Form Health Survey (SF-12) (Morfeld et al. 2011). The SF-12 mental health component summary score was created from the SF-12 individual responses. Higher scores represent better quality of life (Morfeld et al. 2011).

Marital status was categorized as never married, married/current partnership, separated/divorced, and widowed. The employment situation was grouped into currently employed, unemployed, and retired. Educational attainment was measured by summing the number of years of schooling, vocational, and college/university education completed. Income was corrected for inflation, with the year 2012 as reference year (consumer price index), and “equalized” by dividing the household income (in €) by the square root of the number of household members

(Kawachi and Kennedy 1997). Behavioral risk factors were smoking status (never/former, or current smoker), alcohol consumption (in grams ethanol per day derived from a quantity–frequency questionnaire), physical inactivity (less than 1 h leisure time physical activity per week). The functional comorbidity index (FCI), an index of comorbid diseases (excluding depression and anxiety), measured comorbid health status (Groll et al. 2005).

#### Statistical analyses

Stata 13.1 procedures for weighted and complex samples were used (Stata Corp., College Station, TX). Weighted percentages for categorical variables and weighted means/medians (25th and 75th percentiles) for continuous variables were used to compare SHIP-0 and SHIP-Trend. Risk differences and mean differences for comparison of both studies were adjusted for demographic/socioeconomic change, behavioral factors, and comorbid health status using ‘doubly robust’ inverse probability weighted regression models (Wooldridge 2010). The covariables were chosen due to published associations with depression and quality of life (Andersen et al. 2011; de Graaf et al. 2012; Jacobi et al. 2004a, 2014), correlation with depressive symptoms and quality of life in both samples (data not shown), and change over time (variables are listed in Table 1). Cohen’s *d* (mean difference/pooled standard deviation) was used to evaluate secular change in the SF-12 component summary scores; values of 0.2 represent a small change, 0.5 a medium change, and 0.8 a large change.

**Table 1** Socioeconomic characteristics of samples

	SHIP-0 (1997–2001)	SHIP-trend (2008–2012)
Gender, %		
Female	50.9	50.1
Male	49.1	49.9
Age, years	45 (34, 60)	50 (37, 63)
Educational attainment, years	11 (10, 13)	11 (11, 13)
Income, €	765 (484, 980)	1137 (778, 1686)
Marital status, %		
Never married	13.2	13.7
Married/current partnership	74.5	74.9
Separated/divorced	5.8	6.1
Widowed	6.4	5.3
Employment situation, %		
Currently employed	57.1 (55.5, 58.7)	59.5 (58.0, 61.0)
Unemployed	15.1 (14.0, 16.3)	9.9 (9.0, 10.9)
Retired	27.7 (26.4, 29.1)	30.6 (29.2, 32.0)

Entries are weighted % or median (25th, 75th percentile)

## Results

### Sociodemographic characteristics in both samples

The studies were similar with regard to distributions of gender, educational attainment, and marital status/current partnership. Participants of SHIP-Trend (2008–2012) were older, had a higher inflation-corrected income, were less often unemployed and more often retired than those of SHIP-0 (1997–2001) study (Table 1).

### Change in depressive symptoms and mental health-related quality of life between 1997–2001 and 2008

The lifetime prevalence of depressive symptoms increased markedly between 1997–2001 and 2008–2012 (Table 2). The overall prevalence rose from 13.2 to 27.8 % or by approximately 111 %. The increase persisted after adjustment for socioeconomic characteristics, behavioral factors, and comorbid health status [adjusted risk difference (aRD) = 16.1,  $p < 0.001$ ]. The strongest increase appeared in the 50-to-64-year old (12.1 % in 1997–2001 to 32.2 % in 2008–2008) and the smallest change in the 20-to-34-year old (from 15.3 to 24.0 %). There was a stronger relative increase in men (136 %) than in women (102 %).

Next, we investigated the change in current depressive symptoms and quality of life. The prevalence of current depressive symptoms did not differ in the total sample (aRD = 0.6,  $p = 0.701$ ), in men (aRD = 3.1,  $p = 0.084$ ), and women (aRD = 0.3,  $p = 0.101$ ) (Table 3). The prevalence of current depressive symptoms decreased in 35-to-49-year-old participants (−18 %), and in men 35–49 years of age (−23 %). Among women aged 65–81 years, the prevalence of current depressive symptoms increased by approximately 21 % (Table 3). Because reported depressive symptoms might be affected by intake of antidepressants, we compared the combined prevalence of being either in the upper tertile of the DEXX score or taking antidepressants. Using this definition, the prevalence proportion increased in women (aRD = 0.04,  $p = 0.048$ ), particularly in 65-to-84-year-old women (aRD = 0.08,  $p = 0.02$ ), which is most likely due to an increase in utilization of antidepressants (eTable 1). Overall, mental health-related quality of life did not change between 1997–2001 and 2008–2012 (Table 4). However, there were small increases among the 20-to-34-year old (Cohen’s *d* total = 0.18; Cohen’s *d* men = 0.21; Cohen’s *d* women = 0.16).

## Discussion

Lifetime depressive symptoms rose in northeast Germany, from 13.2 % in 1997–2001 to 27.8 % in 2008–2012. The

**Table 2** Change in prevalence of lifetime depressive symptoms (CID-S) among men and women in northeastern Germany, from 1997–2001 to 2008–2012

	Total			Men			Women		
	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)
Overall	13.2 (12.1, 14.3)	27.8 (26.3, 29.2)	16.1 (<0.001)	8.3 (7.1, 9.7)	19.6 (17.9, 21.5)	10.7 (<0.001)	17.8 (16.2, 19.6)	35.9 (33.7, 38.1)	22.0 (<0.001)
By age group									
20–34	15.3 (13.1, 17.9)	24.0 (20.8, 27.4) <sup>a</sup>		10.3 (7.7, 13.6)	18.9 (14.9, 23.6) <sup>a</sup>		20.9 (17.3, 24.9)	29.6 (24.8, 34.8) <sup>a</sup>	
35–49	13.5 (11.6, 15.7)	30.8 (28.2, 33.5) <sup>a</sup>		8.3 (6.2, 11.0)	22.3 (19.0, 25.9) <sup>a</sup>		19.0 (15.9, 22.5)	40.1 (36.3, 44.0) <sup>a</sup>	
50–64	12.1 (10.3, 14.1)	32.2 (29.7, 34.9) <sup>a</sup>		7.8 (5.9, 10.3)	23.1 (19.9, 26.7) <sup>a</sup>		16.1 (13.3, 19.4)	41.3 (37.5, 45.1) <sup>a</sup>	
65–81	10.4 (8.4, 12.8)	22.2 (19.6, 25.1) <sup>a</sup>		5.0 (3.4, 7.3)	12.0 (9.4, 15.0) <sup>a</sup>		14.1 (11.0, 17.9)	30.8 (26.6, 35.3) <sup>a</sup>	

% weighted prevalence. Adjusted risk difference (aRD) from inverse probability weighted regression model, adjusted for (sex), age, age<sup>2</sup>, educational attainment, income, current partnership, employment, current smoker, alcohol consumption, physical inactivity, functional comorbidity index

<sup>a</sup>  $p < 0.001$ , <sup>b</sup>  $p < 0.01$

**Table 3** Change in current depressive symptoms (upper tertile of DEEX scale) among men and women in northeastern Germany, from 1997–2001 to 2008–2012

	Total			Men			Women		
	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD ( <i>p</i> value)
Overall	28.8 (27.4, 30.3)	30.1 (28.7, 31.6)	0.6 (0.701)	21.9 (20.1, 23.8)	24.1 (22.1, 26.2)	3.1 (0.084)	35.9 (33.8, 38.1)	35.8 (33.7, 37.9)	0.3 (0.101)
By age group									
20–34	26.9 (24.1, 30.0)	25.4 (22.1, 28.9)		22.5 (18.7, 26.8)	18.9 (15.0, 23.6)		31.8 (27.8, 36.2)	32.4 (27.4, 37.9)	
35–49	32.0 (29.2, 34.9)	26.3 (23.8, 28.8) <sup>b</sup>		26.3 (22.6, 30.5)	20.2 (17.1, 23.8) <sup>b</sup>		38.0 (34.0, 42.2)	32.9 (29.4, 36.7)	
50–64	32.9 (30.2, 35.7)	33.9 (31.4, 36.6)		23.8 (18.7, 26.5)	27.9 (24.5, 31.6)		41.4 (37.4, 45.6)	39.8 (36.2, 43.6)	
65–84	27.3 (24.3, 30.5)	29.1 (26.3, 32.1)		22.4 (18.7, 26.5)	19.4 (16.3, 23.0)		30.6 (26.3, 35.3)	36.9 (32.7, 41.4) <sup>c</sup>	

Depression and Exhaustion (DEEX scale). % weighted prevalence. Adjusted risk difference (aRD) from inverse probability weighted regression model, adjusted for (sex), age, age<sup>2</sup>, educational attainment, income, current partnership, employment, current smoker, alcohol consumption, physical inactivity, functional comorbidity index

<sup>a</sup>  $p < 0.001$ , <sup>b</sup>  $p < 0.01$ , <sup>c</sup>  $p < 0.01$

**Table 4** Change in mean SF-12 mental component summary score among men and women in northeastern Germany, from 1997–2001 to 2008–2012

	Total			Men			Women		
	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD (p value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD (p value)	1997–2001 % (95 % CI)	2008–2012 % (95 % CI)	aRD (p value)
Overall	51.8 (51.5, 52.0)	52.4 (52.1, 52.6)	0.17 (0.54)	53.0 (52.6, 53.3)	53.6 (53.3, 54.0) <sup>b</sup>	0.13 (0.641)	50.6 (50.2, 51.0)	51.1 (50.7, 51.5)	0.12 (0.705)
By age group									
20–34	50.2 (49.7, 50.7)	51.6 (51.0, 52.2) <sup>a</sup>		51.5 (50.8, 52.2)	52.9 (52.2, 53.6) <sup>b</sup>		48.8 (48.0, 49.6)	50.1 (49.2, 51.1) <sup>c</sup>	
35–49	51.8 (51.2, 52.2)	52.4 (51.9, 52.8)		52.9 (52.4, 53.5)	53.5 (52.9, 54.2)		50.4 (49.7, 51.2)	51.1 (50.4, 51.8)	
50–64	52.6 (52.1, 53.1)	52.0 (51.5, 52.5)		53.7 (53.1, 54.4)	53.2 (52.5, 53.9)		51.5 (50.8, 52.3)	50.8 (50.0, 51.6)	
65–84	53.3 (52.7, 54.0)	53.5 (53.0, 54.1)		54.9 (54.2, 55.6)	55.1 (54.4, 55.8)		52.3 (51.3, 53.2)	52.2 (51.4, 53.1)	

Adjusted mean difference (aMD) from inverse probability weighted regression model, adjusted for (sex), age, age<sup>2</sup>, educational attainment, income, current partnership, employment, current smoker, alcohol consumption, physical inactivity, functional comorbidity index

<sup>a</sup>  $p < 0.001$ , <sup>b</sup>  $p < 0.01$ , <sup>c</sup>  $p < 0.01$

increase was stronger in men than in women and in individuals aged 35–64 years. In contrast, no substantial changes occurred in the overall prevalence of current depressive symptoms and in mental health-related quality of life. However, there were some changes in demographic sub-groups: a small decrease of current depressive symptoms in middle-aged men and older women; small improvements in mental health-related quality of life in young adults. The changes persisted after adjusting estimates for secular demographic and economic change and differences in behavioral risk factors and physical health status. The finding of a strong increase in depressive symptoms in northeast Germany is not supported by findings from the DEGS-2010 study (Jacobi et al. 2014), which suggest no significant increase in the 12-month prevalence of diagnosed unipolar depression between 1998 and 2010. In addition, the suicide rate has decreased by one-fourth between 1998 and 2008 (Gesundheitsberichterstattung des Bundes 2011). Evidence from reviews and meta-analyses of population-based estimates also does not provide reasonable evidence for a remarkable change of depressive disorders among adults between 1990 and 2010 (Baxter et al. 2014b; Richter and Berger 2013; Wittchen et al. 2011).

There are several possible explanations for the mismatch of our findings. First, a change in mode of data collection from self-report questionnaire to face-to-face interview and change in question wording is a likely explanation for the unexpected raise in lifetime prevalence. Second, we applied a screening instrument (CID-S) and a dimensional scale (DEEX) to assess lifetime and current depressive symptoms and did not use trained clinical interviewers to assess clinical depressive disorders using structured diagnostic schedules (Murphy 2011). Symptom scales measure mental or psychological distress rather than clinical disorders (Baxter et al. 2014a; Murphy 2011). Accordingly, some false screening positives could have been classified as cases and the prevalence based on the CID-S is likely to have been overestimated. While studies based on diagnostic schedules did not establish an increase in diagnosed depression, population-based trend studies of symptoms scales found a systematic increase in levels of psychological distress between 1990 and 2010. (Baxter et al. 2014b; Madianos et al. 2011; Richter and Berger 2013; Spiers et al. 2012). Urbanization and raise in social and income inequality, occupational stress and unemployment have been hypothesized as factors causing an increase in psychological distress (Baxter et al. 2014b; Mair et al. 2008). The current economic crisis has further stimulated psychological distress (Madianos et al. 2011; Richter and Berger 2013). Although we adjusted our quasi-experimental data analyses for several of these explaining factors, we cannot exclude the possibility of

residual confounding by the variables not included in our regression models (e.g., occupational stress). Third, the CID-S screened for lifetime occurrence of depressive disorders while the DEGS-2010 and GNHIES studies estimated the 12-month prevalence of depression only. Because older age groups have longer periods of risk, estimates of current and lifetime depression are not directly comparable (Simon et al. 1995). This might also, in part, explain why we found significant changes of lifetime but not current depressive symptoms. Another possible reason for this discrepancy might be that the younger birth cohorts in SHIP-Trend are more affected by the social and economic changes that took place after reunification in northeast Germany (Elkeles et al. 2012; Goebel et al. 2009). Fourth, although attitudes of the population toward persons with depression have barely changed in Germany since 1990 (Angermeyer et al. 2013), the perceived stigmatization of individuals with mental illness has (Angermeyer et al. 2014). Reduced fear of rejection may have prompted more frequent reporting of symptoms of depression in 2008–2012 (Baxter et al. 2014b; Simon et al. 1995). Along these lines, several studies indicate an increase in the awareness of psychological distress in recent decades (Baxter et al. 2014b; Richter and Berger 2013), and there has been a doubling in disability and absence from work due to mental disorders between 2000 and 2011 (Richter and Berger 2013). Work-related stress has become more common as a perceived cause of depressive symptoms, the label “burn-out” has become increasingly popular for depression (Angermeyer et al. 2013; Bahlmann et al. 2013). The discrepancy of similar levels of depressive symptoms, but considerably higher recall of lifetime depression in 2008–2012 compared to 1997–2001 might thus reflect a cultural change that makes it more acceptable to admit episodes of reduced mental strength. Last, although previous studies did not report substantial differences in depressive disorders between East and West Germany, or lower rates in West Germany (Jacobi et al. 2014; Jacobi et al. 2004a). East Germany is heterogeneous in terms of economic, demographic, and social development. The northeastern region has a comparatively high unemployment rate, suffered from high migration and consequently a loss in social and human capital since reunification. Another population-based study conducted in northeast Germany found lower life satisfaction than other German regions and a drop in life satisfaction and quality of life between 1994 and 2008 (Elkeles et al. 2012). Other reports also indicate a flattening of life satisfaction since 1995 in East Germany (Goebel et al. 2009).

The results need to be interpreted in the context of potential limitations. First, reliance on recollections over the whole lifetime of the CID-S comes with the risk of

recall bias among older people (Simon et al. 1995). Thus, it is likely that part of the discrepancy between change in lifetime and current depressive symptoms might be related to recall bias. Second, the mode of administering the CID-S was different in the studies: In SHIP-0, CID-S items were part of the paper–pencil questionnaire, while in SHIP-Trend CID-S questions were asked by an interviewer during the computer-assisted interview. Third, change in item wording is a potential source of differences in responses between the surveys. Fourth, CID-S was developed for DSM-IV/ICD-10 and has not been adapted to changes in diagnostic criteria in DSM-V. Fifth, the response rate is smaller in SHIP-Trend than in SHIP-0 and subjects with mental disorders, low health status and worse quality of life are more likely to refrain from survey participation (Jacobi et al. 2014). However, this would also only suggest that available SHIP-Trend cases provide a conservative estimate of depressive disorders and quality of life.

In conclusion, although this population-based study of inhabitants of a northeastern German region suggests an increase in the prevalence of lifetime depressive symptoms this finding is not supported by comparing current depressive symptoms. Higher reporting of lifetime depressive symptoms is likely to result from change in questionnaire methodology than due to a true increase in the prevalence of clinical depression. It might also reflect lower stigmatization and higher awareness of psychological distress and may be a sign of greater social acceptability of talking about episodes of mental distress. Future population-based studies in northeastern Germany need to apply diagnostic schedules to investigate clinical depressive disorders and examine differences between period and cohort effects. If replicated, this study provides evidence for specific challenges for policies that come with lack of economic opportunities, high unemployment and poverty rates, migration, and mental health services in rural and peripheral areas of East Germany.

**Conflict of interest** Nothing to declare.

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