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Meta-analysis

Evolution of public attitudes about mental illness: a systematic review and meta-analysis

Schomerus G, Schwahn C, Holzinger A, Corrigan PW, Grabe HJ, Carta MG, Angermeyer MC. Evolution of public attitudes about mental illness: a systematic review and meta-analysis.

Objective: To explore whether the increase in knowledge about the biological correlates of mental disorders over the last decades has translated into improved public understanding of mental illness, increased readiness to seek mental health care and more tolerant attitudes towards mentally ill persons.
Method: A systematic review of all studies on mental illness-related beliefs and attitudes in the general population published before 31 March 2011, examining the time trends of attitudes with a follow-up interval of at least 2 years and using national representative population samples. A subsample of methodologically homogeneous studies was further included in a meta-regression analysis of time trends.
Results: Thirty-three reports on 16 studies on national time trends met our inclusion criteria, six of which were eligible for a meta-regression analysis. Two major trends emerged: there was a coherent trend to greater mental health literacy, in particular towards a biological model of mental illness, and greater acceptance of professional help for mental health problems. In contrast, however, no changes or even changes to the worse were observed regarding the attitudes towards people with mental illness.
Conclusion: Increasing public understanding of the biological correlates of mental illness seems not to result in better social acceptance of persons with mental illness.

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Key words: mental health literacy; stigma; trends; depression; schizophrenia; genetics

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Summations

- A more biological public understanding of mental illness parallels greater acceptance of professional treatment, including psychiatric medication.
- Social rejection of mentally ill persons remained disturbingly stable over the last 20 years.
- Increasing public literacy about the biological correlates of mental disorders seems no remedy against stigmatization and discrimination of persons with mental illness.

Considerations

- Time-trend analyses of mental illness–related public attitudes have only been conducted in industrialized, first-world countries, and developments in other parts of the world are unknown.
- This review focuses on broad, long-term developments of public attitudes on a national level. The evaluation of anti-stigma and awareness campaigns, frequently accomplished by short-term and local studies, was not the focus of this review.

Introduction

The last decades have witnessed tremendous advancements of our understanding of the biological correlates of mental disorders. Not only has the knowledge of researchers and mental health professionals expanded, but the public, too, has been increasingly exposed to information on

symptoms, biochemical and genetic etiological theories and to the basic argument that the mental illnesses are diseases no different from other diseases, amenable to effective medical treatment (1). As part of a widely recognized effort to 'enhance public awareness of the benefits to be derived from brain research' (2), the US Congress and President George H.W. Bush designated the 1990s 'Decade of the Brain'. An analysis of the portrayal of depression in high circulating magazines in the United States and in Canada has shown that indeed depression moved from a problem explained in a variety of ways in the 1980s to a primarily biomedical phenomenon in the 1990s and 2000s (3). The coverage of the use of neurotechnology for diagnosis or therapy in neuropsychiatric disorders increased between 1995 and 2004 in major United States and UK English-language news sources and was generally optimistic (4).

It was hoped that the promulgation of mental illness as a 'real' brain disease would challenge the omnipresent stigma attached to mental disorders. Instead of blaming persons with mental illness for their disorders, people endorsing a biological causal model of mental illness might be more inclined to see the symptoms of mental illness as a result of biological illness not under voluntary control (5). In turn, more knowledge and less stigma would lead to greater openness about seeking out treatment or staying in treatment. Many anti-stigma initiatives like that launched by the US National Alliance on Mental Illness (NAMI) have thus incorporated a medicalizing view on mental illness, portraying mental disorders explicitly as medical diseases, for example major depression as 'a biological, medical illness' (6), or schizophrenia as an illness 'like many other medical illnesses such as cancer or diabetes' (7). Taken together, these developments nourished the expectation that people will become more knowledgeable about mental disorders, professional help and psychiatric treatment will be more accepted, negative stereotypes about mentally ill people will diminish, and social acceptance of people with mental illness will improve.

In this review, we look at population studies on public attitudes to find out whether attitudes have indeed developed in the expected direction. Over the last twenty years, many studies have investigated public beliefs about mental disorders, help-seeking and attitudes towards persons with mental illness. Most of these studies are cross-sectional reports on single surveys. To arrive at valid conclusions about attitude changes at population level, studies need to compare responses to identical items at two (or more) time points, and all surveys analysed within one study need to be based on identical sampling procedures employed in the same population. In this review, we look at such population studies which we identified in a systematic review. Time-trend studies have been conducted in different countries, cover different time frames, and use a variety of methods to measure public attitudes. To find out whether there is a common trend of public attitudes across different countries and time frames, we selected a subgroup of studies using similar measures. With these studies, we performed a series of meta-regression analyses to identify any supranational trend of public attitudes related to mental illness.

Aims of the study

To find out whether, over the last decades, the general public has become more knowledgeable about mental disorders and more accepting of professional help-seeking and whether negative stereotypes and social rejection of persons with mental illness have diminished.

Methods

We conducted a systematic review of all representative population-based studies on public attitudes regarding mental disorders and people with mental illness that have appeared until 31st March 2011. Specifically, we looked for time-trend analyses, that is, studies that enquire on public attitudes at least at two occasions with identical methodology. Besides reports published in scientific journals or books, we include also documents published online and so-called 'grey literature', that is, reports not published in commercially available books or journals. To detect all relevant studies, we took a stepwise approach according to the systematic literature review guidelines of the Centre for Reviews and Dissemination (8) and the Cochrane Collaboration (9).

Searching methods

To find all studies examining public attitudes regarding mental illness on a population level, we conducted a literature search in the electronic databases Pubmed, PsychINFO and Web of Science, using the terms ('mental illness' OR 'mental disorder' OR schizophrenia OR depression OR alcoholism OR 'alcohol abuse' OR 'alcohol depend*' OR alcoholic OR 'anxiety disorder' OR 'obsessive compulsive disorder' OR dementia OR 'Alzheimer's disease') AND (attitudes OR stigma

OR 'mental health literacy' OR 'causal beliefs' OR 'causal attributions' OR stereotype OR 'social distance') AND (representative OR population). No restrictions regarding the language of the indexed articles were applied. We expanded this initial search by screening the bibliographies of all relevant reports and by performing electronic searches for further relevant articles by the first author of any identified study. Additionally, we contacted the experts in the field of psychiatric attitude research and asked them about any relevant study not published in peer-reviewed journals or other relevant 'grey literature' known to them. Finally, based on all reports identified by this procedure, we conducted a full-text search of all reports specifically looking for eligible time-trend analyses of public attitudes and beliefs.

The initial database search was conducted by GS. Two researchers (GS and MCA) then independently screened titles, abstracts and, where appropriate, the full text of all identified reports to minimize the possibility of discarding potentially relevant reports. AH and MCA screened bibliographies of all relevant reports and conducted electronic searches for further relevant articles by all first authors. MCA contacted experts in the field of psychiatric attitude research. Finally, the full-text analysis of all previously identified reports was carried out independently by MCA and AH, looking for reports on trend analyses of public beliefs and attitudes about mental illness. At this stage, native speakers were contacted to provide translations of reports if necessary. Disagreement about inclusion of individual reports was resolved by discussion at both stages (screening and full-text analysis for eligibility).

Study selection

We retained all reports on studies that met the following criteria: first, the focus of the study was on the general public. Studies investigating beliefs or attitudes of particular subgroups such as consumers of mental health services, health professionals or students were excluded. Second, to avoid selection effects, we only included studies based on representative population samples obtained by either random or quota sampling methods. Third, we included only studies conducted on a national level (as opposed to local surveys), with a follow-up interval of at least 2 years, as we were interested in broad, sustained time trends of public beliefs and attitudes. The methodological quality of included studies was assessed with regard to sample sizes and response rates.

Data extraction and meta-regression analysis

Corresponding to our research question, data on four domains of attitudes were extracted: information on beliefs about causes and definition of mental disorder, attitudes towards help-seeking, prevalence of negative stereotypes, and social acceptance of persons with mental illness. Study methodology varied considerably: answer formats comprised open-ended questions, yes/no answers, and Likert-type scales. Items were phrased using diagnostic labels ('mental illness', 'depression', 'mental health problems' and 'day-to-day stress' etc.) or referring to an unlabelled brief description of a person with a specific disorder, a case vignette. Among all studies, we identified a group of studies using a coherent methodological approach with unlabelled case vignettes of either schizophrenia or depression which were appropriate to a meta-regression of time trends. In these studies, answers to items relevant to this review were elicited with Likert-type scales with anchors such as 'agree completely/disagree completely' or 'very likely/very unlikely'. All studies collapsed answers on the approval side of the midpoint of the scale into 'agree' or 'likely', and this was the outcome entered into our meta-analysis. Two studies reported disagreement with statements on the willingness to engage in several forms of social contact ('desire for social distance') (10–13). We contacted the authors of these studies who kindly provided the respective results on agreement with these statements (social acceptance). Aim of the meta-regression analysis was to test whether there were significant supranational trends in attitude-change and to estimate their magnitude. Our systematic review thus yields two types of results for each of the four attitudinal domains: results of a meta-regression analysis of a selection of methodologically homogeneous studies and a narrative summary of results from other, methodologically heterogeneous studies.

Statistical analyses were performed using STATA/SE software, release 10 (Stata Corporation, College Station, TX, USA). In contrast to common meta-analysis, we focused on the annual change of the attitude of interest (rather than on the overall attitude). Therefore, only studies with at least two time points were selected. The unit of analysis of our meta-regression was the aggregate-level data for one time point of each study, namely the proportion of respondents endorsing the attitude of interest in one survey. To estimate the overall attitude change per year, we used the revised version of the 'metareg' command (14), which performs a random effect meta-regression analysis

using aggregate-level data. For each attitude, change was adjusted for country (unless stated otherwise), allowing for differing country-specific baselines for any attitude change. All reported *P*-values are two sided. For our figures and tables, proportions (values between 0 and 1) were transformed into percent (0–100) to be congruent with the reporting of percentages in the single studies. While tables show results of all meta-regressions conducted, figures illustrate those analyses where the estimation of overall attitude change was statistically significant.

In our figures, circles are positioned to depict the time point and the results of individual surveys, thus representing the units of analysis. Associated surveys conducted in the same population are represented by similar colours. Circle sizes are proportional to sample sizes (and hence the weight) of the respective study. The slope of the regression line represents average change per year across all countries and illustrates thus the core outcome of our meta-regression. The *y*-axis intercept of the regression line depicts the estimate for the reference category, Germany (West). West Germany was used as the reference category as this study comprised the largest sample, the longest time period (11 years), and started earliest (1990).

Results

Our initial database search identified 7360 potentially relevant documents. Exclusion of duplicates, of documents not dealing with attitudes of the general population, and of documents not based on representative population samples yielded 324 potentially relevant reports, citation-chasing and first-author searches resulted in another 209 reports that met our inclusion criteria. Twenty-six further reports were identified by contacting experts. Thus, the first step of our search strategy yielded in total 559 reports, 102 of which were written in languages other than English. From these 559 reports, we identified 33 reports on 16 national time-trend analyses of beliefs and attitudes about mental illness, covering periods from three to 46 years. Four of these studies originate from the United States, five from the UK or Scotland, and one each from Australia, Austria, the Netherlands, Poland, New Zealand and East- and West Germany. Studies from Germany reported separately for East- and West Germany. Given that both regions constituted different countries with very different political and social structures until unification in 1990, this separate consideration of attitude changes seemed appropriate. Data from a Scottish study were reported separately for results obtained with a female and a male case vignette (15); hence, in our meta-regression analysis, this study is treated as two separate studies. Eleven studies deal with mental illness in general, ten with schizophrenia, seven with depression and two with other mental disorders. Seven studies (from Australia, Austria, and UK/Scotland) were conducted pre and post anti-stigma campaigns. Six studies (from Australia, Austria, USA, Scotland, and East/West Germany) used case vignettes and were thus included in our meta-analysis. Except for one study, sample sizes were generally >1000 respondents, but owing to splitting of samples in studies examining different conditions or using male/female case vignettes, subsample sizes varied from 230 (15) to 6000 (16). Studies reported response rates from 65% to 85%. Four studies did not report this measure, three of which were research reports not published in peer-reviewed journals. Table 1 provides a synopsis with further details of all studies included in our review.

Beliefs about causes and definition of mental disorder

Six studies used case vignettes to elicit causal beliefs for depression and schizophrenia (1, 10, 12, 13, 15, 17–19) and were entered in our meta-regression analysis. Causal beliefs were assessed by offering respondents a list of causes for the problem described in the vignette and asking them to rate the likelihood of each cause. Because data from Scotland were reported separately for male and female characters depicted in the vignette, they are treated as two studies in our analyses. Figure 1 summarizes results of the analysis for two causal beliefs ('inherited/genetic' and 'brain disease'). Together, the studies covered 16 years (1990–2006, *x*-axis). Agreement with 'inherited/genetic' increased by 1.3% per year in schizophrenia ($P < 0.001$) and by 1.2% in depression ($P = 0.007$). The estimated increase over the entire time period across all studies was thus 20.8% (schizophrenia) and 19.2% (depression). This increase in biological causal beliefs was not accompanied by decreasing support for a psychosocial aetiology of schizophrenia and depression: endorsement of stress as a cause remained unchanged at a high level (Table 2).

The meta-regression analysis also yielded coefficients for each country. They signify the differences of the estimates for each country in relation to the reference category, that is, the amount the regression line needed to be moved up or down on the *y*-axis to depict estimates for the respective country. As the predictions for individual countries are not the focus of this study, we omit these

Table 1. Synopsis of national trend analyses of public knowledge about mental disorders, attitudes towards help-seeking and treatment and attitudes towards mentally ill people

Country	Time period	Sample size	Response rate (%)	Age range (years)	Stimulus	Mental illness unspecified	Schizo-phrenia	Depression	Other disorder	Knowledge	Attitudes towards help-seeking / treatment	Attitudes towards the mentally ill	Anti-stigma / awareness campaign	References
USA	1950–1996	352 / 658	? / 71	25+	L	√				√		√		(22)
the Netherlands	1976–1987–1997	1018 / 1925 / 2232	?		L	√						√		(33, 61)
UK	1990–1997	? / 1804	–*	15+	L	√				√				(23)
USA	1990–2003	5388 / 4319	82 / 71	18–54	L	√					√			(28)
UK	1991–1995–1997	2009 / 2050 / 1946	–*	15+	L			√		√	√		√	(21)
Poland	1993–1999–2005–2008	1088 / 1003 / 1037 / 1107	?		L	√	√					√		(35–38)
England and Scotland	1994–1995–1996–1997–2000–2003	2000 / 2000 / 6000 / 6000 / 2000 / 2000	–*		L	√						√	(√)†	(16)
UK	1998–2003	1737 / 1725	67 / 65	16+	L		√	√	√‡		√		√	(31)
USA	1998–2006	1387 / 1437	76 / 71	18+	L	√					√			(29)
New Zealand	1999–2002	1017	65 / ?		L	√	√					√	√	(32)
Germany (West)	1990–2001	6165 / 4005	66 / 65	18+	V	√	√	√		√	√	√		(10, 11, 13, 25, 30, 62–64)
Germany (East)	1993–2001	1564 / 1020	71 / 65	18+	V	√	√	√		√	√	√		(12)
Austria	1999–2007	1042 / 988	–*	16+	V		√					√	√	(24)
Australia	1995–2003 / 2004	2031 / 1832	85 / ?	18–74	V		√	√		√	√		(√)§	(18, 20, 26, 27)
USA	1996–2006	1444 / 1523	76 / 71	18+	V		√	√	√¶	√	√	√		(1, 17, 65)
Scotland	2002–2004–2006	1381 / 1401 / 1216	?	16+	V	√	√	√		√		√	√	(15, 19)

*Quota sampling.
†Only in Scotland.
‡Alcoholism, eating disorder, dementia.
¶Alcoholism.
§Only in some states L Diagnostic label V Case vignette (included in meta-regression analysis).

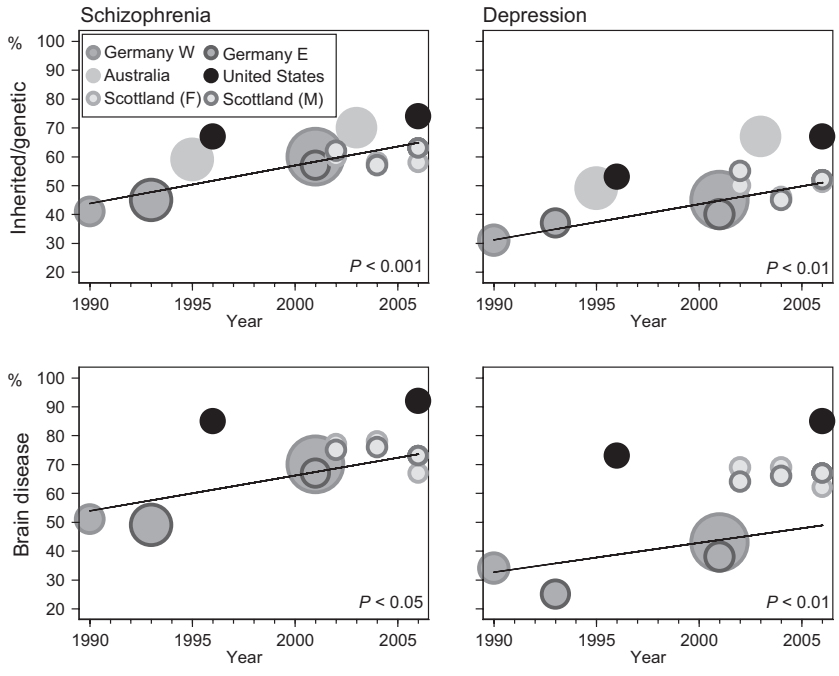

Fig. 1. Evolution of causal explanations for schizophrenia and depression. Results from representative, national trend studies using unlabelled case vignettes. Agreement to a specific cause, meta-regression analysis controlled for study site, reference category: West Germany. The position of each circle represents the result (*y*-axis) and year (*x*-axis) of one national survey, and circle size is proportional to sample size. Surveys from different countries/trend analyses are distinguished by different shades of grey. Germany W: West Germany (old FRG); Germany E: East Germany (former GDR); F: Female vignette; M: Male vignette.

additional coefficients in our table. Country coefficients as well as all individual data extracted for our meta-analyses are available from the authors on request.

Two of the vignette-based trend analyses, from East Germany (12) and Australia (20), additionally examined whether the respondents were able to correctly identify the unlabelled case vignette as 'depression' or 'schizophrenia' respectively. Both studies used open-ended questions to elicit the respondents' problem definition. They show increasing illness recognition in both countries: from 1993 to 2001 (East Germany) and 1995 to 2003/2004 (Australia), correct recognition of schizophrenia increased from 17% to 22% and from 27% to 43% respectively. Recognition of depression increased in East Germany to 38% (+11%) and in Australia to 67% (+27%).

Similar trends towards increased mental health literacy were found in studies with different methodology. In Great Britain (in the context of the *Defeat Depression Campaign*), the proportion of respondents endorsing 'biological changes in the brain' as cause for 'depression' increased from 33% in 1991 to 43% in 1997, and for stress from 71% to 83% (21). Two further studies explored public conceptions of general mental illness. One study, covering the exceptionally long time from 1950 to 1996 (22), showed a broadening of conceptions of mental illness, respondents mentioning a greater proportion of non-psychotic disorders when asked about their definition of mental illness in 1996 than in 1950. The comparison of two surveys conducted in Great Britain in 1990 and 1997 revealed an increase of 14% in the proportion of respondents spontaneously mentioning a specific mental disorder when asked what types of mental illness they can think of (23).

Attitudes towards help-seeking and treatment preferences

Figure 2 shows the results of the meta-regression analysis of two important beliefs about help-seeking for schizophrenia and depression, based on four studies (1, 12, 17, 24–27). Recommendation to visit a psychiatrist for the problem described in the case vignette increased significantly for depression (change per year 1.3%, $P = 0.008$) and, from a higher baseline, just below significance in schizophrenia (change per year 0.9%, $P = 0.06$). Similarly, drug treatment became significantly more popular for both disorders (change per year: 1.7%, $P = 0.017$ in schizophrenia; 1.3%, $P = 0.03$ in depression). Between 1990 and 2006, this amounts to an estimated increase of recommending drug treatment for schizophrenia of 27.2%. Particularly with regard to drug treatment, Figure 2 shows that the direction

Table 2. Meta-regression analyses of time trends of causal beliefs, treatment recommendations, negative stereotypes and social acceptance 1990–2006, based on studies using case vignettes of schizophrenia or depression

	Schizophrenia					Depression				
	Change per year adjusted for country*			Intercept (estimation for Germany West in 1990)†		Change per year adjusted for country*			Intercept (estimation for Germany West in 1990)†	
	%	95% CI	*P*-value	%	95% CI	%	95% CI	*P*-value	%	95% CI
Causal beliefs (n = 6)										
Inherited or genetic	1.32	0.82–1.82	<0.001	43.8	38.3–49.3	1.24	0.05–2.0	0.007	31.2	22.7–39.7
Brain disease‡	1.22	0.11–2.35	0.037	53.9	42.1–65.7	1.01	0.04–1.60	0.006	32.7	26.6–38.8
Stress	0.06	−0.20–0.33	0.61	71.9	68.8–75.1	0.29	−0.11–0.69	0.13	73.2	68.4–78.0
Treatment recommendations (n = 4)										
Psychiatrist	0.92	−0.09–1.93	0.06	69.2	57.9–80.5	1.28	0.64–1.92	0.008	51.0	43.9–58.0
Psychotherapist§	1.17	−0.33–2.66	0.10	64.8	51.9–77.8	1.56	−0.21–3.33	0.07	52.1	36.8–67.5
GP	0.14	−1.53–1.82	0.80	65.0	46.8–83.3	0.30	−1.30–1.91	0.59	68.7	51.2–86.1
Drug treatment	1.68	0.57–2.78	0.02	35.0	23.0–47.1	1.26	0.23–2.30	0.03	27.5	16.3–38.6
Psychotherapy§	0.59	−0.02–0.04	0.61	66.0	40.3–91.7	0.58	−3.45–4.60	0.71	52.5	17.8–87.2
Stereotypes (n = 3)										
Dangerous	0.43¶	−0.90–1.75	0.44	52.3**	34.6–70.0	−1.02††	−3.41–1.37	0.34	32.9**	0.4–65.4
To be blamed	−1.12††	−2.56–0.32	0.10	49.3	34.9–63.8	−0.85††	−1.99–0.29	0.11	50.2	38.8–61.6
Social acceptance (n = 6)										
Co-worker‡‡	−1.11	−2.08 to −0.13	0.033	51.3	41.2–61.5	−0.07	−1.90–1.76	0.93	54.3	35.3–73.3
Neighbour	−0.97	−1.47 to −0.47	0.002	46.3	40.7–52.0	−0.06	−1.11–0.99	0.90	54.3	43.3–65.3
Friend‡‡	−0.89	−2.08–0.30	0.12	28.0	15.7–40.3	−0.51	−2.02–1.01	0.44	33.9	18.0–49.7
Marrying to family	−0.03	−0.48–0.42	0.87	12.5	7.6–17.4	0.45	−0.69–1.59	0.37	16.0	4.3–27.7

*Estimated change of agreement to a specific cause, treatment recommendation, stereotype or willingness to engage in a specific form of social contact (per year, %) across all studies included.

†Estimated baseline for any change in 1990 for the reference category, West-Germany (%).

‡n = 5.

§n = 3, not adjusted for country because of the small number of observations.

¶n = 4.

**Estimation for United States in 1996 (no published data for West Germany).

††Not adjusted for country because of the small number of observations.

‡‡n = 5.

of attitude change is similar even in countries with very different rates of approval (position of the circle in relation to the y-axis). Table 2 shows that recommendation of a GP, a psychotherapist or psychotherapy did not change significantly.

Studies with differing methodological approaches yielded similar results: a trend analysis from the United States (1990–2003) explicitly focussing on the attitudes towards professional mental health treatment also showed that the American public became more accepting in this respect: while in 1990–1992, 36% reported that they would 'definitely go' for professional help, this number was 41% in 2001–2003 (28). Respondents in the more recent survey were also more comfortable talking with a professional about personal problems. A second study demonstrated improving attitudes towards psychiatric medication 1998–2006. More participants in 2006 than in 1998 thought that medications help people to deal with day-to-day stresses (83% vs. 78%), make things easier in relation with family and friends (76% vs. 68%) and help people feel better about themselves (68% vs. 60%) (29). Similarly, a trend analysis from Germany using surveys from 1990 and 2001 showed that anticipation of negative effects from psychotropic drugs declined significantly (30).

Stereotypes about persons with mental illness

Stereotypes play a crucial role in theoretical models of stigmatization, because they supposedly trigger negative emotional responses and discrimination. Table 2 shows the results of a meta-regression of trends for two common mental illness stereotypes, being dangerous and being to blame for the problem (13, 17, 18, 24, 31). These analyses are based on three studies only (being dangerous in schizophrenia: four studies), and neither trend reached statistical significance, although there was a trend towards reduced blame in schizophrenia and depression (P = 0.10 and 0.11).

Inconsistent results were found in other studies: in two surveys using diagnostic labels and conducted in the context of the *Changing Minds Campaign* of the Royal College of Psychiatrists in

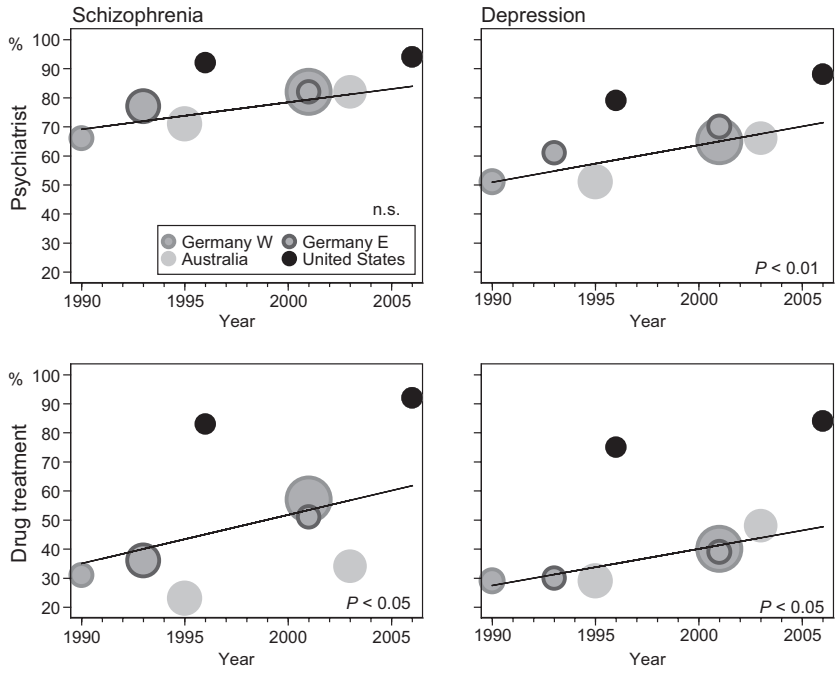

Fig. 2. Evolution of treatment recommendations for schizophrenia and depression. Results from representative, national trend studies using unlabelled case vignettes. Recommendation of a specific treatment, meta-regression analysis controlled for study site, reference category: West Germany. The position of each circle represents the result (y-axis) and year (x-axis) of one national survey, and circle size is proportional to sample size. Surveys from different countries/trend analyses are distinguished by different shades of grey. Germany W: West Germany (old FRG); Germany E: East Germany (former GDR).

Great Britain 1998 and 2003, the perception of dangerousness decreased for both schizophrenia and depression, and blame slightly decreased (from 8% to 6%) for schizophrenia (31). Conversely, two studies examining general mental illness showed an increase in perceived dangerousness. The first study (US, 1950–1996) showed that the perception of mentally ill people being violent or frightening had substantially increased (22). A study from New Zealand (1999–2002) also showed a growing notion that people with mental illness are more likely to be dangerous than other people (32).

Social acceptance of people with mental illness

The final outcome of most theoretical models on stigma is social rejection and discrimination of persons with mental illness. In population surveys, this outcome is usually measured as 'desire for social distance', using items assessing the willingness or reluctance of respondents to engage in specific forms of everyday contact. Most studies using social distance scales reported willingness to engage socially with mentally ill persons, thus generating information about social acceptance (as opposed to social rejection). We included those items in our meta-regression analysis that were used most consistently across six studies assessing social distance towards a person depicted in a case vignette of either schizophrenia or depression (12, 13, 15, 17, 24): accepting someone as a co-worker, as a neighbour, as a friend, and as someone marrying into ones family. Figure 3 shows a significant decline in accepting persons with schizophrenia as a neighbour ($P = 0.002$) and as a co-worker ($P = 0.03$), while no significant changes occurred in depression. Over the 16-year period covered by our meta-regression analysis, the estimated decline for accepting someone with schizophrenia as a neighbour accumulated to 15.5% and to 17.8% for acceptance as a colleague at work. Table 2 shows that acceptance of more intimate relationships (acceptance as a friend and as someone marrying into ones family) did not change significantly for both disorders. In schizophrenia, this could indicate a 'bottom effect', because the acceptance of these relationships was low from the beginning (estimated baseline in West Germany in 1990: 28% and 13% respectively).

Other studies investigated how attitudes toward people with mental illness in general developed over time. They found all either no change or inconsistent trends or even a trend towards a deterioration of public attitudes. Neither study showed evidence of a substantial increase in the public's acceptance of people with mental illness over the last decades.

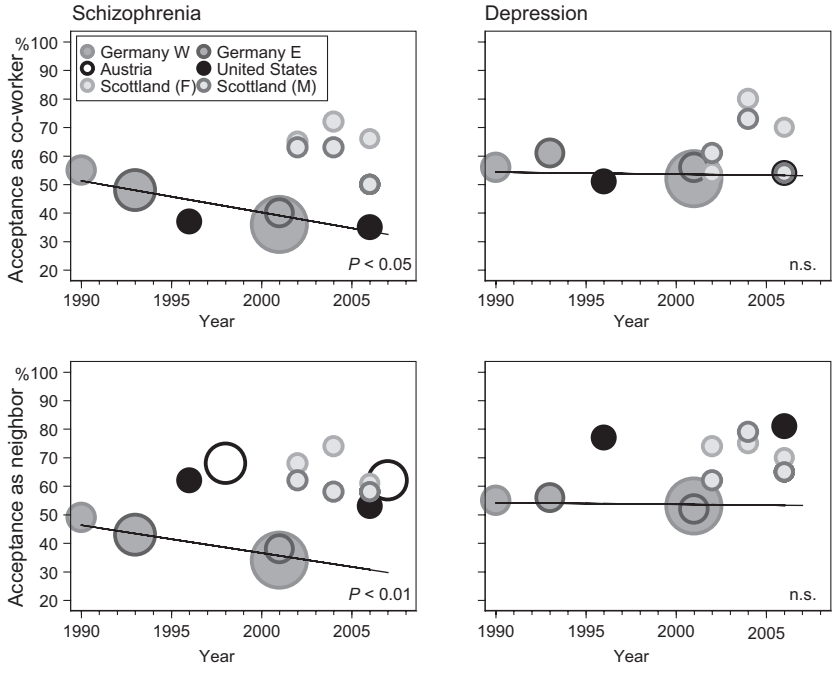

Fig. 3. Evolution of social acceptance of persons with schizophrenia or depression. Results from representative, national trend studies using unlabelled case vignettes. Willingness to engage in specific forms of social contact, meta-regression analysis controlled for study site, reference category: West Germany. The position of each circle represents the result (*y*-axis) and year (*x*-axis) of one national survey, and circle size is proportional to sample size. Surveys from different countries/trend analyses are distinguished by different shades of grey. Germany W: West Germany (old FRG); Germany E: East Germany (former GDR); F: female vignette; M: male vignette.

In the Netherlands, the public had become more acceptant of former psychiatric patients between 1976 and 1987, but in 1997, it had again grown more reluctant to receiving ex-patients into their private life. For instance, while 51% accepted a psychiatric ex-patient as teacher for little children in 1976 and the percentage had increased to 66% in 1987, it dropped again to 56% in 1997 (33). In England and Scotland, surveys were carried out 1994–1997 annually, in 2000 and in 2003, using an adapted version of the Community Attitudes Towards the Mentally Ill (CAMI) survey (34). Over the 9 years, responses to two of 25 items improved and responses to two items deteriorated for both England and Scotland. Comparing the years 2000 and 2003, that is, the data collected immediately before and immediately after the 'see me' Scotland campaign, there was significant deterioration for 17/25 items in England and only for 4/25 items in Scotland. (16). In Poland, four surveys have been conducted over a time period of 12 years (1996, 1999, 2005 and 2008), showing no substantial changes in the respondents' desire for social distance in personal relationships, but somewhat more tolerant attitudes concerning the access of ex-patients to social roles such as mayor, politician, teacher or priest. Fewer people responded friendly towards the mentally ill in 2008 than in 1996 (35–38).

Discussion

Our systematic review and meta-analysis revealed a consistent evolution of public attitudes across different countries. Two distinct developments emerged: first, the public's literacy about mental disorders clearly has increased. Second, at the same time, attitudes towards persons with mental illness have not changed for the better, and have even deteriorated towards persons with schizophrenia. Throughout, the results of our meta-regression analysis of studies using a similar methodological approach based on unlabelled case vignettes of schizophrenia and depression were corroborated by the findings from other studies using different methods. This apparent validity of our findings is limited, however, by two factors: first, we cannot rule out that studies not indexed in one of the major English-language databases PubMed, PsychINFO and Web of Science escaped our attention. We tried to overcome the dominance of English scientific literature by additionally asking international experts on psychiatric attitude research for any studies they were aware of, and by

careful citation tracking within the literature we found. In fact, results of three of the 16 studies identified in this review (from Austria, the Netherlands and Poland) were published in their native language. Still, this does not overcome the second limitation: all studies identified originated from industrialized, first-world countries, and hence, no conclusions on the evolution of attitudes in other countries is permissible.

While in some instances, results from different countries were numerically quite similar (regarding, for example, the role of heredity/genetics for the aetiology of depression or schizophrenia), we found considerable national differences in other respects (approval of drug treatment, social acceptance of persons with depression or schizophrenia). It is not possible to determine to what extent methodological differences like asking about 'prescription medication' in general in the US (1, 17) or specifically for 'antipsychotics' for schizophrenia and 'antidepressants' for depression in Australia (20) contributed to differing results, and to what extent they represent true national particularities. National differences, however, are not the subject of this review, but changes over time, and compellingly, even from very different baselines, changes frequently occurred in similar direction.

The first development, the apparent increase in mental health literacy, illustrates that a biomedical model of mental disorders enjoys growing popularity, which is consistent with the enormous efforts and achievements within psychiatry in understanding the biological correlates of mental illness and conceptualizing mental illness as 'brain disease'. Little change occurred in the public's strong endorsement of psychosocial stress as a major cause of mental disorders. This could be interpreted as an indication of a balanced view including psychosocial and biogenetic causal explanations, equivalent, for example, to a vulnerability-stress model of mental disorders. However, a study from Germany asking respondents to indicate the most and second most important cause for either depression or schizophrenia found most respondents supporting either two biological or two psychosocial causes, suggesting that if people need to prioritize their causal beliefs, they prefer either biological or psychosocial explanations, but usually not a combination of both (39).

Our findings also suggest that conceptualizing mental disorder as a brain disease or a medical problem facilitates the acceptance of a medical-professional solution for this problem. There has been a general increase in the belief that mental illness requires professional help. The growing popularity of psychotropic medications is thereby not accompanied by a decrease in the popularity of psychotherapy, which the public still favours over drug treatment for mental disorders. This trend in attitudes is reflected in increased use of mental health services (40) and sales of psychotropic medication (41).

This apparent success story of psychiatric research and educational work is, however, incomplete. The second development evident from this review does not fuel optimism: attitudes towards persons with mental illness have not changed for the better. Although there were insignificant trends towards reduced blame in schizophrenia and depression, notions of dangerousness did not change. Most strikingly, social acceptance of mentally ill persons did not increase since 1990, instead, acceptance of persons with schizophrenia as a co-worker or neighbour diminished and acceptance as a friend or in-law remained at low levels. Obviously, a better biological understanding of mental illness has not translated into greater social acceptance of mentally ill persons. The persistence of negative attitudes is even more sobering given that attitudes towards other minorities in Western industrialized societies have indeed improved: for example, attitudes towards homosexuals have become considerably more tolerant in many countries (42–44).

How can this failure to improve social acceptance of mentally ill persons be explained? Recently, it has been argued that a biogenetic causal model of mental illness is unlikely to improve attitudes towards persons with mental illness for both theoretical and empirical reasons: While a biogenetic illness model is commonly hypothesized to reduce perceived responsibility and thereby the rejection of mentally ill persons, there is so far no evidence supporting this claim (45). Instead, attention has been drawn to potentially negative effects of biogenetic causal explanations on the stigma of mental disorders, because they may enhance notions of 'otherness', reduce treatment optimism and aggravate anticipations of unexpected and dangerous behaviour (46–50). This could be particularly true for schizophrenia, where we found a deterioration of attitudes in some respects. As we found neither a worsening nor an improvement of social rejection in depression, a potential association between biogenetic illness models and social acceptance is probably less relevant for this disorder. A population study from Germany examining the relation between social distance and causal beliefs regarding schizophrenia and depression points towards this direction (51), showing stronger associations between

biological causal beliefs and negative attitudes in schizophrenia than in depression. However, these illness-specific effects need further exploration. On an individual level, qualitative studies among patients with affective disorders and their relatives have even indicated that biogenetic causal explanations are associated with reduced perceptions of stigma (52), but so far, quantitative studies have not supported such findings (53).

Our results thus provoke far reaching conclusions. While the approach to depict mental disorder as an 'illness like any other' and to emphasize its biological correlates seems useful to enhance the acceptance of professional medical treatment for mental disorders, it is not suitable to improve social tolerance towards those suffering from mental illness. Dissemination of biological knowledge is not a solution to discrimination and stigmatization of persons with mental illness. Instead, it seems necessary to re-evaluate the public image of mental disorders psychiatry creates and to arrive at communicating a more balanced, truly biopsychosocial disease model of mental disorders. Along this line, concerns have been voiced whether the 'illness like any other' approach is generally appropriate to depict mental disorders (54). It has been argued, for example, that the 'chemical imbalance' explanation for depression does not adequately represent the multitude of biological and social determinants of its onset and course (55) or that the 'mental disorders are brain disorders' narrative carries an unduly 'eliminative reductionist perspective' (56).

This seems especially important to anti-stigma and awareness campaigns. During the time covered by our analyses, many local and national campaigns have worked at improving public attitudes towards persons with mental illness (57). Seven studies included in our review were conceptualized to evaluate national campaigns. Overall, no consistent differences were observed between the results of these studies and those not explicitly connected to any interventions. However, as the evaluation of anti-stigma and awareness programs was not the focus of our review, no definite conclusions on their effectiveness can be drawn. An appropriate review of such campaigns would have needed to include both local and short-term studies, which we excluded to elicit broader and sustained time trends of attitudes. It is also important to note that the last survey included in a trend study dated from 2006. As actions to fight the stigma of mental illness have continued and intensified since, new trend analyses tracking present and future attitude changes are necessary. They would provide further feedback for the ongoing efforts to increase social acceptance of those suffering from mental disorders. It seems clear from our review, however, that education about biological correlates of mental disorders is not sufficient to improve attitudes towards persons with mental illness. Effective anti-stigma programs need to embrace other strategies, centred for example on consumer contact (58). Recent large-scale anti-stigma activities follow this rationale (59, 60), giving hope to finally arrive at improving attitudes and not merely increasing knowledge about mental illness.

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