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Review article

Evidence for effective interventions to reduce mental health-related stigma and discrimination in the medium and long term: systematic review

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Background
Most research on interventions to counter stigma and discrimination has focused on short-term outcomes and has been conducted in high-income settings.

Aims
To synthesise what is known globally about effective interventions to reduce mental illness-based stigma and discrimination, in relation first to effectiveness in the medium and long term (minimum 4 weeks), and second to interventions in low- and middle-income countries (LMICs).

Method
We searched six databases from 1980 to 2013 and conducted a multi-language Google search for quantitative studies addressing the research questions. Effect sizes were calculated from eligible studies where possible, and narrative syntheses conducted. Subgroup analysis compared interventions with and without social contact.

Results
Eighty studies ($n = 422\,653$) were included in the review. For studies with medium or long-term follow-up (72, of which 21 had calculable effect sizes) median standardised mean differences were 0.54 for knowledge and −0.26 for stigmatising attitudes. Those containing social contact (direct or indirect) were not more effective than those without. The 11 LMIC studies were all from middle-income countries. Effect sizes were rarely calculable for behavioural outcomes or in LMIC studies.

Conclusions
There is modest evidence for the effectiveness of anti-stigma interventions beyond 4 weeks follow-up in terms of increasing knowledge and reducing stigmatising attitudes. Evidence does not support the view that social contact is the more effective type of intervention for improving attitudes in the medium to long term. Methodologically strong research is needed on which to base decisions on investment in stigma-reducing interventions.

Declaration of interest
None.

Since Goffman's seminal work on stigma,[1] research in this field has steadily grown,[2] although most work consists of surveys among the general public about attitudes towards people with mental illness,[3–6] and much less is known about effective interventions to reduce stigma,[6] or about stigma in low- and middle-income countries (LMICs).[7–10] To better understand the evidence base on interventions to reduce mental illness-related stigma and discrimination, we identified eight existing systematic reviews on this topic.[11–18] The reviews varied widely in their methods and foci. There was considerable methodological and clinical heterogeneity in the included studies, and consequently meta-analysis was only undertaken in one review,[11] and for small subgroups in two others.[12,13] Four reviews presented data or commented on the overall pattern of effect sizes,[11–14] and in each of these the interventions had small to moderate effects, using Cohen's interpretation.[19] There was clearest consensus that the interventions containing social contact and first-person narratives were more effective than others.[11,13,15,16] Two of the reviews explored moderators of effects to understand which types of contact work best,[11,13] but there is a need for more research in this area. Two reviews indicated that some interventions have the potential to worsen stigma.[13,17] Most of the reviews were critical of the methodological quality of the included studies,[12–15,18] commenting in particular on the need for more randomised controlled trials (RCTs) and robust methods generally; the use of unvalidated measures; and the relative lack of follow-up beyond the immediate post-intervention period. Other study limitations noted were the use of convenience samples,[13,15,17] small sample sizes,[14] or inappropriate outcome measures.[14,15] Some reviews highlighted the poor quality of the interventions, which were sometimes delivered without training, manualisation or fidelity checks,[11] and interventions often lacked a theoretical underpinning and developmental research.[13,14] In all except one review, which was restricted to studies in Iran,[12] interventions taking place in LMICs were a small minority or did not feature. From this scoping of existing systematic reviews we concluded that there was a need for a further systematic review to synthesise the evidence on two key issues: effectiveness in the longer term and in LMIC contexts. Consequently this systematic review aimed to assess the effectiveness of interventions (of any type with any target population), compared with inactive or baseline comparators, in reducing mental health-related stigma (knowledge, attitudes and behaviour) using any quantitative study design, addressing specifically the evidence for medium- and long-term effectiveness (research question 1) and the effectiveness of interventions in LMICs (research question 2).

Method

Studies were included if they described any type of intervention with a stated aim of changing mental health-related stigma or with an implied aim of changing stigma as indicated by the inclusion of

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at least one of the following core stigma-related outcomes: stigma (any), prejudice (attitudes and related outcomes), discrimination, internalised/self-stigma or public mental health awareness/literacy. Intervention studies were included if they related to functional mental illnesses; interventions solely about, or delivered to, populations with dementia, substance misuse, intellectal disabilities or developmental disorders were excluded from this review. We included all quantitative study designs, including RCTs, controlled and uncontrolled pre–post studies, crossover studies, cohort studies and longitudinal panel studies. Studies with more than one intervention group were included. To be eligible, studies needed to report a comparison with a control group (including treatment as usual, best available current treatment or an active control, to control for non-specific effects of the intervention) or a baseline comparator. Studies needed to include at least one stigma outcome which we categorised as related to knowledge, attitudes (prejudice, self- stigma, self-esteem) or behaviour (discrimination, stigma-coping). To be eligible studies also had to address one of our two research questions: to have at least one follow-up point at least 4 weeks after the intervention was completed (to reflect the importance of medium- and longer-term outcomes relevant to stigma, as this is often described by people with mental illness as a long-term challenge); or for the intervention to be carried out in an LMIC setting. Eligibility criteria are shown in the Appendix.

Information sources and search strategy

We identified studies by searching electronic databases, hand-checking reference lists of reviews and consulting with experts in the working group with knowledge of papers in press. We searched the following databases between 25 January 2013 and 8 February 2013: Medline, PsycINFO, the Cochrane Library, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the Social Science Citation Index (SSCI) and Global Health. In addition we conducted a Google advanced search focusing on LMICs (see Fig. 1 for details). The Google search was warranted in the light of the limited amount of stigma research in LMICs, but was precluded for our first research question as research from high-income countries is more likely to be found through a standard systematic review search. A search strategy was developed by consensus among authors (N.M., S.C., E.B. and M.D.) using both MeSH and text word searching. We searched using the format 'Stigma' OR 'Discrimination' OR synonyms AND 'mental health' OR 'mental disorders' OR synonyms AND 'Intervention Studies' OR synonyms. The full Medline search strategy is shown in online Table DS1. The search was restricted to results between 1980 and 2013 and studies on human beings, but was not limited by language. The decision to start the search at 1980 was a pragmatic one based on our examination of the existing reviews which revealed that the vast majority of stigma intervention research commenced after 1980. Relevant non-English language papers were read by fluent native language speakers in French and Spanish according to the linguistic skills available to members of the review team. Potentially relevant papers in many important languages, including Chinese, were therefore excluded from the review. Systematic and non-systematic reviews were identified during the search and the reference lists of these studies were hand-checked.

Study selection and data collection

All identified titles and abstracts were screened by two researchers. Because of the large number of search hits, two researchers screened 5% of abstracts together. As good agreement ($>95\%$) was achieved, the remainder were divided between the two researchers and study selection conducted by one researcher for each half. Where the researcher was unclear as to whether a paper should be included, the paper was discussed in consensus meetings. Two review authors extracted data from included studies for all parts of the systematic review, with queries resolved by discussion and consensus.

Statistical analysis

Outcomes for the studies included were reported using both scales and individual items, although for the effect size calculations were restricted to scale data for knowledge and attitudes. We classified all reported stigma outcomes into the categories of 'knowledge', 'attitudes' or 'behaviour'. Differences between intervention group and control group at follow-up were our main focus for the quantitative review. Effect sizes, standardised mean differences (SMDs) and 95% confidence intervals were calculated for studies where there were sufficient data to calculate this using the Campbell Collaboration effect size calculator.[20] We had planned to calculate odds ratios for dichotomous outcomes but found no study for which this was calculable. Negative SMDs indicate a reduction in stigma (benefit), i.e. an improvement in knowledge outcomes or a reduction in either negative attitudes or discriminatory behaviour in the intervention group. Where more than one outcome was reported within a category, the median effect size was presented.[21] In the online tables we present data on the number of outcomes with statistically significant changes in outcome and the direction of effect to complement the effect size data of outcomes.[21] These also provide some information about all included studies and at least some information on effectiveness for studies that reported insufficient data to calculate effect sizes. Owing to the considerable heterogeneity of the interventions, measures and participants in the included studies, it was not possible to conduct meta-analyses or to use conventional analytical methods to control for heterogeneity. As some studies had more than one intervention, this analysis was carried out at the intervention level with the number of participants in the control group split between the interventions, to control for unit of analysis error.[22]

We conducted two subgroup analyses on type of intervention by calculating, presenting and comparing median effect sizes attitude outcomes for each subgroup. The first analysis compared direct, indirect or no social contact, and the second compared target groups. We undertook similar sensitivity analyses to explore the possible effects of study design and risk of bias. First, we compared RCT evidence with non-RCT evidence, and second, within RCTs we compared the third of studies with the least risk of bias (see below) with the remainder.

Assessment of study quality and risk of bias

A quality assessment and profile of risk of bias within studies were carried out individually for all included studies. Level of RCT evidence was rated by two authors using the Cochrane risk of bias tool.[23] The third of RCTs with the lowest risk of bias are identified with an asterisk in the data extraction tables. To assess bias in non-randomised studies two researchers conducted quality appraisals using risk of bias criteria for non-randomised studies,[23] suitable to the wide range of study designs included. When a decision about the risk of bias could not be made, it was resolved through discussion with a third author. In addition, for each study we indicated whether at least one outcome measure was validated, whether it was previously published, developed by the author or if items were used. Scales were marked as having evidence of psychometric adequacy providing they met one or more of the following

criteria: the authors reported a Cronbach's α of 0.7 or greater, the authors referenced the measure as being reliable or valid, or there was some evidence of validity or reliability as judged by the review team.

Results

A total of 80 quantitative studies (422 653 participants) were identified for inclusion in the review, 72 addressing research question 1 (long-term effectiveness) and 11 addressing research question 2 (setting), of which 3 studies addressed both questions (Fig. 1). The database search provided 27 876 citations. After a review of the abstracts 26 563 papers were excluded as they were clearly irrelevant or did not meet the inclusion criteria. The reference lists of 17 reviews were hand-checked and 49 further papers identified. Seven papers in press known to the authors were included. After removal of 330 duplicates the full text of the remaining 1061 potentially relevant papers was sought. Of these, 21 papers were unobtainable and 843 papers did not meet the inclusion criteria. Of the remaining papers 17 did not contain enough relevant data to extract. A full reference list is given in online Table DS2 and study characteristics are listed in online Tables DS3–5. Online Tables DS6 and DS7 give risk of bias and quality ratings for RCTs and other studies respectively.

Medium- and long-term follow-up

Study characteristics

Most of the studies addressing medium- or long-term outcomes took place in high-income countries (93%), were aimed at school or university students (37%) and used interventions comprising mental health education and literacy or mental health information (43%). About a quarter (28%) of the studies included were RCTs, 52% consisted of pre–post studies with or without a control group and 21% were longitudinal panel or cohort studies. Most studies (69%) had a final follow-up assessment 1–6 months after the intervention had ended, whereas 21% had a longer follow-up (1–10 years post-intervention). Tables DS3 and DS4 show details of study characteristics.

Evidence

There were 72 quantitative studies with at least 4 weeks of follow-up, which included 81 interventions with 42 653 participants. It was possible to calculate effect sizes and confidence intervals for 21 of these studies (23 interventions). These studies and their effect sizes are shown in Table 1. Findings based on statistical significance for all included studies are shown in Tables

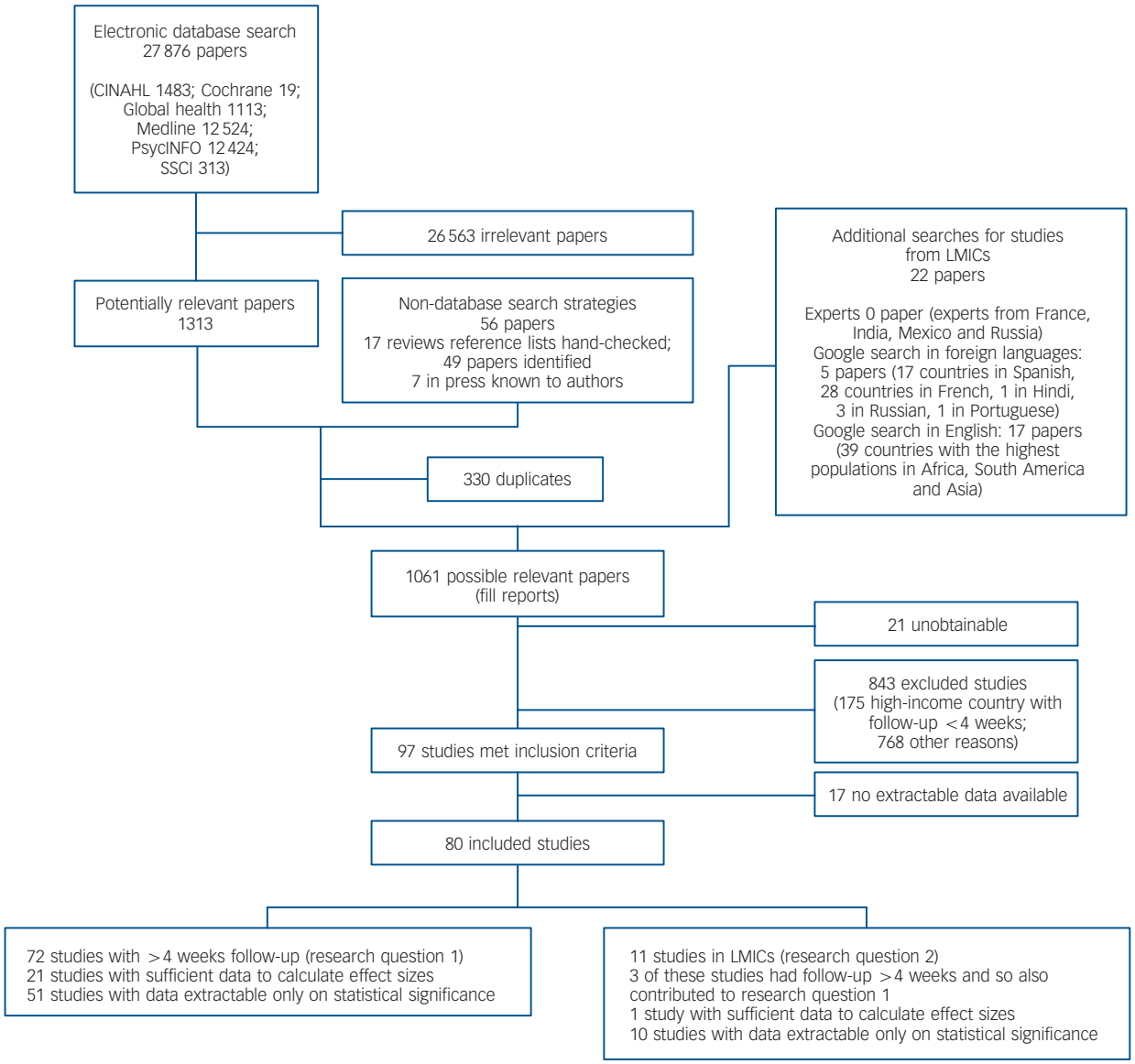

Fig. 1 Selection of papers and sources included in the review. LMIC, low- and middle-income country; SSCI, Social Science Citation Index.

DS3 (RCT, controlled and uncontrolled pre–post studies) and DS4 (longitudinal panel study or cohort design). For knowledge outcomes the median effect size was 0.54 indicating a medium effect in increasing knowledge.[19] For attitude outcomes SMDs ranged from 0.05 to −1.22 with a median effect size of −0.26, indicating a small reduction in stigmatising attitudes. For behavioural outcomes SMDs were calculated in one intervention which showed a small (SMD = 0.22) effect in reducing stigmatising behaviour. Inspection of the pattern of significance findings for scales for all the included studies with medium- or long-term follow-up indicated that there were similar numbers of significant and non-significant findings indicating an increase in knowledge (26 *v.* 22). Similar numbers were also found for attitude scales (63 non-significant findings *v.* 52 significant in the direction of stigma reduction). Five scales had significant findings indicating an increase in stigma. For behavioural outcomes measured with scales, non-significant findings outnumbered significant ones indicating a reduction in discriminatory behaviour (12 *v.* 2) and this was also the case for behavioural outcomes measured at the item level (38 *v.* 19).

Our subgroup analysis of type of intervention found that interventions containing direct social contact had a smaller median effect size for stigmatising attitudes (−0.17) than those with indirect social contact (−0.32) or no social contact (−0.33). There were enough interventions with effect sizes to make comparisons of median effect sizes by three types of target group, and we found that interventions targeted at health professionals had a somewhat higher median effect size (−0.41) than those targeting school pupils (−0.21) or university students (−0.13).

Risk of bias

Across all RCTs there was a low risk of bias for 50% of the criteria and an unclear or high risk of bias in the other 50%. Only five trials met 70% or more of the criteria. Nine trials met between 40% and 60% of the criteria and five only met 15–30%. In light of the nature of anti-stigma interventions it was not possible to mask participants and personnel to allocation, with the exception of one trial which was internet-based and thus easier to conceal.[24] Of the 19 trials, 17 used at least one validated scale to measure outcomes, whereas 2 used non-validated scales that had been used in previously published papers. There were 53 non-randomised studies, 30 of which did not have a control group. Among studies with a control group, 6 were deemed to have a low risk of selection bias with regard to the comparability between the intervention and control groups. In 26 studies there was a high risk of attrition bias, where more than 20% of the sample were lost to follow-up and no intention to treat analysis was carried out. Possible confounders were considered and controlled for in only 28% of studies. As with the RCTs, masking of participants and personnel was not possible owing to the type of intervention. Among non-randomised studies, 24 had at least one validated outcome measure, 2 had at least one that was previously published, 4 had one that was specifically developed for the study with no psychometric testing reported, and 23 used items only. Details of risk of bias in individual studies are given in Tables DS5 and DS6. The median effect size for RCTs was lower than for non-randomised controlled studies (−0.17 *v.* −0.37). Within RCTs the third with the least risk of bias had a higher effect size (−0.30) than the remainder (−0.09).

Evidence from LMICs

There were 11 studies (1967 participants) from LMIC settings, 8 with less than a 4-week follow-up and 3 with longer follow-up. Study characteristics and statistical significance findings for these are shown in Table DS5. Eight of these were from upper middle-income countries and three were from lower middle-income countries. There was no study meeting our criteria from a low-income country. Six studies were aimed at school and university students, two at caregivers of people with schizophrenia, and three at healthcare professionals. Three studies used an RCT design, one of which was a cluster randomised trial analysed within groups, two were controlled studies and six were uncontrolled pre–post studies. Within the 11 studies included there were 16 intervention arms, with 5 measuring knowledge outcomes and 14 measuring attitude outcomes. None of the studies had behavioural outcomes. Sufficient data to calculate an effect size were reported in only one of the studies;[25] in this study – a psychoeducation programme for caregivers of patients with schizophrenia in Chile – the SMD for stigmatising attitudes was −2.11 (95% CI −2.87 to −1.34), indicating a large effect. Inspection of the statistical significance of the knowledge scale findings for all studies revealed that both studies with such outcomes found no evidence of change; however, there were findings indicating a significant reduction in stigmatising attitudes for 11 of the 12 attitude scale outcomes assessed in these studies (Table DS5).

These results should be interpreted with caution. In seven of the studies, follow-up assessments were undertaken immediately after the intervention (in one study this was done 1 week after the intervention had ended). There were also issues regarding bias: owing to a lack of information in the papers it was generally difficult to gauge the extent of risk of bias. For the three RCTs, in 52% of criteria the risk of bias was unclear. Where information was provided, a high risk of bias was found in 19% of criteria across the RCTs, whereas in 29% of criteria the risk was low. This was most common for the incomplete outcome data and selective outcome reporting criteria. For the non-randomised studies, risk of bias varied across criteria, with 33% classified as high and 33% as low, and for 33% the degree of risk was unclear.

Behavioural outcomes

Among the 15 studies that did report behavioural outcomes, 7 assessed contact with someone with a mental health problem, 4 measured perceived discrimination and coping strategies in participants who had a mental health problem, 2 measured changes in school and workplace policies regarding mental health,[26,27] 2 measured experienced discrimination reported by people with mental health problems,[28,29] and only 1 measured actual discriminatory behaviour by participants in the general population.[30]

Discussion

Our synthesis of 72 studies with follow-up beyond 4 weeks revealed that, at this follow-up, interventions aimed at reducing mental health-related stigma typically had a medium-sized effect on knowledge outcomes and a small effect on attitudinal outcomes, although for both types of outcome statistically non-significant findings were as common as significant ones. There were insufficient data on behavioural outcomes to draw any conclusions on the medium- or long-term effectiveness of interventions to reduce discrimination. This is the first systematic review to synthesise evidence on medium- and long-term effectiveness, which is striking given that stigma is often experienced by people with mental illness as a long-term difficulty. Although a number of systematic reviews indicated that social contact interventions were particularly effective,[11,13,15,16] the majority of studies in these reviews had only short-term follow-up. Our review, restricted to studies with medium- and

Table 1 Evidence for medium- and long-term effectiveness of interventions to reduce mental health-related stigma

Study[a]	Design[b]	*n*[c]	Intervention	Time to follow-up[d]	Evidence for effectiveness SMD (95% CI)[e]		
					Knowledge	Attitudes	Behaviour
Targeted at the armed forces							
Seal *et al* (2012)[45]	RCT	73	Motivational interviewing	8 weeks		0.04 (−0.07 to 0.86)	
Gould *et al* (2007)[46]	Controlled	124	Training programme to provide support, education and modify attitudes about PTSD	1 month		0.42(r) (0.00 to 0.85)	
Targeted at school students							
Campbell *et al* (2011)[47]	RCT	92	Mental health workshop including education and direct contact	10 weeks		0.05 (−0.39 to 0.49)	
Pinto-Foltz *et al* (2011)[48]	RCT	156	Direct contact with service users who were in sustained recovery from mental illness	8 weeks	0.29 (−0.05 to 0.63)	−0.17 (−0.50 to 0.17)	
Esters *et al* (1998)[49]	Controlled	40	Mental health education about stigma and help-seeking	12 weeks		**−0.45 (−1.08 to −0.18)**	
O'Kearney *et al* (2006)[50]	Controlled	59	Internet programme aiming to help people identify, overcome and cope with depression	16 weeks		−0.25 (−0.83 to 0.34)	
O'Kearney *et al* (2009)[51]	Controlled	157	Internet programme aiming to help people identify, overcome and cope with depression	20 weeks	−0.14 (−0.45 to 0.18)	**−0.17 (−0.49 to 0.15)**	
Ventieri *et al* (2011)[52]	Controlled	195	Mental health education, with role play and activities	4 months	**0.51 (0.21 to 0.80)**	**−0.33 (−0.62 to −0.03)**	
Targeted at university students							
Gonzales *et al* (2002)[53]	RCT	167	Mental health education about stigma	4 weeks		−0.07 (−0.52 to 0.38)	
Sharp *et al* (2006)[54]	RCT	123	Mental health education	1 month		−0.09 (−0.47 to 0.29)	
Faigin & Stein (2008)[55]	Controlled	204	A play by actors with history of severe mental illness addressing their experiences and stigma	1 month		−0.13 (−0.47 to 0.20)	
Faigin & Stein (2008)[55] (2nd arm)	Controlled	222	A video-recorded version of the play described above	1 month		−0.37 (−0.69 to −0.05)	
O'Reilly *et al* (2011)[56]	Controlled	272	Mental health first aid training for pharmacy students	6 weeks		−0.61 (−0.92 to −0.31)	
Targeted at healthcare professionals							
Blair Irvine *et al* (2012)[57]	RCT	172	Internet courses with behavioural skills and knowledge training for long-term care staff	1 month	**0.56 (0.25 to 0.86)**	**−0.17 (−0.47 to 0.13)**	
Patterson *et al* (2007)[58]	Controlled[f]	91	Educational intervention about self-harm behaviour for nurses	18 months		−1.22 (−1.86 to −0.58)	
Treloar (2009)[59]	Controlled[f]	90	Educational programme about self-harm using psychoanalytic aetiology framework	6 months		−0.35 (−1.06 to 0.37)	
Treloar (2009)[59] (2nd arm)	Controlled[f]	91	Educational programme about self-harm using CBT aetiology framework	6 months		−0.47 (−1.23 to 0.29)	
Targeted at the general public							
Jorm *et al* (2004)[60]	RCT*	753	Mental health first aid course	4 months	**11.77 (5.98 to 17.56)**	**−0.26 (−0.49 to −0.03)**	0.22(r) (−0.18 to 0.63)
Targeted at people with mental health problems							
Fung *et al* (2011)[61]	RCT*	66	Self-stigma reduction programme	6 months		0.34 (−0.82 to 0.15)	
Gumley *et al* (2006)[62]	RCT	144	CBT targeting negative beliefs about self and illness	12 months		−0.12 (−0.45 to 0.21)	
Targeted at other groups							
Gulliver *et al* (2012)[24]	RCT*	59	Mental health literacy and destigmatisation intervention for elite athletes	3 months	0.76 (−0.17 to 1.68)	0.50(r) (0.41 to 1.41)	
Kitchener & Jorm (2004)[27]	RCT*	301	Mental health first aid course for employees	5 months	0.07 (−0.16 to 0.30)	−0.17 (−0.40 to 0.05)	
Jorm *et al* (2010)[63]	RCT*	327	Youth mental health first aid course for teachers	6 months	0.67 (0.18 to 0.65)		

CBT, cognitive–behavioural therapy; PTSD, post-traumatic stress disorder; RCT, randomised controlled trial; SMD, standardised mean difference.
a. Studies with sufficient data to calculate effect sizes.
b. Designs include RCTs in the top tercile for quality, i.e. highest numbers of Cochrane risk of bias items rated as low (RCT*); RCTs in the lower two terciles for quality (RCT) (see online Table DS5 for details); pre–post studies with a control group (Controlled).
c. Number of participants in the intervention and control groups.
d. Time to final follow-up results.
e. An SMD <0 indicates a reduction in knowledge, stigmatising attitudes or stigmatising behaviours unless the data are such that this can only be calculated to show the reverse effect, in which case this is marked (r). Bold type indicates confidence intervals that do not cross zero.
f. Hedges' *g* used by study authors instead of Cohen's *d* owing to small sample sizes.

longer-term outcomes, did not support the superiority of social contact interventions as we had expected. As it is vital that stigma reduction is sustained in the longer term, the effectiveness of such social contact interventions clearly warrants further research.

Study quality was variable, and indeed study design and quality did appear to affect median effect sizes, although these subgroup and sensitivity analysis findings should be interpreted with caution owing to the heterogeneity of the studies. Overall, where we did identify positive changes from the interventions, the magnitude of the effects was generally rather modest. It is also clear that there is therefore a lack of research on actual discriminatory behaviour within the stigma research field.

For our second research question regarding LMICs, we found comparatively few studies from middle-income countries and none from low-income countries. A large effect size was found for the one LMIC study for which there were sufficient data to calculate the effect size and the majority of attitude scale outcomes indicated significant improvements in attitudes, although such findings must be treated with considerable caution. There is a clear need for more stigma reduction studies, particularly from low-income countries.

Our results regarding service user social contact are consistent with those of Griffiths *et al*,[31] who recently published a meta-analysis of RCTs of interventions intended to reduce stigma. Analysing data from 26 trials they found that interventions targeting personal stigma or social distance yielded small but significant reductions in stigma across all mental disorders. Further, they reported that educational interventions were effective in reducing personal stigma, as were interventions incorporating service user contact. This study also considered internet use and self-stigma and found that internet programmes were at least as effective in reducing personal stigma as face-to-face delivery (see also Clement *et al*).[32] They found no evidence that stigma interventions were effective in reducing self-stigma. In our review, although social contact appears to be the most strongly evidence-based type of intervention to reduce stigma when measured by immediate post-intervention outcomes, there is not at present evidence to show that such immediate benefits persist in the longer term.

Limitations of the study

This review has a number of limitations. In conducting a comprehensive overview of all relevant literature we have identified considerable heterogeneity among participant groups, interventions and outcomes. For example, we identified 55 different scales used for the 136 outcomes measured. Study quality also varied considerably. We were able to include studies in some non-English languages, but it is possible that we missed important projects published in other languages, for example potentially important studies not available at all in English, or studies for which only abstracts were available in English, and which we were not able to assess fully (see, for example, Shi *et al*).[33] The temporal limitation of the search start date being 1980 will have resulted in the review missing studies before that date. We also need to acknowledge the possibility of publication bias, for example that intervention studies showing no difference might be published less often than those that do identify a clear benefit. Further, the risk of bias results given above, with half of all studies having a high or unknown risk of bias, mean that considerable caution needs to be exercised in interpreting these findings. It is also notable that relatively few of the interventions assessed following published, manualised procedures or including any rating of treatment fidelity. It should also be appreciated that although a narrative review may be able to disaggregate the nature of the interventions, and the specific target groups, into a greater number of specific subtypes, the numbers of studies in each of these categories would be small, and that this would give a greater descriptive richness at the expense of the wider generalisability of the findings. The systematic review method used here does not allow this narrower focus.

Challenges in the measurement of stigma

The assessment and validation of instruments to measure stigma and discrimination against people with mental illness has been under way since the 1960s. Although early measures such as the Opinions About Mental Illness and the Community Attitudes to Mental Illness scales are still used in some studies,[34,35] there have been many developments in the breadth and quantity of measures to assess stigma in recent years. These include a trend to incorporate multiple outcomes or domains, for example knowledge and behaviour as well as attitudes; techniques to control for social desirability bias such as implicit measures; research on coping or 'stigma resilience'; and assessments among multiply stigmatised groups, such as people from ethnic minorities with mental illness. Despite these developments there are still substantial gaps in what can be assessed using available measures, including a lack of behavioural and structural indicators. We have seen in this review that behaviour is under-represented in stigma intervention outcomes, for example changes in behaviour of others rated by patients or service users, or directly observed discrimination-related outcomes. There is a further gap in terms of important subgroups. For example, Link *et al* noted that children and adolescents were represented in only 3.7% of stigma studies.[36] More specific and tailored measures might facilitate inclusion of specific subpopulations in stigma research, such as those already affected by discrimination on the grounds of (for example) ethnicity. Additionally, studies that include measures validated in LMICs are rare, and only a few include any intervention component developed specifically in such countries. Future efforts should therefore address these gaps, because measurement and evaluation are critical to understanding the underlying mechanisms and effectiveness of anti-stigma interventions. A further challenge is to stop the use of unvalidated measures and item level analyses, while retaining enough flexibility to promote conceptual, contextual and theoretical relevance.

Gaps in the evidence base

This review has highlighted clear gaps in the field of anti-stigma interventions and research methods and a need for the harmonisation of outcomes in this field of research. These include the paucity of evidence on discrimination outcomes, or on reducing negative behaviours or increasing positive behaviours towards people with mental illness,[37] and the lack of studies of specific target groups such as employers or family members, despite service users commonly reporting experiencing discrimination from both of these groups.[38] There is an important need to assess whether benefits identified in the short term are maintained in the longer term, and if any booster interventions are needed to achieve sustainability. This review has also shown a relatively narrow focus of work to date: either on the general population (in attitude surveys) or on students within settings accessible to researchers (e.g. universities and colleges).[16] From a global health viewpoint there is a distinct lack of interventional research in LMICs, despite emerging evidence of the scale and severity of the challenges posed by stigma and discrimination, and despite the fact that 85% of the world's population live in such countries.[39,40] Finally, there is a need for more studies using high-quality research designs. Only a third of studies included in this paper used an RCT or other robust study design, and many of these had a high risk of bias.

Future research

Knowledge in this field is generally from small studies of poor methodological quality, using inconsistent outcomes scales, and in particular few strong RCTs or interrupted time series studies have been carried out to test interventions intended to reduce stigma and discrimination. Our summary of previous systematic reviews does tend to support the view that social contact is the more effective type of intervention known to reduce stigma, at least in the short term.[41] We do not yet have even weak consistent evidence to support interventions for target groups identified as priorities by service user groups, such as family members, and only an embryonic evidence base concerning how to address stigma in healthcare staff.[42] Indeed, this degree of evidential neglect could itself be seen as a manifestation of structural discrimination. Given the magnitude of the challenges posed by stigma and discrimination, it is clear that there needs to be a commensurate concerted effort to fund methodologically strong research to provide robust evidence to support policy decisions on investment and interventions. Such a wider policy framework is now emerging.[43] The World Health Organization Mental Health Action Plan, ratified by the World Health Assembly in May 2013, states as its vision:

'A world in which mental health is valued, promoted and protected, mental disorders are prevented and persons affected by these disorders are able to exercise the full range of human rights and to access high quality, culturally-appropriate health and social care in a timely way to promote recovery, in order to attain the highest possible level of health and participate fully in society and at work, free from stigmatization and discrimination.'[44]

Specifically, paragraph 75 of the Action Plan indicates a need to prioritise:

'Mental health promotion and prevention: provide technical support to countries on the selection, formulation and implementation of evidence-based and cost-effective best practices for promoting mental health, preventing mental disorders, reducing stigmatization and discrimination, and promoting human rights across the lifespan.'[44]

This review indicates that an early necessity is to conduct more high-quality research to allow this policy priority to be firmly evidence-based, especially within LMICs.

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Appendix

Eligibility criteria for study inclusion

Participants

Any, except target populations that solely comprised people with dementia, substance misuse, intellectual disabilities or developmental disorders.

Setting

Any.

Intervention

Any intervention with a stated aim of changing mental health-related stigma, or with an implied aim of changing stigma as indicated by the inclusion of at least one of the following stigma-related outcomes: stigma (including internalised stigma), prejudice (attitudes and related outcomes), discrimination, or public mental health awareness/mental health literacy. Interventions relating to functional mental illnesses were included, those solely about dementia, substance misuse, learning disabilities or developmental disorders were excluded.

Comparison

Inactive or baseline comparator.

Outcomes

Outcomes comprising:

- knowledge
- attitudes (prejudice/self-attitudes)
- behaviour (discrimination/stigma-coping)
- follow-up at least 4 weeks after the intervention was completed (research question 1) or any (research question 2).

Study design

Any quantitative design.

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Data supplement to Mehta et al. Evidence for effective interventions to reduce mental health-related stigma and discrimination in the medium and long term: systematic review. Br J Psychiatry doi: 10.1192/bjp.bp.114.151944

Table DS1. Medline Search Strategy

1. Stereotyping/ or Social Stigma/ or Prejudice/ or Attitude/
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4. stereotyp*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
5. Social Perception/
6. Interpersonal Relations/
7. Public Opinion/
8. "Attitude of Health Personnel"/
9. Social Distance/
10. "Rejection (Psychology)"/
11. Human Rights/
12. Civil Rights/
13. Social Justice/
14. public opinion.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
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heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
23. injustice.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
24. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23
25. Mental Health/
26. Mental Disorders/
27. Mentally Ill Persons/
28. Somatoform Disorders/
29. Depression/ or Depression, Postpartum/
30. common mental disorders.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
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32. Depressive Disorder, Major/
33. Psychotic Disorders/ or Affective Disorders, Psychotic/
34. Neurotic Disorders/ or Self-Injurious Behavior/ or Anxiety/
35. Anxiety Disorders/
36. Schizophrenia, Paranoid/ or Schizophrenia/
37. Bipolar Disorder/
38. Mood Disorders/
39. Obsessive-Compulsive Disorder/
40. Personality Disorders/
41. Eating Disorders/
42. Anorexia Nervosa/ or Anorexia/
43. Bulimia Nervosa/ or Bulimia/
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57. randomized controlled trial.pt.

58. controlled clinical trial.pt.

59. evaluation studies.pt.

60. Prospective Studies/

61. Follow-Up Studies/

62. Social Marketing/

63. National Health Programs/

64. Government Programs/

65. Program Development/

66. Mass Media/

67. Learning/ or Multimedia/ or Teaching/

68. Internet/

69. Journalism/

70. Video Games/ or Video-Audio Media/ or Video Recording/

71. Software/

72. Pamphlets/

73. Advertising as Topic/

74. Public Relations/

75. Public Relations/

76. Persuasive Communication/

77. Famous Persons/

78. Health Knowledge, Attitudes, Practice/

79. Awareness/

80. Consumer Advocacy/ or Patient Advocacy/

81. Health Promotion/

82. evaluat*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

83. intervention*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

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85. Randomized Controlled Trials as Topic/

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113. (stigma* adj5 reduc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
114. (discrim* adj5 reduc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]
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word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

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118. (discrim* adj5 combat*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

119. (stigma* adj5 counter*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

120. (discrim* adj5 counter*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

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123. mental health literacy.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier]

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125. 24 and 56 and 124

126. 124 and "Humans".sa_suba.

127. 125 and 1980:2013.(sa_year).

128. 126 and 1990:2013.(sa_year).

129. 127 and 2000:2013.(sa_year).

Table DST. References for included studies

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Table DS3. Medium/long-term effectiveness of interventions to reduce stigma: study characteristics, statistical significance and direction of findings (RCTs,and con

Study	Intervention Scale	Country	HIC or LAMIC[a]	Design[b]	Participant type	Intervention Group (n)	Control Group (n)	Intervention Description	Disorder focused on	Control description
Targeted at the Armed Forces										
Seal 2012	Target population	USA	HIC	RCT	Middle east war veterans screened positive for mental health problems	34	39	Four unscripted 20-30 min telephone sessions of motivational interviewing.	Mental illness	Consisted in providing participants with mental health assessment results and advising about the logistics of treatment referrals, e.g. clinic hours, parking, transportation etc.
Castro 2012	Target population	USA	HIC	RCT	US soldiers	804	841	Mental health training program developed for military personnel across the deployment cycle.	Stress and PTSD	No intervention
Gould 2007	Target population	UK	HIC	Controlled$_1$	Active service members of the UK Armed Forces	62	62	Training programme which seeks to modify attitudes about PTSD, provide support and education, and identify and refer at risk personnel.	PTSD	No intervention
Targeted at School Students										
Campbell 2011	Target population	England	HIC	RCT	Students (14-15 years)	43	49	Mental health workshop including an interactive educational presentation and a personal testimony of psychotic experiences by a service user researcher.	Mental illness	No intervention
Pinto-Foltz 2011	Target population	USA	HIC	RCT	Female students (13-17 years)	95	61	Narrative story-telling, discussion and a video presentation administered by two trained service users who were in sustained recovery from mental illness.	Mental illness	No intervention
Conrad 2009	Target population	Germany	HIC	Controlled$_1$	Students (13-18 years)	120	90	Introduction to mental health, discussion about students' perceptions of life and a discussion with other young people with lived experience mental illness.	Mental illness	No intervention
Economou 2012	Target population	Greece	HIC	Controlled$_2$	Students (13-15 years)	308	308	A two hour session including a discussion of 'myths' regarding schizophrenia, patient narratives with described experiences of stigma and a role-play session.	Schizophrenia	A talk about nutrition and healthy living
Esters 1998	Target population	USA	HIC	Controlled$_1$	Students enrolled in health classes (13 to 17 years)	20	20	Three day programme including a video and information about sources of help for mental health problems and the reality of associated stigma.	Mental illness	Regularly scheduled classes unrelated to mental health
Naylor 2009	Target population	England	HIC	Controlled$_1$	Students (14-15 years)	174	242	Six lessons on mental health issues delivered over a six week period.	Mental illness	Different school in which intervention did not occur (inactive)
Ng 2002	Target population	China (Hong Kong)	HIC	Controlled$_1$	Students (mean age: 14-15 years)	79	90	School based mental health club including a weekly 1h mental health education program, a mental health promotion day, talks and exhibitions, and direct contact with people with mental heath problems.	Mental illness	No intervention
O'Kearney 2006	Target population	Australia	HIC	Controlled$_1$	Male Students (15-16 years)	35	24	An interactive Internet programme aiming to help people identify, overcome and cope with depression. Skills and knowledge based with information, demonstrations, questionnaires and practice exercises.	Depression	Usual personal development programme scheduled by the school consisting in private study, ad hoc discussion and physical activities with no specific discussion of depression.
O'Kearney 2009	Target population	Australia	HIC	Controlled$_1$	Female Students (15-16 years)	67	90	An interactive Internet programme aiming to help people identify, overcome and cope with depression. Skills and knowledge based with information, demonstrations, questionnaires and practice exercises.	Depression	School's normal personal development activities about nutrition.

Schulze 2003	Target population	Germany	HIC	Controlled[1]	Students (14-18 years)	90	60	A week dedicated to an anti-stigma initiative including discussions of wellbeing, mental illness, responses to low mood and causes of illness, a personal testimony from a young person with schizophrenia and further discussions about schizophrenia and stigma.	Schizophrenia	1 week of a different unrelated project
Ventieri 2011	Target population	Australia	HIC	Controlled[1]	Students (9-12 years)	69	126	Educational intervention including a general introduction to mental illness, causes and treatments of mental illness and stigma.	Mental illness	Normal classes covering material unrelated to mental illness
Yamaguchi 2007Ω	Target population	Japan	HIC	Controlled[1]	Students (16-18 years)	99	81	50-min mental health lecture and 50-min patient's talk at class homeroom	Mental illness	No intervention
Buizza 2007 (Brescia)	Target population	Italy	HIC	Uncontrolled	Students (16-19 years)	327	n/a	A 2 hour session including a stigma video, an educational talk about mental health illnesses and stigma, a live testimony by a mental health service user (or family member) and a final discussion.	Mental illness	n/a
Buizza 2007 (Cremona)	Target population	Italy	HIC	Uncontrolled	Students (16-19 years)	380	n/a	A 2 hour session including a stigma video, an educational talk about mental health illnesses and stigma, a live testimony by a mental health service user (or family member) and a final discussion.	Mental illness	n/a
Essler 2006	Target population	England	HIC	Uncontrolled	Students (13-14 years)	104	n/a	Intervention delivered by a theatre company aimed at increasing knowledge about mental health issues, promoting positive attitudes towards people with mental health problems, and increasing awareness of the pupils' own attitudes.	Mental illness	n/a
Pejovic-Milovancevic 2009	Target population	Serbia	LAMIC	Uncontrolled	Students (15 years)	63	n/a	6 week anti-stigma programme including educational sessions covering mental health problems, discrimination, common myths and a weekly interactive workshop where targeted activities were carried out.	Mental illness	n/a
Pinfold 2003	Target population	UK	HIC	Uncontrolled	Students (14-15 years)	472	n/a	Two hour educational intervention including mental health awareness workshops, a video about people living with schizophrenia and discussions about labels and stereotypes or a session co-facilitated by a person who had experiences of living with mental health problems.	Mental illness	n/a
Targeted at University Students										
Gonzales 2002	Target population	USA	HIC	RCT	Psychology University Students	167 for both interventions and controls	167 for both interventions and controls	Educational intervention in which participants read information about mental illness and stigma.	Mental illness	No intervention
Kerby 2008	Target population	UK	HIC	RCT	Medical Students	23	23	2 films produced by mental health service users combining both education and stereotype disconfirmation elements.	Mental illness	25 minute documentary unrelated to mental illness or psychiatry, matched for visual format.
Sharp 2006	Target population	USA	HIC	RCT	University Students	62	61	A 40 minute lecture including information about psychological disorders, the therapeutic process, common misconceptions about psychotherapy and information about local mental health services.	Mental illness	The control group met for 40 minutes and watched an astronomy science video.
Domino 1983	Target population	USA	HIC	Controlled[1]	University Students	37	19	Watching the film 'One Flew Over The Cuckoo's Nest" in a public cinema.	Mental illness	Not having watched the film

Faigin 2008	Target population	USA	HIC	Controlled$_1$	Psychology University Students	81	123	A play conducted by actors with history of severe mental illness addressing issues such as group-home living, hospitalization, and the impact of social stigmatization. Included a question and answer session.	Mental illness	No intervention
Faigin 2008 (2nd arm)	Target population	USA	HIC	Controlled$_1$	Psychology University Students	99	123	Video group - viewed a recorded version of the play described above.	Mental illness	No intervention
Friedrich 2013	Target population	UK	HIC	Controlled$_1$	Medical Students	1066	386	Short lecture with key facts about stigma and discrimination, testimonies about the experiences of mental health problems and stigma from people with direct experience and role-plays in small groups.	Mental illness	No intervention
O'Reilly 2011	Target population	Australia	HIC	Controlled$_1$	Pharmacy Students	60	212	Mental Health First Aid training course consisting in mental health lectures, supervised weekly placements in the community pharmacy and a tutorial on a mental health topic.	Mental illness	Group who did not attend the course (because they did not wish to and because there was not enough space available on the course)
Altindag 2006	Target population	Turkey	LAMIC	Controlled$_2$	Medical Students	25	35	1 day program with an educational lecture about stigma and schizophrenia, direct contact with a young person with schizophrenia and indirect contact, viewing of the film 'A Beautiful Mind'.	Schizophrenia	1 day program with a 2-h lecture about water metabolism and a viewing of a documentary on the migratory patterns of birds.
Masuda 2009	Target population	USA	HIC	Uncontrolled	Psychology University Students	27	n/a	Acceptance and Commitment Therapy delivered in a 150-minute workshop format. The major goal of the intervention was to humanise the stigmatised individuals.	Mental illness	n/a
O'Reilly 2010	Target population	Australia	HIC	Uncontrolled	Pharmacy Students	258	n/a	Mental health lectures, placements in community pharmacy settings, and a tutorial with trained mental health consumer educators. Students asked the educators about their experience of medication history and counselling.	Mental illness	n/a
Rong 2011	Target population	China	LAMIC	Uncontrolled	Medical Students	103	n/a	The intervention consisted in a 1.5 hour lecture which covered all the basic medical aspects about depression required by the teaching guidelines	Depression	n/a
Rong 2011 (2nd arm)	Target population	China	LAMIC	Uncontrolled	Medical Students	102	n/a	The intervention consisted in a 1.5 hour lecture about depression and 2 weeks of additional activities carried out by students about the experience of mental illness.	Depression	n/a
Targeted at Healthcare Professionals										
Irvine 2012	Target population	USA	HIC	RCT	Licensed care staff in long-term care facilities	84	88	Two Internet courses with video-based behavioural skills and knowledge training.	88	No intervention
Patterson 2007	Target population	UK	HIC	Controlled$_2$	Healthcare professionals	69	22	Educational intervention over 12 days which aimed to improve knowledge of causes of self-harm and reflect on feelings and responses to self-harming behaviour.	Self-harm and suicide	Course unconnected to self harm, on research method
Treloar 2009	Target population	Australia and New Zealand	HIC	Controlled$_2$	Health practitioners with experience of patients with BPD	49	41	Educational programme which covered research and attitudes about borderline personality disorder and discussions of BPD using case studies.	Borderline personality disorder	No intervention
Treloar 2009	Target population	Australia and New	HIC	Controlled	Health practitioners with experience of patients	50	41	A cognitive-behavioural education programme using case studies and a discussion of of clinical guidelines for	Borderline personality disorder	No intervention

(2nd arm)	Target population	Zealand	HIC	Controlled[2]	experience of patients with BPD	50	41	case studies and a discussion of of clinical guidelines for self-harm.	Borderline personality disorder	No intervention
Armstrong 2011	Target population	India	LAMIC	Uncontrolled	Community health workers	70	n/a	Mental health training program aiming to increase recognition of mental disorders, enhance appropriate response and referral, support people with mental disorders and their families, and improve mental health promotion in communities.	Mental illness	n/a
Graham 2010	Target population	Australia	HIC	Uncontrolled	Workers from diverse sectors of the mental health workforce	1126	n/a	Mental health aptitudes into practice training package including an introduction to mental health and mental illness, depression and anxiety.	Mental illness	n/a
Krawitz 2004	Target population	Australia	HIC	Uncontrolled	Staff working with BPD patients from public mental health and substance abuse services	418	n/a	2 day educational workshop about BPD including educational media, interactional learning and structured discussion.	Borderline personality disorder	n/a
Ücock 2006	Target population	Turkey	LAMIC	Uncontrolled	General Practitioners	106	n/a	Training session including information about the course of schizophrenia, treatment, the impact of stigma and a description of GP roles followed by an discussion session.	Schizophrenia	n/a
Targeted at the General Public										
Jorm 2010	Large Scale	Australia	HIC	RCT*	General population	90	84	Mental Health First Aid e-learning CD which teaches members of the public to recognize the early signs of mental illness and to provide initial help to a person developing a mental disorder or in a mental health crisis situation delivered with the aid of video clips and interactive case studies.	Mental illness	Waiting list control
Jorm 2010 (2nd arm)	Large Scale	Australia	HIC	RCT*	General population	88	84	Mental Health First Aid manual, containing the same elements as above but in written format only.	Mental illness	Waiting list control
Jorm 2004	Large Scale	Australia	HIC	RCT*	Residents in regional catchment areas	416	337	9 hour Mental Health First Aid course which teaches how to help people in the crisis situations of being suicidal, having a panic attack, being exposed to a traumatic event, or in an acute psychotic state.	Mental illness	Waiting list control
Luty 2008	Large Scale	UK	HIC	RCT	General population	148	155	Vignettes containing a photograph of a professional-looking male model with an 'upbeat' description of a hypothetical patient in remission.	Schizophrenia	Case description of a patient
Kelly 2011	Small Scale	Australia	HIC	Uncontrolled	General public	246	n/a	Youth Mental Health First Aid course which teaches adults how to support adolescents who might be developing a mental health problem/in a mental health crisis and to assist them to receive professional help.	Mental illness in adolescnets	n/a
Kitchener 2002	Small Scale	Australia	HIC	Uncontrolled	General public	190	n/a	Mental Health First Aid training (9 hours) which covers how to help people in mental health crises and/or in the early stages of mental health problems and educational information about mental illnesses.	Mental illness	n/a
Shandley 2010	Target population	Australia	HIC	Uncontrolled	General population, females aged 18-25 years	266	n/a	A web-based interactive educational game designed to support the mental health of young people and assisting them in identifying and developing coping skills dealing with precursors to mental health problems.	Mental illness	n/a
Shandley 2010 (2nd arm)	Target population	Australia	HIC	Uncontrolled	General population, males aged 18-25 years	266	n/a	A web-based interactive educational game designed to support the mental health of young people and assisting them in identifying and developing coping skills dealing with precursors to mental health problems.	Mental illness	n/a
Sogaard 1992	Large Scale	Norway	HIC	Uncontrolled	General population	T1 survey: 1191	T2 survey: 574	A 6h TV show consisting in information on mental health problems and prevention interspersed with	Mental illness	n/a

								entertainment and reporting fundraising results.		
Targeted at people with mental health problems										
Fung 2011	Target population	China (Hong Kong)	HIC	RCT*	People with schizophrenia receiving psychiatric services in the community	34	32	Self-stigma reduction programme containing 16 sessions covering psychoeducation, self-esteem, readiness for change, social skills and a goal attainment.	Schizophrenia	Newspaper reading group
Aho-Mustonen 2011	Target population	Finland	HIC	RCT	Long-stay forensic patients of a maximum security forensic psychiatric hospital	19	20	A group psychoeducation programme consisting of eight group sessions which were conducted once a week.	Schizophrenia	Treatment as usual
Gumley 2006	Target population	Wales and Ireland	HIC	RCT	People diagnosed with schizophrenia (or related disorder) prone to relapse	72	72	CBT consisting a five-session engagement phase delivered and an intensive targeted phase.	Schizophrenia	Treatment as usual (ongoing medication, regular psychiatric review and regular follow-up from key worker
Link 2002	Target population	USA	HIC	RCT	People with a serious mental illness	88 including controls	88 including controls	16 sessions consisting in specific approaches to developing an awareness of stigma, internalisation of stigma and its consequences, identification of stigma in social interactions and choosing ways to cope with it.	Mental illness	Waiting list control
Yanos 2012	Target population	USA	HIC	RCT	People with a serious mental illness who met criteria for elevated internalized stigma	15	18	Narrative enhancement/cognitive therapy including psychoeducation, cognitive restructuring and narrative enhancement which addresses themes of hope which contrast with stigmatising views.	Mental illness	Treatment as usual (did not include any services which focused on internalised stigma)
Knight 2006	Target population	England	HIC	Waiting list control	People with schizophrenia spectrum disorders	21	n/a	Two CBT interventions conducted over 7 weekly sessions focused on educating and emphasizing the similarity of experience of group members, self-esteem, and highlighting maladaptive coping strategies. Included psychoeducation about stigma and mental illness.	Schizophrenia	6 week waiting control in which participants were assessed prior to the intervention.
Schneider 2011	Small Scale	England	HIC	Uncontrolled	Service users of an English mental health trust	243	n/a	Anti-stigma campaign in an NHS trust for one month which aimed to improve public attitudes, remove barriers to service users' working, promote recovery and social inclusion and reduce the incidence of service users' experiences of discrimination and self-stigma.	Mental illness	n/a
Other										
Gulliver 2012	Target population	Australia	HIC	RCT*	Elite Athletes	30	29	Mental Health literacy and destigmatization intervention including online educational material about common mental health disorders, stigma and help-seeking sources.	Mental illness	No intervention
Gulliver 2012 (2nd arm)	Target population	Australia	HIC	RCT*	Elite Athletes	30	29	Comprised interactive quizzes providing tailored feedback to the participant about his or her level of depression and anxiety allowing the participant to assess their need to seek help.	Mental illness	No intervention
Gulliver 2012 (3rd arm)	Target population	Australia	HIC	RCT*	Elite Athletes	31	29	Help-seeking intervention including an online list of help seeking sources and a congratulatory page.	Mental illness	No intervention

Kitchener 2004	Target population	Australia	HIC	RCT*	Government Employees	146	155	9 hour Mental Health First Aid course which teaches how to help people in mental health crises and/or in the early stages of mental health problem. Includes mental health education about depressive, anxiety and psychotic disorders.	Mental illness	Waiting list control
Jorm 2010	Target population	Australia	HIC	RCT	School teachers of pupils aged 12-15 years	221	106	Youth Mental Health First Aid course completed over 2 days including departmental policy on mental health issues, common mental disorders in adolescents and how to apply the mental health action plan to help a students with such problem.	Mental illness	Waiting list control
Anderson 2012	Target population	USA and Canada	HIC	Uncontrolled	Certified genetic counsellors and genetic counselling students	87	n/a	A 45 minute documentary film “Cracking Up” that follows a group of individuals with mental illness as they participate in a programme that teaches individuals with mental illness how to perform stand-up comedy.	Mental illness	n/a
Pierce 2010	Target population	Australia	HIC	Uncontrolled	Football Coaches	36	n/a	Mental health first training covering depressive, anxiety and psychotic disorders, with education of overlapping substance abuse for 12 hours aver 3 weeks.	Mental illness	n/a
Pinfold 2003	Target population	England	HIC	Uncontrolled	Police Officers	163	n/a	An educational intervention delivered by service users, carers and people working in the field of mental health. Included a hearing voices simulation exercise, personal testimonies of psychotic experiences and recovery, and ‘How can the police support people with mental health problems?’.	Mental illness	n/a

a High income country (HIC) or low to middle income country (LAMIC). Based on World Bank classifications as of July 1, 2012

b In studies which mesaured outcomes at more than 2 time points, only the first and last assessments were included in the table. In RCTs, only time*intervention interactions were reported. Where this was carried across multiple time points, only the final time point results were reported. When studies included between and within-group an

c + indicates p< 0.05 in a direction of benefit (reduction in stigma); 0 indicates p>0.05; - indicates p<0.05 in direction of harm (increase in stigma). Each symbol represents one outcome (scales, or item)

Time to follow-up		Evidence of effectiveness[c] Knowledge	Attitudes	Behaviour	Outcome Measures
8 weeks	Scale		0		Perceived barriers to seeking mental health services; Stigma and Beliefs Subscales (Hoge et al., 2004) Intention to engage in treatment (developed by authors) Actual engagement in treatment (self-report/evidence of a clinical note in the VA electronic medical record)
	Item				
6 months	Scale		0		5-item version of the Stigma Scale (Hoge et al., 2004)
	Item				
1 month	Scale		0+++		Attitudes to Stress and PTSD Schedule (developed and used by the Royal Navy).
	Item				Stigma of Help-seeking from TRiM practitioners or normal military support networks - 6 items taken from Hoge et al.'s (2004) 18 item Help Seeking questionnaire
2.5 months	Scale		0		Corrigan's Attribution Questionnaire (Corrigan et al., 2003); 3 subscales used (fear, anger and coercion/segregation) .
	Item				
8 weeks	Scale	+	0		'In our own Voice' Knowledge Measure (Wood & Wahl., 2006) Revised Attribution Questionnaire (Watson et al., 2004)
	Item				
3 months	Scale		0		Questionnaire on Social Distance (Schulze et al., 2003) Help-Seeking Questionnaire (Wilson et al., 2005; Australian Government Department of Health and Ageing, 2007)
	Item				
12 months	Scale		0		Alberta Pilot Site Questionnaire Toolkit (Thompson et al., 2002)
	Item	000+++++++			
12 weeks	Scale		+		Opinion about Mental Illness Questionnaire (Struening & Cohen., 1963) - 3 subscales used Pro-Con Attitude Scale (Fisher & Turner., 1970)
	Item				
6 months	Scale	000++++			Mental Health Questionnaire (6 scales) - developed by the authors and adapted from Attitudes to Mental Health and Knowledge of Mental Health Issues Questionnaire by the Royal College of Psychiatrists
	Item				
7 months	Scale		-000+++		Opinion about Mental Illness in the Chinese Community Scale (Chu, 1996) - 6 factors
	Item				
16 weeks	Scale		0		Personal Attitudes Subscale of the Depression Stigma Scale (Griffiths et al., 2004).
	Item				
20 weeks	Scale	0	0		Depression Literacy Scale (Christensen et al., 2004) Attitudes to Depression (Griffiths et al., 2004)
	Item				

1 month	Scale		++		Stereotypes of Schizophrenia (Schulze et al., 2003) Social distance (Schulze et al., 2003)							
	Item											
4 months	Scale	+	+++		Knowledge measure (Ventieri et al., 2011) Attitude measure; Benevolence subscale and Unkindliness subscale (Ventieri et al., 2011) Social distance (Schulze et al, 2003)							
	Item											
3 months	Scale				England National Survey 2002 (Pinfold et al, 2003) Social Distance (Mino et al., 2000) Attitudes towards Mental Illness (Mino et al., 2001)							
	Item	0000+++++	0000000000+++++++									
3 months	Scale		+		Myths & Facts about Schizophrenia School Evaluation (World Psychiatric Association., 1996) - translated into Italian, Schizophrenia							
	Item	-000++	0000+									
3 months	Scale		+		Myths & Facts about Schizophrenia School Evaluation (World Psychiatric Association., 1996) - translated into Italian, Schizophrenia							
	Item	00000+	00000									
1 month	Scale	+			Quiz taken from the Mindout for Mental Health activity pack for young people (Department of Health, 2001)							
	Item											
6 months	Scale		0++		Opinion about Mental Illness Questionnaire (Struening & Cohen, 1963)							
	Item											
6 months	Scale		+		Mental health knowledge, Attitudes towards people with Mental Health Disorders and Social Distance Scales (Pinfold et al., 2003b). All questionnaires based on an instrument piloted in the World Psychiatric Association's anti-stigma school project in Canada, 2000).							
	Item	0+++										
4 weeks	Scale		0		Nunnally Conception of Mental Illness Questionnaire (Nunnaly., 1961) Attitudes Towards Seeking Professional Psychological Help Scale-Short Form (Fisher & Farina., 1995)							
	Item											
8 weeks	Scale		0000		Attitudes to Psychiatry Scale (Burra et al., 1982) Attitudes Toward Serious Mental Illness Scale - Adolescent Version (Watson et al., 2005) Dangerousness Scale (Link & Cullen., 1986) Social Distance Scale (Penn et al., 1994)							
	Item											
1 month	Scale		00		Opinion about Mental Illness Questionnaire (Struening & Cohen, 1963) - 3 subscales used Attitudes Towards Seeking Professional Psychological Help Scale - Short Form (Fischer & Farina, 1995) Actual Help-seeking Behaviour (Sharp et al., 2006)							
	Item											
8 months	Scale		----0		Attitudes about Mental Illness (Domino., 1983)							
	Item											

1 month	Scale		0++++		Community Attitudes toward the Mentally Ill questionnaire (Taylor & Dear, 1981) Behavioural Intentions Scale for Students (Faigin et al., 2008)							
	Item											
	Scale		0++++		Community Attitudes toward the Mentally Ill questionnaire (Taylor & Dear, 1981) Behavioural Intentions Scale for Students (Faigin et al., 2008)							
	Item											
6 months	Scale	0	0		Mental Health Knowledge Schedule (Evans-Lacko et al., 2010) Community Attitudes toward the Mentally Ill questionnaire (Taylor & Dear, 1981) Intended Behaviour Scale (Evans-Lacko et al, 2011)							
	Item		0+									
6 weeks	Scale	0+	++		National Survey of Mental Health Literacy (Jorm et al, 1997). Social Distance Scale (Corrigan, 2001)							
	Item	0+										
1 month	Scale				Social Distance Scale (Psychiatric Research and Education Center)							
	Item		000000+									
1 month	Scale		+		The Community Attitudes toward the Mentally Ill Scale (Taylor & Dear, 1981) - the term 'mental illness' was changed to 'psychological disorder'							
	Item											
12 months	Scale				Pharmacist Attitudes Towards Mental Illness and Stigmatization of Consumers (Bell et al, 2006)							
	Item		0000+++++++++++++									
6 months	Scale		0		International Depression Literacy Survey (Hickie et al., 2007) Mental Illness: Clinician's Attitude's (Kassam et al, 2010) - term 'mental illness' was changed to 'depression'							
	Item	--00000000+++										
6 months	Scale		+		International Depression Literacy Survey (Hickie et al., 2007) Mental Illness: Clinician's Attitude's (Kassam et al, 2010) - term 'mental illness' was changed to 'depression'							
	Item	-00000000++++										
1 month	Scale	0+	000000++++++		Knowledge scale (Irvine et al., 2012) Video Situational Testing (VST) Knowledge of appropriate reactions to situations (Irvine et al., 2012) Attitude Scale (Irvine et al., 2012) Empathy Scale (Ray & Miller, 1994) Stigma Attribution Questionnaire AQ-27 (Corrigan., 2004, 2008) - 9 subscales Intentions Scale (Irvine et al., 2012)							
	Item											
18 months	Scale		+		Self harm antipathy scale (Patterson et al., 2006)							
	Item											
6 months	Scale		+		Attitudes Towards Deliberate Self-harm Questionnaire (McAllister et al., 2002)							
	Item											
6 months	Scale		0		Attitudes Towards Deliberate Self-harm Questionnaire (McAllister et al., 2002)							

6 months	Item				Attitudes Towards Deliberate Self-Harm Questionnaire (McAllister et al., 2002)							
3 months	Scale				Mental Health Literacy survey, adapted by authors from Jorm et al. (1997)							
	Item	0000000000++++++++	00000000000000+									
6 months	Scale		++		Mental health literacy (Jorm et al., 1997) Self-assessed Mental Health Knowledge and Skills (Graham, 2010). Social Distance (Link et al., 1999) Community Attitudes toward the Mentally Ill questionnaire (Taylor & Dear, 1981) - Community Mental Health Ideology Subscale							
	Item	-0000++++										
6 months	Scale				Clinician Attitudes and Perceptions of Knowledge and Skills (Krawitz, 2004)							
	Item	++	++++									
3 months	Scale				Attitudes of Doctors Towards General Myths about Schizophrenia (Ücock et al., 2006)							
	Item		0000000++++++									
6 months	Scale	000+	0+++		Mental Health Literacy (Jorm et al., 1997) Perceived Stigma Scale (Griffiths., 2008) Personal Stigma Scale (Griffiths et al., 2008) Social Distance (Link et al., 1999).							
	Item	+										
6 months	Scale	000+	000+		Mental Health Literacy (Jorm et al., 1997) Perceived Stigma Scale (Griffiths., 2008) Personal Stigma Scale (Griffiths et al., 2008) Social Distance (Link et al., 1999).							
	Item	+										
4 months	Scale	+	+		Mental Health Literacy (Jorm et al, 1997) Confidence and Intentions providing Mental Health First Aid (Kitchener & Jorm, 2004) Social distance (Link et al, 1999)							
	Item	+		0								
4 weeks	Scale		0		Attitudes to Mental Illness Questionnaire (Luty et al, 2006)							
	Item											
6 months	Scale	00+			Mental Health Literacy (Jorm et al, 1997) Perceived Stigma Scale (Griffiths et al, 2008) Personal Stigma Scale (Griffiths et al, 2008).							
	Item	++	0000000000+++									
6 months	Scale	++	+		Recognition of Mental Illness using vignettes (Kitchener et al., 2002) Beliefs about Treatment for Depression and Schizophrenia (vignettes) (Kitchener et al., 2002) Social Distance Scale (Link et al., 1999) Contact with someone with a mental health problem (Kitchener et al., 2002)							
	Item	0+		0								
2 months	Scale				Mental Health Literacy (Shandley et al., 2010) Stigma (Shandley et al., 2010) Help-seeking (Shandley et al., 2010)							
	Item	0	0									
2 months	Scale				Mental Health Literacy (Shandley et al., 2010) Stigma (Shandley et al., 2010) Help-seeking (Shandley et al., 2010)							
	Item	0	0									
1 month	Scale				Omnibus Survey (Sogaard et al., 1992)							

	Item	0000+	000+++++	0								
6 months	Scale	0	000		The Chinese Self-stigma of Mental Illness Scale (Fung et al, 2007) - Stereotype Agreement, Self-concurrence and Self-esteem Decrement subscales							
	Item											
3 months	Scale	+	0		Knowledge about Schizophrenia Questionnaire (Ascher-Svanum and Krause., 1991) The Rosenberg Self-Esteem Scale (Rosenberg., 1965) Perceived Stigma Questionnaire (Link et al., 1989)							
	Item											
12 months	Scale		000+		Personal Beliefs about Illness Scale Birchwood et al (1993) - Loss, Shame and Humiliation subscales The Rosenberg Self-Esteem Scale (Rosenberg., 1965)							
	Item											
6 months	Scale		000	0000000	Different and Ashamed Scale (Link et al., 2002) Misunderstood by Others (Link et al., 2002) Rosenberg's Self-Esteem Scale (Rosenberg, 1979) Perceived Devaluation-Discrimination (Link, 1987, 1989) Self-Reported Experiences of Rejection (Link et al, 1997) - modified version. Approaches to Coping with Stigma - Secrecy, Withdrawal and Educating scales (Link et al, 1989) ; Challenging and Distancing scales (Link et al., 2002)							
	Item											
3 months	Scale	0	0		Internalized Stigma of Mental Illness (Ritsher & Phelan, 2004) Rosenberg Self-Esteem Scale (Rosenberg, 1989)							
	Item											
6 weeks	Scale		00	00	Empowerment (Rogers et al, 1997) Index of Self-Esteem (Hudson, 1982) Perceived devaluation and discrimination (Link, 1985) Cybernetic Coping Scale (Edwards & Baglioni, 1993).							
	Item											
1 month	Scale				Service Users' Perceptions of Public Attitudes towards Mental Illness, Relationships with Staff and Inter-personal Relationships (Schneider et al., 2011)							
	Item			0000000000 0000000000 0000++								
3 months	Scale	++	0+		Depression Literacy Questionnaire (Griffiths et al, 2004) Anxiety Literacy Questionnaire (developed by Griffiths., 2012) Depression Stigma Scale (Griffiths et al., 2004) Generalised Anxiety Stigma Scale (Griffiths et a., 2011)							
	Item				Attitudes Towards Seeking Professional Psychological Help Scale - Short Form (ATSPPH-SF) (Fischer & Farina, 1995) Intentions Scale of the General Help-seeking Questionnaire (GHSQ) (Deane et al, 2001) Actual Help-seeking Questionnaire (AHSQ) (Wilson et al, 2002)							
3 months	Scale	00	00		Depression Literacy Questionnaire (Griffiths et al, 2004) Anxiety Literacy Questionnaire (developed by Griffiths., 2012) Depression Stigma Scale (Griffiths et al., 2004) Generalised Anxiety Stigma Scale (Griffiths et a., 2011)							
	Item				Attitudes Towards Seeking Professional Psychological Help Scale - Short Form (ATSPPH-SF) (Fischer & Farina, 1995) Intentions Scale of the General Help-seeking Questionnaire (GHSQ) (Deane et al, 2001) Actual Help-seeking Questionnaire (AHSQ) (Wilson et al, 2002)							
3 months	Scale	00	0+		Depression Literacy Questionnaire (Griffiths et al, 2004) Anxiety Literacy Questionnaire (developed by Griffiths., 2012) Depression Stigma Scale (Griffiths et al., 2004) Generalised Anxiety Stigma Scale (Griffiths et a., 2011)							

	Item				Attitudes Towards Seeking Professional Psychological Help Scale - Short Form (ATSPPH-SF) (Fischer & Farina, 1995) Intentions Scale of the General Help-seeking Questionnaire (GHSQ) (Deane et al, 2001) Actual Help-seeking Questionnaire (AHSQ) (Wilson et al, 2002)							
5 months	Scale	00	+		Recognition of Mental Illness using vignettes (Kitchener et al., 2002) Beliefs about Treatment for Depression and Schizophrenia (vignettes) (Kitchener et al., 2002) Social Distance Scale (Link et al., 1999) Contact with someone with a mental health problem (Kitchener et al., 2002)							
	Item	00		0								
6 months	Scale	++			Mental Health Literacy (Jorm et al, 1997) Perceived Stigma Scale (Griffiths, 2008) Personal Stigma Scale (Griffiths et al, 2008) School Policies on Student Mental Health (developed by authors)							
	Item	0000000+	000000+	0++++								
1 month	Scale	0	0		Stereotype Endorsement scale (Nordt et al., 2006) Social Distance Scale (Penn et al., 1994)							
	Item											
6 months	Scale				Recognition of Depression and Schizophrenia (vignettes) (Kitchener & Jorm, 2004) Responses to Depression (Kitchener & Jorm, 2004) Depression Management (Kitchener & Jorm, 2004)							
	Item	00000000000000 00+++++										
4 weeks	Scale	0	0+++		Knowledge of mental illness (Pinfold et al., 2003a) Officers endorsements of 5 key workshop messages (Pinfold et al., 2003a)							
	Item	+++++			Community Attitudes towards Mental Illness (Taylor and Dear, 1981) and WPA Alberta Pilot site questionnaire tool kit (WPA, 2000) used to create an Attitude measure (3 scales) and a Social Distance measure (4 items)							

nalyses, only the between group data was extracted. In studies with a control group where data was analysed within-group, results were only reported as a benefit or harm when no changes were detected in the control group. In pre-post studies with a control group, we only reported findings at time points where control data was presey

When a study included unadjusted and adjusted logistic regressions, multiple regressions or ANCOVAs, we extracted the adjusted findings only.

Table DS4. Medium/long-term effectiveness of interventions to reduce stigma: statisitical significance and direction of findings (longitudinal, panel, prospective and cohort studies)

Study	Country	High or low/middle income country[a]	Design[b]	Participant type	Intervention Participants (n)	Control Participants (n)	Intervention Description	Condition that was focused on	Control description	Time to final follow-up	
Corker 2013	England	HIC	Longitudinal panel study	Mental health service users	T1:537 T2: 979 T3: 1016	n/a	Time To Change programme which aims to reduce stigma and discrimination against people with mental health problems.	Mental Illness	n/a	3 years	*Scale* *Item*
Evans-Lacko 2013a	England	HIC	Longitudinal panel study	General population	T1: 1751 T2: 1745 T3: 1717	n/a	Time To Change programme which aims to reduce stigma and discrimination against people with mental health problems.	Mental Illness	n/a	3 years	*Scale* *Item*
Evans-Lacko 2013b	England	HIC	Longitudinal panel study	General population	T1: 1110 T2: 868	n/a	Social marketing campaign of the Time To Change programme which aims to reduce stigma and discrimination against people with mental health problems.	Mental Illness	n/a	2.5 years	*Scale* *Item*
Henderson 2012	England	HIC	Longitudinal panel study	Users of specialist mental health services	T1: 537 T2: 1047	n/a	Time To Change programme which aims to reduce stigma and discrimination against people with mental health problems.	Mental Illness	n/a	1 year	*Scale* *Item*
Henderson 2013	England	HIC	Longitudinal panel study	Senior British employers	T1: 480 T2: 500 T3: 500	n/a	Time To Change programme which aims to reduce stigma and discrimination against people with mental health problems.	Mental Illness	n/a	4 years	*Scale* *Item*
Crisp 2005	UK	HIC	Longitudinal panel study	General population	T1: no info T2: 1725	n/a	Changing Minds campaign which aimed challenge discrimination and educate the public about mental disorders.	Mental Illness	n/a	5 years	*Scale* *Item*
Mehta 2009[d]	UK	HIC	Longitudinal cohort study with control group	General population	T1: 1000 T2: 1000	T1: 1000 T2: 1000	See Me anti-stigma campaign which aimed to deliver specific messages to members of the public using a range of media.	Mental Illness	Negative coverage of mental health legislation issues in England	3 years	*Scale* *Item*
Paykel 1998	UK	HIC	Longitudinal panel study	General population	T1: 2009 T2: 2050 T3: 1946	n/a	Defeat Depression campaign aimed to reduce stigma associated with depression in order to encourage earlier treatment-seeking using a range of media.	Depression	n/a	6 years	*Scale* *Item*

Dietrich 2010	Germany	HIC	Longitudinal panel study with control group	General population	T1: 713 T2: 740 T3:709	T1: 710 T2: 750 T3:707	Nuremberg Alliance Against Depression campaign about depression using print materials and local media to counteract negative media reporting.	Depression	Samples from another city in Germany, Wurzburg, where the intervention did not occur	2 years	*Scale* *Item*
Gaebel 2008	Germany	HIC	Longitudinal cohort study with control group	General population	T1: 2443 T2: 1493	T1: 2391 T2: 1571	Global Program against Stigma and Discrimination Because of Schizophrenia campaign which promoted contact to people with mental illness and education of target groups.	Schizophrenia	No antistigma or awareness programmes conducted in Berlin and Essen.	3 years	*Scale* *Item*
Gaebel 2008 (2nd arm)	Germany	HIC	Longitudinal cohort study with control group	General population	T1: 2391 T2: 1558	T1: 2391 T2: 1571	Awareness programme set up to address specific target groups who are frequently in contact with young people at risk of developing schizophrenia.	Schizophrenia	No antistigma or awareness programmes conducted in Berlin and Essen.	3 years	*Scale* *Item*
Grausgruber 2009	Austria	HIC	Longitudinal panel study	General population	T1: 1042 T2: 988	n/a	Anti-stigma campaign with events including: educational interventions in schools, social advertising and conferences where people with mental health problems and family members were able to discuss their experiences.	Mental Illness, focus on Schizophrenia	n/a	9 years	*Scale* *Item*
Jorm 2005	Australia	HIC	Longitudinal panel study with control group	General population	T1: 687 T2: 522	T1: 323 T2: 388	Beyondblue campaign which aimed to improve knowledge and responses to depression. Its priority areas include community awareness and destigmatisation.	Depression	Surveys carried out in low-exposure states (those that did not provide funding for the campaign)	8 years	*Scale* *Item*
Jorm 2006	Australia	HIC	Longitudinal panel study with control group	General population	T1: 687 T2: 522	T1: 323 T2: 388	Beyondblue campaign which aimed to improve knowledge and responses to depression. Its priority areas include community awareness and destigmatisation.	Depression	Surveys carried out in low-exposure states (those that did not provide funding for the campaign)	8 years	*Scale* *Item*
Reavley 2012	Australia	HIC	Longitudinal panel study	General population	T1: 3998 T2: 5860	n/a	Australian national campaigns to improve mental health literacy and reduce stigma: beyondblue and SANE Australia.	Mental Illness	n/a	8 years	*Scale* *Item*
Wright 2006	Australia	HIC	Longitudinal panel study	Young people aged 12-25 years	T1: 538 T2: 520	T1: 538 T2: 520	Mental health literacy community awareness campaign targeting young people using multimedia, a website and an information telephone service.	Mental Illness	Regions in which intervention was not implemented	14 months	*Scale* *Item*

a High income country (HIC) or low to middle income country (LAMIC). Based on World Bank classifications as of July 1, 2012

b Study designs included: longitudinal panel studies with a control group, longitudinal panel studies without a control group and longitudinal cohort studies with a control group.

c + indicates p< 0.05 in a direction of benefit (reduction in stigma); 0 indicates p>0.05; - indcates p<0.05 in direction of harm (increase in stigma). Each symbol represents one outcome (scales, or item). Comparisons were made between baseline and final follow-up assessments.

d This study found evidence of harm in 4/25 items in the intervention group and 17/25 items in the control group; results are presented as a reduction of harm (benefit) in 13/25 items

Evidence of effectiveness[c]			
Knowledge	**Attitudes**	**Behaviour**	**Outcome measures**
		00+	The Discrimination and Stigma Scale (Brohan et al., 2012)
0	+	0	Mental Health Knowledge Schedule (Evans-Lacko et al., 2010) Attitudes to Mental Illness questionnaire (Department of Health., 1993) Intended Behaviour Scale (Evans-Lacko et al, 2011) Reported Behaviour Scale (Evans-Lacko et al, 2011)
0	0		Mental Health Knowledge Schedule (Evans-Lacko et al., 2010) Attitudes to Mental Illness questionnaire (Department of Health., 1993) Intended Behaviour Scale (Evans-Lacko et al, 2011) Reported Behaviour Scale (Evans-Lacko et al, 2011)
	000+		
		+	The Discrimination and Stigma Scale (Brohan et al, 2012)
		0++	
			Knowledge of Mental Health in the Workplace (Henderson et al., 2013) Attitudes of Employers (Henderson et al., 2013) Mental Health Policies in the Workplace; Preparedness for Workplace Mental Health Problems (Henderson et al., 2013)
000000+++++++	00++++++	00000++++++++++	
			Negative Attitudes to People with Mental Illnesses (Crisp et al., 2005)
	00000000000000000+++++++++++++++++		
			Community Attitudes to the Mentally Ill survey (Taylor & Dear, 1981)
	000000000000+++++++++++++		
			Structured Interview (Paykel et al., 1998)
0000++++++++++++++++++++++	000++++	0+	

			Beliefs about causes, symptoms and treatment of depression (Dietrich et al., 2010) General Attitudes towards depression (Dietrich et al., 2010)
-00000000000+			
	0+		Transient' and 'Closer' factors of the Social Distance Scale (Bogardus, 1925) modified by Stuart and Arboleda-Florez (2001)
	00		Transient' and 'Closer' factors of the Social Distance Scale (Bogardus, 1925) modified by Stuart and Arboleda-Florez (2001)
	0		Attitudes to Schizophrenia (Grausgruber et al., 2009) Attitudes to Schizophrenia (Grausgruber et al., 2009) -using vignettes
-+	---		Social Distance scale; from Angemeyer (1997) and Link (1999) (adapted by the authors)
			Mental Health Literacy (Jorm et al., 1997)
000000000000000000000000++++++			
			Mental Health Literacy (Jorm et al., 1997)
-	000000000+	0	
			Perceived discrimination (Reavley et al., 2012) Perceived Stigma Scale (Griffiths et al., 2004) Personal Stigma Scale (Griffiths et al., 2004) Social Distance (Link et al., 1999).
000000000000000000000000000000++++++	---------000000000000000000000000000000000000		
			Survey questionnaire (Wright et al., 2005)
000000000+++		0	

Table DS5. Effectiveness of interventions to reduce stigma in low- and middle-income countries: study characteristics, statistical significance and direction of findings

Study	Country	Income Group[a]	Design[b]	Participant type	Intervention Partcipants (n)	Control Partcipants (n)	Intervention Description		Evidence of Effectiveness (at post-intervention)[c] Knowledge	Attitudes	Behaviour
Gutierrez-Maldomado 2009	Chile	Upper-middle income	RCT	Key caregivers of patients with Schizophrenia	18	23	Psychoeducational progreamme aiming to change caregivers attitudes to schizophrenia and their general health perceptions.	Scale		+	
								Item			
Hao 2011	China	Upper-middle income	RCT	University students majoring in developmental psychology	34	30	Group mental health training for improving students intentions and attitudes towards seeking psychological help.	Scale		++++	
								Item			
Rahman 1998	Pakistan	Lower-middle income	RCT	School children (12-16 years)	50	50	Mental health programme in schools to improve the understanding of mental-health disorders and increase awareness of available treatment. Schoolchildren share knowledge with friends, family and neighbours.	Scale		+	
								Item			
Rahman 1998 (sample 2)	Pakistan	Lower-middle income	RCT	Parents of school children	50	50	As above	Scale		+	
								Item			
Rahman 1998 (sample 3)	Pakistan	Lower-middle income	RCT	Friends of school children not in school	50	50	As above	Scale		+	
								Item			
Rahman 1998 (sample 4)	Pakistan	Lower-middle income	RCT	Neighbours of school children	50	50	As above	Scale		+	
								Item			
Bayar 2009	Turkey	Upper-middle income	Post-test controlled	Medical professionals in psychiatry	100	105	An instructive e-mail that presented a general account of stigma in mental health.	Scale		+	
								Item			
Altindag 2006	Turkey	Upper-middle income	Controlled	Medical Students	25	35	1 day program with an educational lecture about stigma and schizophrenia, direct contact with a young person with schizophrenia and indirect contact, viewing of the film 'A Beautiful Mind'.	Scale			
								Item		0000+++	
Armstrong 2011	India	Lower-middle income	Uncontrolled	Community health workers	70	n/a	Mental health training program aiming to increase recognition of mental disorders, enhance appropriate response and referral, support people with mental disorders and their families, and improve mental health promotion in communities.	Scale			
								Item	000000000000+++++++++	0	
Chinnayya 1990	India	Lower-middle income	Uncontrolled	Primary health care workers	150	n/a	1 week mental health training programme - lectures, case demonstrations and role play.	Scale			
								Item	00000+++++++	0++	
Garcia Silberman 1993	Mexico	Upper-middle income	Uncontrolled	High school students (16-23 years)	21	n/a	A commercial film depicitng a true story in which a psychiatrist is portrayed in a positive light.	Scale			
								Item		--0000000000000000000000000++++++++++++++++	
Garcia Silberman 1993 (2nd arm)	Mexico	Upper-middle income	Uncontrolled	High school students (16-23 years)	21	n/a	A commercial film depicitng a true story in which a psychiatrist is portrayed in a negative light.	Scale			
								Item		----------000000000000+++++++++	
Ghorbani 2009	Iran	Upper-middle income	Uncontrolled	High school students (15-16 years)	639	n/a	A teen health webiste covering mental health topics in various media formats.	Scale	0		
								Item			
Rong 2011	China	Upper-middle income	Uncontrolled	Medical Students	103	n/a	The intervention consisted in a 1.5 hour lecture which covered all the basic medical aspects about depression required by the teaching guidelines	Scale		0	
								Item		--000000000++	
Rong 2011 (2nd arm)	China	Upper-middle income	Uncontrolled	Medical Students	102	n/a	The intervention consisted in a 1.5 hour lecture about depression and 2 weeks of additional activities carried out by students about the experience of mental illness.	Scale		+	
								Item	000000000++++		
Worakul 2007	Thailand	Upper-middle income	Uncontrolled	Caregivers or family members	91	n/a	Psycho-educational program aiming to provide knowledge, reduce the cargegivers'stress, and help	Scale	0		

Worakul 2007	Thailand	Upper-middle income	Uncontrolled	of patients with schizohprenia	[illegible]	n/a	the caregivers to provide care to the patients more effectively.	Item		

a Categorised using the World Bank classifications as of July 1st 2012

b Type of study design includes: randomised controlled trials (RCT), randomised controlled trials analysed within-group (RCT1), post-test only controlled experimental study (Post-test controlled) and pre-post studies with no control group (Uncontrolled). Findings at post-intervention: comparisons were made between baseline and post-intervention assessments and grouped into knowledge and attitudes.

c + indicates p< 0.05 in a direction of benefit (reduction in stigma); 0 indicates p>0.05; - indicates p<0.05 in direction of harm (increase in stigma). Each symbol represents one outcome (scales, or item)

Rahman A, Mubbashar MH, Gater R, Goldberg D. Randomised trial of impact of school mental-health programme in rural Rawalpindi, Pakistan. Lancet. 1998;352(9133):1022-5.

Bayar MR, Poyraz BC, Aksoy-Poyraz C, Arikan MK. Reducing mental illness stigma in mental health professionals using a web-based approach. Israel Journal of Psychiatry & Related Sciences. [Randomized Controlled Trial]. 2009;46(3):226-30.

Premalatha Chinnayya H, Chandrashekar CR, Moily S, Puttamma, Raghuram A, Subramanya KR, et al. Training Primary Care Health Workers in Mental Health Evaluation of Attitudes towards Mental Illness before and after Training. International Journal of Social Psychiatry. 1990 December 1, 1990;36(4):300-7.

Garcia Silberman S. Mental health and the movies: An experimental study about attitude change. Revista Mexicana de Psicologia. 1993 Jan-Jun;10(1):37-48.

Ghorbani NR, Heidari RN. Effects of information and communication technology on youth's health knowledge. Asia-Pacific Journal of Public Health. 2011 May;23(3):363-8.

Worakul P, Thavichachart N, Lueboonthavatchai P. Effects of psycho-educational program on knowledge and attitude upon schizophrenia of schizophrenic patients' caregivers. J Med Assoc Thai. 2007 2007;90(6):1199-204.

							1 month	Scale																Social Distance Scale (Psychiatric Research and
					L			Item				$B^{(1/7)}$	$O^{(6/7)}$									L		
						Scale																Mental Health Literacy survey, adapted by authors		
		L	N		3 months	Item	$B^{(1/11)}$ $B^{(2/2)}$	$O^{(10/11)}$		$B^{(1/7)}$	$O^{(6/7)}$ $O^{(7/7)}$								E	L				

																				N		International Depression Literacy Survey (Hickie et		
																			L				
																				E		International Depression Literacy Survey		
																			L				

Table DS6. Quality ratings for randomised controlled trials using Cochrane Risk of Bias Tool

Study reference	Random sequence generation	Allocation concealment	Blinding participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective outcome reporting
Gulliver 2012	L	L	L	L	L	L
Fung 2011	L	U	U	L	L	L
Jorm 2004*	L	L	H	L	L	L
Jorm 2010a	L	L	H	L	L	L
Kitchener 2004	L	L	H	L	L	L
Aho-Mustonen 2011	L	U	H	L	L	H
Irvine 2012	U	U	U	L	L	L
Jorm 2010b*	L	H	H	L	L	L
Seal 2012	U	U	U	L	L	L
Sharp 2006	U	L	U	L	H	L
Yanos 2012	L	L	U	U	L	L
Kerby 2008	U	L	H	L	L	H
Luty 2008	L	U	U	U	H	L
Pinto-Foltz 2011*	U	U	H	U	L	L
Campbell 2011*	U	U	U	U	H	L
Gumley 2006	L	H	U	H	L	H
Castro 2012*	H	H	H	U	H	U
Gonzales 2002	U	U	U	U	H	L
Link 2002	U	U	U	U	H	L

*Cluster randomised trials

§Validated = at least one scale was validated; Previously published = scale had been previously published, no evidence of validity

Other bias	Validity of Scales§
U	Validated
L	Validated
U	Validated
U	Validated
U	Validated
L	Validated
L	Validated
H	Validated
L	Previously published
L	Validated
H	Validated
H	Validated
L	Validated
L	Validated
L	Validated
U	Validated
L	Previously published
H	Validated
U	Validated

Table DS7. Quality ratings for non randomised studies usin

Study reference	Selection Bias (intervention vs control group)¥
Altindag 2006	U
Anderson 2012	n/a
Armstrong 2011	n/a
Buizza 2007	n/a
Conrad 2009	U
Domino 1983	L
Economou 2012	L
Essler 2006	n/a
Esters 1998	U
Faigin 2008	L
Friedrich 2013	H
Gould 2007	H
Graham 2010	n/a
Kelly 2011	n/a
Kitchener 2002	n/a
Knight 2006	U
Krawitz 2004	n/a
Masuda 2009	n/a
Naylor 2009	L
Ng 2002	L
O'Kearney 2006	H
O'Kearney 2009	H
O'Reilly 2010	n/a
O'Reilly 2011	H
Patterson 2007	H
Pejovic-Milovancevic 2009	n/a
Pierce 2010	n/a
Pinfold 2003a	n/a
Pinfold 2003b	n/a
Rong 2011	L

Schneider 2011	n/a	
Schulze 2003		H
Shandley 2010		
Sogaard 1992	n/a	
Treolar 2009		H
Ucock 2006	n/a	
Ventieri 2011		H
Corker 2013	n/a	
Evans-Lacko 2013a	n/a	
Evans-Lacko 2013b	n/a	
Henderson 2012	n/a	
Henderson 2013	n/a	
Crisp 2005	n/a	
Mehta 2009	n/a	
Paykel 1998	n/a	
Dietrich 2010	n/a	
Gaebel 2008		H
Jorm 2005		H
Jorm 2006		H
Reavley 2012	n/a	
Wright 2006		H
Grausgruber 2009		n/a
Yamaguchi 2007		U

¥Comparability between the intervention and control groups. **†**Repr
ΔWhether or not the authors controlled for any confounders in the a
developed by authors with no evidence of validity; Items only= scale

ıg criteria developed by review team (based on an adaptation of the Co

Selection Bias (representativeness)†	Attrition Bias‡	Selective Outcome reporting
H	L	L
U	H	L
U	L	H
U	H	H
L	U	H
U	H	L
L	L	L
H	L	L
U	L	L
H	L	L
U	H	L
U	H	L
H	H	H
H	H	L
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H	L	L
L	H	L
L	H	L
L	L	L
H	H	L
U	L	L
U	H	H
L	H	L
U	H	L
U	U	L

H	L	L
H	U	L
H	L	L
L	H	L
H	H	L
U	H	L
H	L	L
H	n/a	L
L	n/a	L
L	n/a	L
H	n/a	L
L	n/a	L
L	n/a	L
L	n/a	L
L	n/a	L
L	n/a	L
L	H	L
H	n/a	L
H	n/a	L
H	n/a	L
L	n/a	L
L	n/a	L
L	L	L

:asentativeness of sample in comparison to the target population. ‡ Whether there
analysis. §Validated = at least one scale was validated; Previously published = scale
:s have been reported at item level/only single items have been used.

chrance Risk of Bias Tool)

Performance Bias (blinding of personnel and participants)	Confounding (did authors control for or consider possible confounders)Δ
U	N
U	Y
U	N
U	N
U	Y
U	N
U	N
U	N
U	N
U	Y
U	Y
U	Y
U	N
U	N
U	N
U	N
U	Y
U	N
U	Y
U	N
H	N
H	N
U	N
U	N
U	N
U	N
U	N
U	N
U	N
U	N

U	N
U	Y
U	N
U	N
U	N
U	N
U	Y
n/a	N
n/a	Y
n/a	Y
n/a	N
n/a	Y
n/a	N
n/a	N
n/a	N
n/a	N
n/a	N
n/a	N
n/a	N
n/a	Y
n/a	Y
n/a	Y
U	N

was more than 20% attrition and if so, whether an intention to treat analys
had been previously published, no evidence of validity; Developed by autho

Validity of Scales§
Items only
Validated
Items only
Previously published
Validated
Developed by authors
Items only
Previously published
Validated
Validated
Validated
Items only
Validated
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Validated
Validated
Items only
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Developed by authors
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Items only
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Items only

Items only

Items only

Items only

Developed by authors

Validated

Items only

Items only

Items only

Items only

Developed by authors

Items only

is was carried out.

rs = scale was

Evidence for effective interventions to reduce mental health-related stigma and discrimination in the medium and long term: systematic review

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