

tasks for study participants were therefore excluded. Studies of interventions to improve medical or nursing students' diagnosis and management of mental illness were also excluded.

Studies of antistigma interventions focusing on any type of mental health problem were included, for example, severe mental illness, common mental disorders, mental retardation, dementia, and substance abuse, although interventions aimed at prevention of abuse were excluded. We considered the following five types of outcomes related to stigmatization toward people with mental health problems (Thornicroft, 2006): a) knowledge about people with mental health problems, b) attitudes or attributions toward people with mental health problems, c) social distance/behavioral intentions toward people with mental health problems, d) attitudes toward the use of services and help-seeking intentions, and e) actual behavior (discriminatory behavior and actual service use).

Information Sources and Search

We searched 11 bibliographic databases, including two Japanese databases (MEDLINE, PsychINFO, EMBASE, OLDMEDLINE, Social Policy and Practice, British Nursing Index and Archive, CENTRAL, Web of Knowledge, Social Care Online, Ichushi, and CiNii), using relevant words (see our Web site: <http://www.kcl.ac.uk/iop/depts/hspr/research/APPENDIXstigmastudentsasystematicreview.pdf>). There were no language, geographical, and time restrictions. The search terms were modified for each database. The reference lists of the included studies and the identified systematic reviews were also checked. A Google search was also conducted, using several relevant words (e.g., *mental illness* or *psychiatric disorder** or *schizophrenia* and *university student** or *college students* and *stigma** or *attitude** or *help-seeking** or *discrimination** and *intervention** or *programme** or *education*), within first 20 pages. We also checked Web sites of relevant associations (National Health Service, World Health Organization, RETHINK, and MIND) and contacted experts within relevant publications to access the gray literature.

Study Selection

One author (S. Y.) screened all titles and abstracts and eliminated any obviously irrelevant studies. The titles and the abstracts of the remaining studies were screened by at least two authors (S. Y., S.-I. W., M. Y., and M. B.), and the studies that were very unlikely to be relevant were excluded. The full texts of all remaining potentially relevant studies were retrieved. At least two authors (S. Y., S.-I. W., M. Y., M. B., and Y. A.) independently applied the inclusion criteria to identify eligible studies. Disagreements were resolved by discussion and the involvement of a third review author (G. T.). We contacted the original authors when necessary.

Assessment of Methodological Quality in Individual Studies

The methodological quality of each study was assessed independently by at least two authors (S. Y., S.-I. W., M. Y., M. B., and Y. A.) using the EPOC (Cochrane Effective Practice and Organisation of Care Review Group) data collection checklist (<http://epoc.cochrane.org/sites/epoc.cochrane.org/files/uploads/datacollectionchecklist.pdf>). This has four domains: a) random allocation for RCTs or characteristics of controls for CBAs, b) completeness of follow-up, c) baseline measurement, and d) protection against contamination. Each domain was rated "done," "not clear," or "not done." If there were disagreements, we discussed with each other and consulted with a third author (G. T.). Although the Cochrane Effective Practice and Organisation of Care Review Group data collection checklist has a domain for the reliability of measures, in many studies, the primary outcome was unclear. We therefore excluded this domain and reported the measures having good test-retest reliability, that is, a correlation coefficient or a kappa statistic that was more than 0.8 in each comparison. Sex

is a possible confounder in stigma research (Thornicroft, 2006), so the proportion of men and women in the studies was assessed.

Summary Measures

The overall effects of each study were judged at the 5% significance level. If the *p*-value was less than 0.05, we considered that interventions had significant effects on improving each outcome. In the studies that reported only means or proportions of each item or subscale rather than the whole questionnaire, we used the median *p*-value to show the overall effect of the intervention. In the studies that stated the results of the post hoc analysis of each subscale without a *p*-value, we considered the intervention to be effective if half of the subscales significantly changed compared with the control. For example, if the post hoc analysis found significant effects in three of the five subscales, we judged that the interventions were, overall, effective. In addition, the *p*-values were recalculated using appropriate formulas (Higgins and Green, 2009) and Review Manager (<http://ims.cochrane.org/revman>) when a) the studies provided only the results comparing the mean pre-post test score in each group rather than between groups, b) the studies analyzed more than three groups together, and (3) the studies divided each group into students who initially had negative or positive attitudes and then separately analyzed the changes in stigmatization of these differing students.

Synthesis of Results

There was considerable clinical and statistical methodological heterogeneity across the included studies; for example, whereas in some social contact interventions people with mental illness talked about only their symptoms, in others, people with mental illness focused on their successful life events. Regarding statistical heterogeneity, some studies compared data in follow-up between groups, and others analyzed the mean difference in post-pre test scores between groups without information about original scores. A narrative synthesis was therefore produced. We classified the interventions into the following nine categories (as defined in Box 1): a) social contact, b) video-based social contact, c) video-based education, d) education-lecture, e) education-text, f) famous film, g) education-role play, and h) other. Where data were available, we compared each intervention with an inactive control, that is, no education, education without mental health issues, or education without mention of stigma or with another intervention.

RESULTS

Selection Process

A total of 7676 study references were screened, and 199 potentially relevant studies were identified. Two studies (Finkelstein et al., 2007; Wasserman and Lapshina, 2006) reported different aspects of another included study (Finkelstein et al., 2008). After the screening, 35 studies were included (Fig. 1).

Description of Included Studies

Table 1 shows the characteristics of the included studies. Twenty-three studies were RCTs, and 12 studies were CBAs. Twelve studies involved future professionals, including medical students (Altindag et al., 2006; Kerby et al., 2008; Lincoln et al., 2008; Mino et al., 2001), nursing students (Coleman, 2007; Dearing and Steadman, 2008; Godejohn et al., 1975; Han et al., 2006), social work students (Lewis and Frey, 1988; Shera and Delva-Tautilili, 1996), special education students (Finkelstein et al., 2008), and law school students (Russell and Bryant, 1987). In the other 23 studies, the participants were university or (community) college students, including those who enrolled in psychology courses. In 17 studies, approximately 70% of the participants were women. Most of the included studies measured at least one outcome relating

Box 1 Definitions of categories for interventions

1. *Social contact:*

Any interaction between people with mental health problems and participants; for example, people with mental health problems talking about their own experiences in an educational intervention.

2. *Video-based social contact:*

Media (e.g., videos or personal computer [PC] programs) showing people (or actors/actresses) with mental health problems talking about their own experiences.

3. *Video-based education:*

Media aimed at reducing stigma or providing academic information about mental health issues, including specialists explaining about mental health problems and the lives of people with mental illness. This category also includes media showing people with mental health problems who discuss symptoms but do not disclose that they themselves have a mental illness.

4. *Education-lecture:*

A lecture or session in which specialists or family members discuss mental health problems including symptoms of mental disorders or the lives of people with mental illness.

5. *Education-text:*

Any interventions in which participants just read information sheets, relevant books, or articles.

6. *Famous film:*

Any videos and films that are primarily aimed at entertainment, but have people with mental health difficulties as their primary or secondary characters.

7. *Education-role-play:*

Any intervention in which participants do role play in which they play either people with mental health problems or other people (e.g., family or employer) involved with those with mental health problems.

8. *Other:*

Interventions not described in the abovementioned categories.

to knowledge, attitudes, or social distance toward targeted diseases. Three studies dealt with attitudes toward the use of services or help-seeking intentions (Han et al., 2006; Morgan-Owusu, 2003; Sharp et al., 2006). However, no studies measured discriminatory and help-seeking behavior.

Methodological Quality

Randomized Controlled Trials

The details of the authors' judgments of the methodological quality for each study are shown in the Appendix (see our Web site:

<http://www.kcl.ac.uk/iop/depts/hspr/research/APPENDIXstigmastudent.sasystematicreview.pdf>). Overall, the study quality was unclear because of incomplete reporting, particularly random allocation (Fig. 2). Only three studies (13% of the RCTs) clearly demonstrated the concealment of random allocation or the methods of randomization, which included using a random number table or coin toss (Godejohn et al., 1975; Kerby et al., 2008; Miller, 1989). Eighty-three percent of the RCTs had follow-up rates of more than 80% at any follow-up points. Two studies gained data from 46% of the participants at 1-week follow-up in the United States and 79% at 6-months follow-up in Russia, although both studies had more than 80% of follow-up rates at

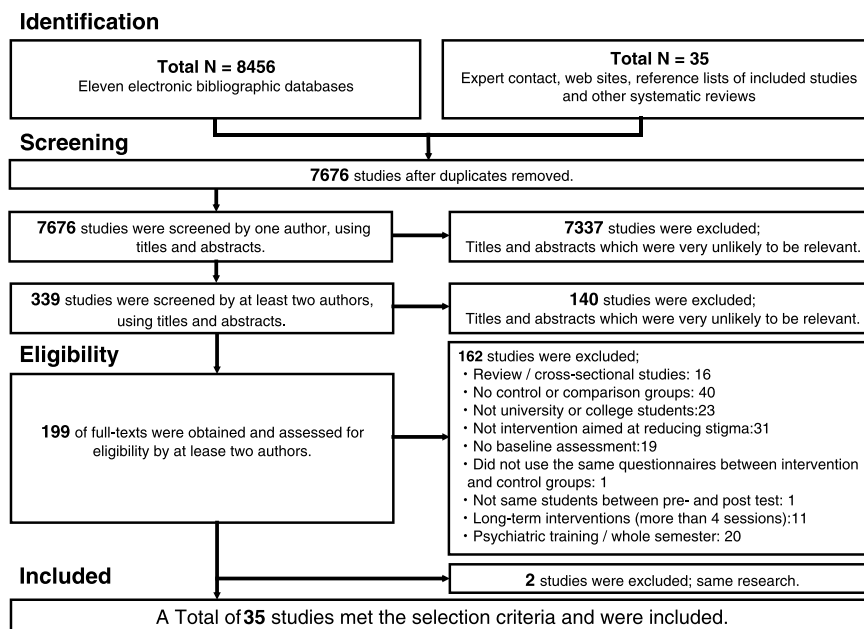


FIGURE 1. Process of study selection: PRISMA flow diagram (Moher et al., 2009). The figure shows the process of study selection adopted by PRISMA flow diagram.

TABLE 1. Characteristics of the 35 Included Studies (Ordered by Study IDs)

Study ID	Authors, Year: Country	Types of Participants	No. Participants	Follow-ups	Interventions	Target Diseases	Outcomes
RCTs							
2) Coleman, 2007: US		Nursing	240 ^a	After intervention	Video-based social contact + video-based education	Schizophrenia	ATM
3) Corrigan et al., 2007: US		Community college	244 ^a	After intervention and 1 week	1 ¹) video-based social contact and 1 ²) video-based education	Mental illness	ATM
4) Corrigan et al., 2001: US		Community college	152 ^a	After intervention	1 ¹) social contact, 1 ²) education-lecture (specific information), and 1 ³) education-lecture (protest)	Mental illness	ATM
5) Corrigan et al., 2002: US		Community college	213 ^a	After intervention and 1 week	1 ¹) social contact (dangerousness), 1 ²) social contact (personal responsibilities), 1 ³) education-lecture (dangerousness), and 1 ⁴) education-lecture (personal responsibilities)	Mental illness	ATM, SD
7) Desforges et al., 1991: US		University	95 ^a	After intervention	1 ¹) other (script cooperative training), 1 ²) other (jigsaw cooperative learning), and 1 ³) other (individual study)	Mental illness	ATM, SD
10) Finkelstein et al., 2008: Russia		Special education	193 ^a	After intervention and 6 mos	1 ¹) video-based social contact + video-based education (Personal computer program) and 1 ²) education-text	Mental illness	K, ATM, SD
11) Godejohn et al., 1975: US		Nursing	27	After intervention	Education—role play	Mental illness	ATM
12) Han et al., 2006: Taiwan		University	243 ^a	2 weeks	1 ¹) education-text (biological information), 1 ²) education-text (psychological information), and 1 ³) education-text (biological and psychological information)	Depression	ATS
14) Kerby et al., 2008: UK		Medical	41 ^a	After intervention	Video-based education + video-based social contact	Mental illness	ATM, SD
15) Kodaira et al., 2007: Japan ^d		University	67	After intervention	1 ¹) video-based social contact + video-based education and 1 ²) video-based education	Schizophrenia	ATM, SD
16) Kodaira et al., 2009: Japan ^d		University	82	After intervention	1 ¹) video-based social contact + video-based education and 1 ²) video-based education	Schizophrenia	ATM, SD
19) Mann and Himelstein, 2008: US ^b		University	53	After intervention	1 ¹) video-based social contact + education-text and 1 ²) video-based education + education-text	Schizophrenia and bipolar disorder	SD
20) Miller, 1989: US ^b		Community college	38 ^a	After intervention and 6 weeks	Education-lecture	Dementia	K
22) Morgan-Owusu, 2003: US		University	90	After intervention	1 ¹) video-based education and 1 ²) video-based education (cultural information)	Mental illness	ATM, ATS
24) Owen, 2007: US		University	143	2 weeks	1 ¹) famous film and 1 ²) education-lecture	Schizophrenia	K
25) Reinke et al., 2004: US		Community college	164	After intervention	1 ¹) social contact, 1 ²) video-based social contact (successful story), 1 ³) video-based social contact (normal life, symptom, and recovery), and 1 ⁴) video-based social contact (symptoms)	Mental illness	SD
26) Ritterfeld and Jin, 2006: US		University	132	After intervention	1 ¹) famous film + video-based education and 1 ²) famous film	Schizophrenia	K, ATM
27) Rusch et al., 2008: US ^c		University	41 ^a	After intervention	1 ¹) social contact (successful story) and 1 ²) education-lecture	Mental illness	SD
28) Russell and Bryant, 1987: US		Low school	102	After intervention	1 ¹) education-lecture and 1 ²) education-text	Mental retardation	K, ATM
29) Sharp et al., 2006: US ^d		University	115 ^a	After intervention and 4 weeks	Education-lecture (therapeutic processes and personal responsibility)	Mental illness	ATM, ATS

continued on next page

TABLE 1. (Continued)

Study ID Authors, Year: Country	Types of Participants	No. Participants	Follow-ups	Interventions	Target Diseases	Outcomes
33) Wood and Wahl, 2006: US	University	114 ^a	After intervention	Video-based social contact (successful story) + social contact	Mental illness	K, ATM, SD
34) Woods, 2002: US	College	112 ^a	After intervention	Video-based social contact	Tourette's syndrome	ATM
35) Woods and Mareks, 2005: US ^d	College	170 ^a	After intervention	1 ¹) video-based social contact (Tourette's syndrome) and 1 ²) video-based social contact (depression)	Tourette's syndrome	ATM, SD
CBAs						
1) Alitindag et al., 2006: Turkey	Medical	60	After intervention and 1 mo	Education-lecture + social contact + famous film	Schizophrenia	K, ATM, SD
6) Dearing and Steadman, 2008: US ^d	Nursing	94 ^a	1 week	Other (voice simulation exercise)	Mental illness	ATM
8) Domino, 1983: US	College	115	After intervention	1 ¹) famous film + video-based education, 1 ²) famous film, and 1 ³) video-based education	Mental illness	ATM
9) Faigin and Stein, 2008: US	University	303 ^a	After intervention and 1 month	1 ¹) social contact and 1 ²) video-based social contact	Mental illness	ATM, SD
13) Hirata et al., 2007: Japan	Nursing	90	1 month	Education-lecture + social contact	Alcohol dependence	K, ATM
17) Lewis and Frey, 1988: US	Social work	66 ^a	After intervention	Education-lecture	Mental illness	ATM, SD
18) Lincoln et al., 2008: Germany ^d	Psychology and medical	115 ^a	After intervention	1 ¹) education-text + video-based education + video-based social contact (biological information) and 1 ²) education-text + video-based education + video-based social contact (psychological information)	Schizophrenia	ATM, SD
21) Mino et al., 2001: Japan	Medical	142	After intervention	Education-lecture	Mental illness	ATM, SD
23) Nishio, 2004: Japan ^d	University	116	2 weeks	Education-lecture + social contact	Schizophrenia	K, ATM, SD
30) Shera and Delva-Tauili, 1996: US	Social work	59 ^a	4 weeks	Education-lecture + video-based social contact + social contact	Mental illness	ATM
31) Sullivan and O'Connor, 2001: Australia	Psychology	100 ^a	After intervention	1 ¹) video-based social contact + education-text, 1 ²) education-text, and 1 ³) video-based social contact	Alzheimer's disease	K
32) Walker and Read, 2002: New Zealand ^d	Mathematics	126	After intervention	1 ¹) video-based education (psychological information), 1 ²) video-based education (biological information), and 1 ³) video-based education (biological and psychological information)	Mental illness	ATM, SD

Interventions were presented as 1¹), 1²), or 1³) when studies had more than two types of interventions.

ATM indicates attitudes/attributes toward (people with) mental illness; ATS, attitudes toward service use (including help-seeking intentions); K, knowledge; SD, social distance (including behavioral intentions).

^aPercentages of women were approximately or more than 70%.^bA cluster design was used.^cA crossover design was used.^dAdditional information was gained from the original authors.

Study IDs are alphabetical order among the studies included in this review.

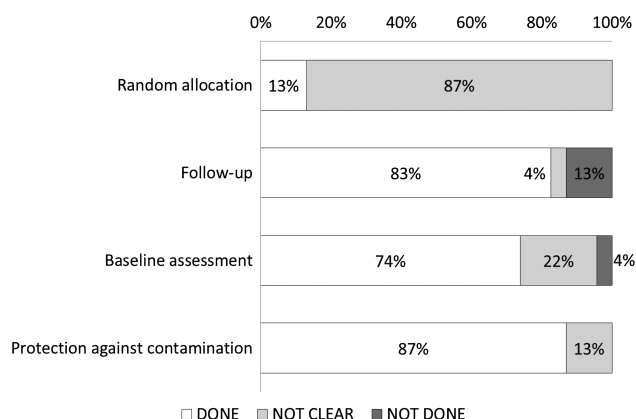


FIGURE 2. Summary of methodological quality in RCTs. a) Random allocation (concealment of allocation): the score was done if a study clearly stated the methods and process of randomization. b) Completeness of follow-up: the score was done if a study obtained the data on outcomes from 80% of participants. For cluster RCTs, we rated done if a study obtained the data on outcomes from all cluster arms. c) Baseline measurement: the score was done if performance or participants' outcomes were measured before the intervention and there were no substantial differences across study groups. d) Protection against contamination: the score was done if control groups were unlikely to receive the intervention.

the immediate follow-ups (Corrigan et al., 2002; Finkelstein et al., 2008). In addition, a cluster RCT excluded from the analysis one of two cluster arms in the control group (Miller, 1989) because of a significant difference in the ages of the participants between the cluster arms in the intervention and control groups. In only one study, there were significant differences in outcome scores between the intervention and control groups at baseline (Godejohn et al., 1975), and in five studies (22% of the RCTs), it was unclear whether the groups differed at baseline because they presented their results using only graphs rather than the means and standard deviations or showed only the results from a multivariate analysis controlling baseline scores (Han et al., 2006; Kodaira et al., 2007; Morgan-Owusu, 2003; Reinke et al., 2004; Ritterfeld and Jin, 2006). Three studies (13% of the RCTs) that used paper materials or famous films and carried out mid- or long-term follow-up did not mention how contamination between groups was prevented (Finkelstein et al., 2008; Han et al., 2006; Owen, 2007). Only one study was judged to have met criteria for good methodological quality in all domains (Kerby et al., 2008); 61% of the RCTs met these criteria for three of the four domains.

Controlled Before and After Studies

In one study, the intervention and control groups differed in sex (Nishio, 2004); and in another, by ethnicity (Walker and Read, 2002); otherwise, 75% of the CBAs had no significant difference in characteristics between the two groups at baseline. All the included CBAs gained outcome data from 80% of the participants at follow-up, apart from one study with a 55% follow-up rate (Nishio, 2004). One study reported differences in the means of outcome measures between the intervention and control groups at baseline (Sullivan and O'Connor, 2001); another did not report clearly the outcome scores for the control group at baseline (Altindag et al., 2006). The remaining studies (84% of the CBAs) had no significant differences between the intervention and control groups at baseline. Only one study that used a feature film did not state the ways used to prevent students in the control group from watching this (Domino, 1983). Fifty-eight percent of the CBAs

met the criteria for good methodological quality in all the measured domains (Fig. 3).

Effects of Interventions

Each study individually measured the effects of interventions at several follow-up points. We therefore classified the follow-up points in each study into three time points: immediately after intervention, midterm follow-up (less than 6 months after the intervention but not immediately after the intervention), and long-term (6 months or more after interventions).

Comparison 1: Any Intervention Compared With Inactive Controls

Knowledge

Three RCTs (total, $N = 345$) and four CBAs (total, $N = 366$) tested the effect of 10 interventions on knowledge. Table 2 shows that three interventions (having a lecture, video-based social contact plus video-based education, and social contact) in three RCTs (Finkelstein et al., 2008; Miller, 1989; Wood and Wahl, 2006) resulted in significant improvement in students' knowledge about the target illnesses at immediate or long-term follow-up. Having a lecture and social contact were also found to be effective in two CBAs (Hirata et al., 2007; Nishio, 2004), and a further CBA found three types of interventions (video-based social contact, text, or video-based social contact plus text) to improve knowledge at all time points (Sullivan and O'Connor, 2001). However, the reliability of measures for assessing the students' knowledge was low or unclear.

Attitudes toward people with mental illness

Eleven RCTs (total, $N = 1467$) and 10 CBAs (total, $N = 1169$) tested the effect of 33 interventions on attitudes. No intervention tested in medical students (one RCT and three CBAs) showed a significant effect (Altindag et al., 2006; Kerby et al., 2008; Lincoln et al., 2008; Mino et al., 2001). Of the studies in other students, seven RCTs (total, $N = 981$) found significantly improved attitudes

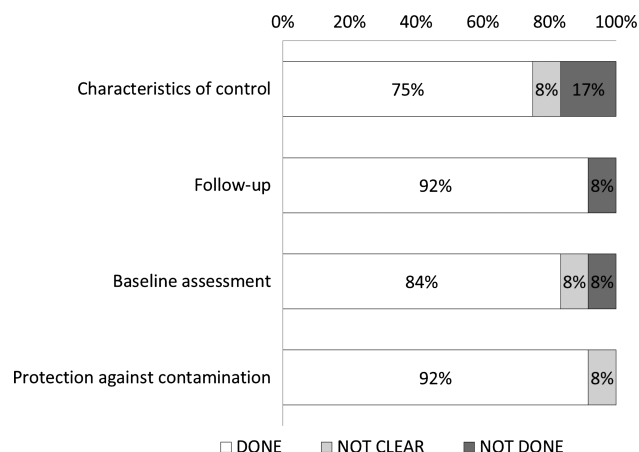


FIGURE 3. Summary of methodological quality in the CBAs. a) Characteristics of controls: the score was done if a study reported characteristics of the control group and there were no differences in characteristics between the intervention and control groups. b) Completeness of follow-up: the score was done if a study obtained the data on outcomes from 80% of participants. c) Baseline measurement: the score was done if performance or participants' outcomes were measured before the intervention and there were no substantial differences across study groups. d) Protection against contamination: the score was done if control groups were unlikely to receive the intervention.

TABLE 2. Effect of Interventions Compared With Control on Changes in Stigmatization Toward Targeted Conditions (Comparison 1)

Types of Interventions (vs. Control)	Knowledge			Attitudes/Attribute Toward People With Mental Illness			Social Distance/Behavioral Intentions			Attitudes Toward Service Use/Help-Seeking Intentions		
	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up
Social contact				+ ⁴ + ⁹	+ ⁹		+ ²⁵ + ⁹	0 ⁹				
Social contact (dangerousness or personal responsibilities)				+ ⁵ + ⁵	0 ⁵ 0 ⁵		+ ⁵ + ⁵	0 ⁵ + ⁵				
Video-based social contact	+ ³¹			+ ³⁴ * + ³⁵ * + ⁹	+ ⁹		0 ³⁵ * 0 ⁹	+ ⁹				
Video-based social contact (not target diseases)				0 ³⁵ *			0 ³⁵ *					
Video-based social contact (mainly successful story or mainly symptoms)							0 ²⁵ 0 ²⁵					
Video-based social contact (normal life, symptom, and recovery)							+ ²⁵					
Video-based education				0 ²² 0 ⁸ *						0 ²²		
Video-based education (cultural information)				0 ²²						0 ²²		
Education-lecture	+ ²⁰ *	0 ²⁰ *		+ ⁴ + ¹⁷ 0 ²¹ *			0 ¹⁷ 0 ²¹ *					
Education-lecture (protest or moral condition)				0 ⁴								
Education-lecture (dangerousness or personal responsibilities)				+ ⁵ + ⁵	0 ⁵ 0 ⁵		+ ⁵ + ⁵	0 ⁵ 0 ⁵				
Education-lecture (therapeutic processes and personal responsibility)				0 ²⁹	0 ²⁹					+ ²⁹	+ ²⁹	
Education-text	+ ³¹		0 ¹⁰ *			0 ¹⁰ *			+ ¹⁰ *			
Education-text (biological information or psychological information or biological and psychological information)				− ⁸ * + ¹¹ *								0 ¹² * 0 ¹² *
Famous film												
Education–role play												
Other (voice simulation exercise)					+ ⁹ *							
Education-lecture + social contact		+ ¹³ * + ²³ *		0 ¹³ * 0 ²³ *				0 ²³ *				
Education-lecture + social contact + famous film	0 ¹ *	0 ¹ *		0 ¹ *	0 ¹ *		0 ¹ *	0 ¹ *				
Education-lecture + video-based social contact + social contact					+ ³⁰ *							
Video-based social contact + social contact (successful story)	+ ³³ *			+ ³³ *			+ ³³ *					
Video-based social contact + video-based education				0 ² * 0 ¹⁴			0 ¹⁴					

	Midterm	1 week to 6 weeks in the included studies	6 months in the included studies
Video-based social contact + video-based education (PC program)	$+^{10)*}$		
Video-based social contact + education-text	$+^{3/1)}$		
Education-text + video-based education + video-based social contact (biological information or psychological information)		$0^{1/8)*} 0^{1/8)*}$	$0^{1/8)*} 0^{1/8)*}$
Famous film + video-based education		$-^{8)*}$	

Midterm: 1 week to 6 weeks in the included studies; long-term: 6 months in the included studies.
RCTs are in boldface: +, significantly positive effects; 0, no change; -, significantly negative effects.
CBAs are not in boldface, but in italic: +, significantly positive effects; 0, no change; -, significantly negative effects.
Numbers indicate the study IDs corresponding to the table 1.
*Direct comparisons of means or proportions of outcomes between the intervention and control groups rather than comparisons of mean differences (follow-up and baseline scores) between groups, multivariate analyses, and post hoc tests.

The validity and reliability of the attitude measures varied between studies; the measure of attitudes toward people with Tourette's syndrome (Long et al., 1999) in two RCTs (Woods, 2002; Woods and Marcks, 2005) and the Medical Condition Regard Scale (Christison et al., 2002) and the S-C Attitude Measure (Shera and Delva-Tauiiliili, 1996) in two CBAs (Dearing and Steadman, 2008; Shera and Delva-Tauiiliili, 1996) were the well-validated and reliable measures used.

Six RCTs (total, $N = 895$) and six CBAs (total, $N = 811$) measured social distance. In three RCTs using the Social Distance Scale (SDS; an established valid and reliable measure: test-retest reliability correlation coefficient, >0.8 ; Brown, 2008; Link et al., 1987), significant improvements were seen after social contact (Corrigan et al., 2002; Reinke et al., 2004; Wood and Wahl, 2006), video-based social contact (Reinke et al., 2004), and lectures about dangerousness or responsibility (Corrigan et al., 2002). In a Russian RCT, students who used a PC program or read articles concerning psychiatric stigma had closer social distance than those in the control group at 6 months (Finkelstein et al., 2008); however, the response rate was slightly poor.

In the United States, one RCT ($N = 115$) reported that a lecture providing information about therapeutic process, treatment effects, and available mental health services yielded significant improvements in participants' attitudes toward the use of services compared with those in the control group at immediate and 4-week follow-ups (Sharp et al., 2006). A valid and reliable attitude measure (Fischer and Farina, 1995) was used.

The following comparisons between interventions were made in the included studies: a) social contact versus video-based social contact, b) social contact versus education-lecture, c) any intervention presenting video-based social contact versus education-text or video-based education, d), famous film versus education-lecture or versus famous film and video-based education, e) any interventions presenting biological information versus psychosocial information, f) education-lecture versus education-text, g) education-lecture including cultural information versus education-lecture not including cultural information, and h) script cooperative training or jigsaw cooperative learning versus education-text (individual study).

An RCT ($n = 164$) in the United States using the SDS (Brown, 2008), which is a reliable measure, found that there were no significant differences in change in social distance between social contact and videotaped social contact (Reinke et al., 2004). By contrast, a CBA study ($N = 303$) reported that attitudes and behavioral intentions of students in the social contact were significantly more improved than those in the video-based social contact (Faigin and Stein, 2008; Table 3).

A US RCT ($n = 152$) reported that students who experienced social contact improved their attributions more than those who

TABLE 3. Effect of Comparative Interventions on Changes in Stigmatization Toward Targeted Conditions (Comparison 2.1–2.3)

Types of Interventions (A vs. B)	Knowledge						Attitudes/Attribute Toward People With Mental Illness						Social Distance/Behavioral Intentions						Attitudes Toward Service Use/Help-Seeking Intentions					
	Immediate Follow-up			Long-term Follow-up			Immediate Follow-up			Midterm Follow-up			Long-term Follow-up			Immediate Follow-up			Midterm Follow-up			Long-term Follow-up		
	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up	Follow-up	Midterm Follow-up	Long-term Follow-up			
<i>Comparison 2.1: social contact versus video-based social contact</i>																								
Social contact versus video-based social contact																								
<i>Comparison 2.2: social contact versus education-lecture</i>																								
Social contact versus education-lecture (specific information)																								
Social contact versus education-lecture (protest or moral condition)																								
Social contact (dangerousness) versus education-lecture (dangerousness or personal responsibilities)																								
Social contact (personal responsibilities) versus education-lecture (dangerousness or personal responsibilities)																								
Social contact (successful story) versus education-lecture																								
<i>Comparison 2.3: video-based social contact versus any other type of interventions</i>																								
Video-based social contact versus education-text																								
Video-based social contact (target diseases) versus video-based social contact (not target diseases)																								
Video-based social contact + education-text versus education-text																								
Video-based social contact + education-text versus video-based social contact																								
Video-based social contact versus video-based education (PC program) versus education-text																								

Video-based social contact + video-based education versus video-based education	+ ¹⁵⁾ + ¹⁶⁾	0 ¹⁵⁾ 0 ¹⁶⁾
Video-based social contact + education-text versus video-based education + education-text		+ ¹⁹⁾

The symbols indicate the effect of intervention A compared with the effect of intervention B. Midterm, 1 week to 6 weeks in the included studies; long-term, 6 months in the included studies. RCTs are in boldface: +, significantly positive effects; 0, no change.

CBAAs are not in boldface, but in italic: +, significantly positive effects; 0, no change.

Numbers indicate the study IDs corresponding to the table 1.

*Direct comparisons of means or proportions of outcomes between the intervention and control groups rather than comparisons of mean differences (follow-up and baseline scores) between groups, multivariate analyses, and post hoc tests.

participated in lectures that criticized stigma (called “protest”; Corrigan et al., 2001). Similarly, In two RCTs (total, $N = 254$), the intervention including social contact led to a more favorable change in social distance immediately after the intervention (Rusch et al., 2008) or after 1 week (Corrigan et al., 2002) than did lectures. These studies used the SDS (Brown, 2008), which is a reliable measure (Table 3).

2.3 Video-based social contact vs. any other type of intervention

In one Japanese RCT ($N = 67$) using a reliable measure (Makita, 2006), there was no significant effect on desire for social distance between those who experienced video-based social contact plus a brief explanation about psychiatric symptoms by a psychiatrist and those who experienced the explanation by a psychiatrist only (Kodaira et al., 2007). However, five RCTs (Corrigan et al., 2007; Finkelstein et al., 2008; Kodaira et al., 2007, 2009; Mann and Himelein, 2008) and one CBA ($N = 100$; Sullivan and O’Conor, 2001) that used less reliable measures reported more benefits for video-based social contact plus text than video-based social contact only at each follow-up (Table 3).

2.4 Famous film vs. education-lecture or vs. famous film plus video-based education

Whereas an RCT ($N = 143$) in the United States reported that there were no differences in students’ knowledge between famous films about schizophrenia and a lecture by professionals after 2 weeks (Owen, 2007), another ($N = 132$) found significant increases in knowledge and improvement in attitudes in students who received a set of famous films plus video-based education compared with a famous film alone (Ritterfeld and Jin, 2006). A CBA found that showing a film gave more negative attitudes after intervention compared with showing a television program only (Domino, 1983). Three studies in this comparison, however, used unvalidated measures to assess each outcome (Table 4).

2.5 Interventions presenting biological information vs. psychosocial information

None of these studies used measures with good reliability. One CBA ($N = 126$) from New Zealand found significant improvements in students’ attitudes after video-based education with psychological information compared with biological information at immediate follow-up (Walker and Read, 2002). The two other studies making this comparison found no significant difference (Han et al., 2006; Lincoln et al., 2008; Table 4).

2.6 Other comparisons

Other comparisons made within the included studies were education-lecture versus education-text and video-based education versus video-based education with cultural information (Desforages et al., 1991; Morgan-Owusu, 2003; Russell and Bryant, 1987). There were no significant differences in any outcome at any time point (Table 4).

DISCUSSION

Summary of Findings

This review identified 35 RCTs and CBAs of interventions to reduce mental health–related stigma in university and college students; 4257 participants were included. The interventions varied between studies, but the findings were relatively consistent and suggest that some interventions, especially social contact for changing attitudes and reducing desired social distance and video contact for changing attitudes, may be effective, at least in students other than medical students. However, methodological quality was slightly unclear; few studies both clearly stated their methods of random allocation and used reliable measures. Further research is therefore needed to confirm these findings.

There was also very limited evidence that role-play education or a simulated experience of hallucinations may successfully change

TABLE 4. Effect of Comparative Interventions on Changes in Stigmatization Toward Targeted Conditions (Comparison 2.4–2.6)

Types of Interventions (A vs. B)	Knowledge			Attitudes/Attribute Toward People With Mental Illness			Social Distance/Behavioral Intentions			Attitudes Toward Service Use/Help-Seeking Intentions		
	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up	Immediate Follow-up	Midterm Follow-up	Long-term Follow-up
<i>Comparison 2.4: famous film versus education-lecture or versus famous film and video-based education</i>												
Famous film versus video-based education												
Famous film versus education-lecture												
Famous film + video-based education versus famous film	+ ²⁶ *	0 ²⁴										
Famous film + video-based education versus video-based education												
<i>Comparison 2.5: any interventions presenting biological information versus psychosocial information</i>												
Video-based education (psychological information versus biological information)												
Video-based education (psychological information versus biological information)												
Video-based education (biological and psychological information versus biological information)												
Video-based education (biological and psychological information versus biological information)												
Education-text (psychological information versus biological information)												
Education-text (psychological information versus biological information and psychological information)												
Education-text (biological and psychological information versus biological information)												
Education-text + video-based education + video-based social contact condition (biological information versus psychological information)												
<i>Comparison 2.6: comparisons of other ways to reduce stigma</i>												
Education-lecture versus education-text	0 ²⁸											
Video-based education (cultural information) versus video-based education												

Other (script cooperative training) versus other (jigsaw cooperative learning)	0 ⁷ *)
Other (script cooperative training) versus education-text (individual study)	0 ⁷ *)
Other (jigsaw cooperative learning) versus education-text (individual study)	0 ⁷ *)

The symbols indicate the effect of intervention A compared with the effect of intervention B. Midterm, 1 week to 6 weeks in the included studies; long-term, 6 months in the included studies.

RCTs are in boldface; +, significantly positive effects; 0, no change; -, significantly negative effects.

CBAAs are not in boldface, but in italic: +, significantly positive effects; 0, no change; -, significantly negative effects.

Numbers indicate the study IDs corresponding to the table 1.

*Direct comparisons of means or proportions of outcomes between the intervention and control groups rather than comparisons of mean differences (follow-up and baseline scores) between groups, multivariate analyses, and post hoc tests.

students' attitudes toward people with mental illness (Dearing and Steadman, 2008; Godejohn et al., 1975). One study warned about the adverse effects of the use of a famous film (Domino, 1983), whereas another study showed that students' attitudes improved when students gained additional information about psychiatric disorders after watching the film (Ritterfeld and Jin, 2006). More studies are needed to understand the process by which interventions may impact either positively or negatively on different stigma-related outcomes.

Because of heterogeneity between studies, it was not possible to estimate an overall effect size. However, in half of the included studies, the female participants were approximately or more than 70% of the total participants; women are more likely to change their stigmatizing attitudes than are men (Thornicroft, 2006), so the reported effects may be reduced for male students.

Effective Ways to Reduce Stigmatization

A further tentative finding is that each type of intervention may have different effects on each outcome. Social contact or video-based social contact, particularly describing normal lives and successful events for people with mental health problems, seems more effective in improving attitudes toward people with mental health problems and in reducing desire for social distance from them at immediate follow-up than are education-lectures or video-based education (Corrigan et al., 2001; Rusch et al., 2008).

In contrast, in one well-conducted study, a lecture giving detailed information about available mental health services positively changed students' attitudes toward the use of services (Sharp et al., 2006). Two prospective cohort studies have found that stigmatizing attitudes toward people with mental illness did not relate to actual use of services (Golberstein et al., 2009; Jorm et al., 2000). Improvements in attitudes toward the use of services may therefore require different information in contrast to changing attitudes toward and desire for social distance from people with mental health problems.

Difficulties and Problems in Reducing Stigmatization

Overall, this review found very little evidence of the effectiveness of interventions to reduce mental health-related stigma in medical students. This is important because negative attitudes in professionals adversely affect the quality of care (Thornicroft et al., 2010). Moreover, negative stereotypes of people with mental illness held by medical students may prevent them from becoming psychiatrists (Sierles and Taylor, 1995). A possible explanation for difficulties in improving stigmatization in medical students may be that their greater diagnostic and biological knowledge of mental illness (Lincoln et al., 2008) may cause them to focus more than other students do on problems resulting from mental illness. Such knowledge and views are sometimes associated with strong stigmatization (Angermeyer et al., 2011; Corrigan, 2007). If this is the case, in medical students, human rights-based antistigma interventions, which emphasize the individualized nature of mental illness and that current evidence-based community services enable people with mental illness to live in their community and to work, may be more effective (Thornicroft et al., 2010). Further studies are needed to develop and evaluate effective interventions for medical students.

There are few studies that evaluated the effects of interventions at long-term follow-up. However, one study of video-based social contact plus video-based education reported long-term positive changes in students' knowledge and attitudes (Finkelstein et al., 2008), although this study had slightly less than 80% follow-up rates and did not use reliable measures. In addition, no study evaluated actual behavior and service use. The most important goal of stigma studies is behavioral change in the long-term rather than temporary changes in only

students' knowledge and attitudes toward people with mental illness or services use (Thornicroft, 2006). We need further evidence to determine whether interventions directly improve behavior in the long-term or whether changes in attitude translate into changes in behavior in the long-term.

Comparing the Findings in University Students With Other Types of Participants

The finding of this review that social contact is an effective anti-stigma intervention in students is supported by the findings of other systematic reviews (Holzinger et al., 2008; Kolodziej and Johnson, 1996; Schachter et al., 2008) that found that social contact is effective in reducing mental health-related stigma in other young people, adults, and mental health professionals. However, reviews on interventions in people younger than 18 years indicate inconstant effects of video materials on reducing stigmatization (Schachter et al., 2008; Yamaguchi et al., 2011). The evidence for the effectiveness of video-based social contact in improving attitudes in university and college students is stronger than that in children. Moreover, one study showed a possibility to improve students' attitudes (Dearing and Steadman, 2008). However, this should be interpreted with caution because in the general public, simulation of hallucinations has been found to not only improve empathy but also increase desire for social distance (Ando et al., 2011).

Strengths and Limitations of This Review

In selecting studies to include in this review, the first screening and citation searches were conducted by only one author, which may have resulted in error. However, we made extensive efforts to search and collect both published and unpublished studies through cooperation with coauthors and expert researchers to ensure that all relevant studies were included. Furthermore, this review was not limited to English-language studies.

Because of large statistical and clinical heterogeneity across the included studies, a meta-analysis could not be conducted. However, we have tried to account for differences in study quality when synthesizing the results.

CONCLUSIONS

This review indicates that social contact and video-based social contact may improve attitudes toward and reduce the desire for social distance from people with mental illness in students other than medical students. Different types of intervention may be needed to change attitudes toward service use. This review also helps us to understand problems with studies aimed at reducing stigmatization. In particular, more rigorous, long-term studies using reliable measures are needed, and reporting of univariate descriptive statistics may be a solution for problems of methodological heterogeneity. Development of effective interventions for medical students is necessary. Finally, future research should focus more on developing interventions that could directly reduce discrimination and promote proper access to services.

ACKNOWLEDGMENTS

The authors thank the original authors of the included studies and the stigma research experts for information: Adrienne van Nieuwenhuizen, Dr Brook A. Marcks, Prof Douglas W. Woods, Dr Frank Larøi, Prof Masaaki Nishio, Dr Norihito Tobata, Dr Rüsche Nicolas, Dr Sara Evans-Lacko, Dr Sarah Clement, Dr Sheryl Steadman, Dr Tania Lincoln, Dr Tomoe Kodaira, Dr William Sharp, and Prof Yoshio Mino (alphabetical order).

DISCLOSURES

This article presents independent research commissioned by the National Institute for Health Research (NIHR) under its Programme

Grants for Applied Research scheme (RP-PG-0606-1053). This study was also funded through the NIHR Specialist Mental Health Biomedical Research Centre at the Institute of Psychiatry, King's College London, and the South London and Maudsley NHS Foundation Trust (G. T.). The views expressed in this publication are those of the authors and not necessarily those of the NHS, the NIHR, or the Department of Health.

The authors declare no conflict of interest.

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