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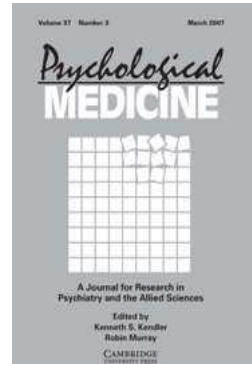
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# A cluster randomized controlled trial to assess the effectiveness of an intervention to educate students about depression

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## ABSTRACT

**Background.** Depression is an important cause of disability worldwide, with many people experiencing their first depressive episode before the age of 18. University students are particularly vulnerable to depression. Depression can be treated successfully in most patients. However, for treatment to be successful, depressed people need to recognize their symptoms as illness, present to medical care, and be aware that effective treatment is available. A thoughtful health campaign might therefore increase the likelihood of successful treatment.

**Method.** A cluster randomized controlled trial was conducted to determine the effectiveness of an educational intervention. A total of 3313 undergraduate students participated in the study. The intervention consisted of postcards and posters on depression and its treatment. The primary outcome was student awareness that depression can be treated effectively. Secondary outcomes included the proportion of students reading the postcards, recognition of symptoms and knowledge of treatments.

**Results.** The postcards were read by 69% of students. Less than half of participants reported that depression could be treated effectively, and there was no evidence of a difference between the intervention and control groups [341 (49.1%) v. 379 (49.7%), difference  $-0.7$ ,  $p=0.8$ , 95% confidence interval (CI)  $-5.1$  to  $3.7$ ]. However, intervention group participants were more likely than control group participants to recognize depressive symptoms and to report that antidepressants are not addictive.

**Conclusions.** Many university students lack knowledge about depression and its treatment. Simple and cheap media, such as postcards and posters, might help to improve awareness in areas where current knowledge is low.

## INTRODUCTION

Depression is an important cause of disability worldwide (Üstün *et al.* 2004), and a common problem in young people. Epidemiological studies show that up to two-fifths of young people suffer from a depressed mood in any 6-month period, with 6-month prevalence rates

of major depressive disorder ranging from 0.4% to 8.3% (Merry *et al.* 2004). It has been estimated that up to 24% of young people will have suffered from at least one clinically significant depressive episode by the time they are 18 years old (NHMRC, 1997). A study of an Oxford college found that 31% of male and 35% of female students had contemplated suicide (Sell & Robson, 1998). Another study, conducted over a 14-year period, reported a higher rate of definite suicide than in the expected figure for

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the general population aged 18–25 (Hawton *et al.* 1995). The study also found that nearly half of the students who had committed suicide had previously been identified as clinically depressed. Although other studies have found differing rates of student suicide (Silverman *et al.* 1997; Surtees *et al.* 2000), the figures are still alarming and increasing.

Depression can be treated successfully in most patients and drug treatment with selective serotonin reuptake inhibitors is the recommended first-line therapy for patients with moderate and severe depression (NICE, 2004). However, for treatment to be successful, depressed people need to recognize their symptoms as illness, present to medical care, be aware that effective treatment is available, and understand that, for most people, the advantages of drug therapy outweigh the disadvantages. A thoughtful health campaign might encourage patients to do these things.

In the UK, the largest health education campaign targeting depression to date is the Defeat Depression Campaign, promoted by the Royal College of Psychiatrists and the Royal College of General Practitioners. It ran for 5 years from 1992 and although positive attitude changes were reported (Paykel *et al.* 1998), the campaign's length and the lack of a control group led to uncertainty about the meaning of these changes. The 5-year 'beyondblue' campaign in Australia reported similar uncertainties (Jorm *et al.* 2005). Health education campaigns should be subject to the same rigorous evaluation to which we subject other health-care interventions. Careful evaluation both enables health educators to understand the effects of the campaign or a single intervention and may inform improvement, thereby benefiting future campaigns.

Recently, there have been a growing number of randomized trials evaluating community-based educational interventions (Angunawela & Mullee, 1998; Atherton-Naji *et al.* 2001; Mundt *et al.* 2001; Jorm *et al.* 2003; Christensen *et al.* 2004; Carter *et al.* 2005). The reported interventions varied in nature and effectiveness, but most improved at least some outcomes. None of the studies used social marketing techniques to improve the effectiveness of the intervention.

Social marketing is the application of commercial marketing techniques to campaigns

aiming to change individuals' voluntary behaviour in order to improve personal and societal welfare (Kotler *et al.* 2002). Social marketing techniques may both increase the effectiveness of a campaign and assist its evaluation. In June 2006, the National Social Marketing Centre launched their report on the effectiveness of social marketing. The report made recommendations for the Department of Health to use social marketing techniques in future campaigns, and that mental health be integrated as a key feature of all campaigns (National Social Marketing Centre, 2006). To date, social marketing techniques have not been used in the UK to design a health campaign for depression.

We therefore conducted a cluster randomized trial to determine the effectiveness of an intervention, designed using social marketing techniques, and intended to educate university students about depression and its treatments.

## METHOD

### Intervention

The intervention was developed in several distinct stages. Detailed below are some of the established marketing techniques used:

- (1) *Identification of the target audience.* A segment is a homogeneous group of people who share similar beliefs, attitudes and behaviours (Wind & Cardozo, 1974). By identifying the target segment, the campaign can be tailored to appeal to the chosen audience. Here, the target segment was undergraduate students.
- (2) *Market research.* To ensure that a campaign is pitched at the correct level and appeals to the target audience, research into the specific needs, beliefs and attitudes of that audience is needed (Kotler *et al.* 2002). Here, a focus group was held to determine the media, designs and information to be presented.
- (3) *Price.* This is the cost a person will experience in exchange for accepting the promoted behaviour. Costs can be financial, social, physical and/or psychological. Here, costs were seen as social and physical, therefore successful people who had depression were listed on postcard 1, and physical costs, such as treatment side-effects, were addressed in

postcard 3. [The postcards can be viewed at the Journal's website (<http://journals.cambridge.org>).]

- (4) *Two-sided appeal*. Two-sided appeals (those that incorporate arguments for and against) can be more effective than one-sided appeals, and are usually most successful when the target audience is highly educated (Foxall *et al.* 1998). Here, the positive and negative aspects of each treatment were presented.
- (5) *Adding credibility*. Social marketing messages should be delivered by an individual or an organization that is credible with the target audience (Marriott *et al.* 2000). Here, we emphasized the fact that the postcards were designed by the Department of Psychiatry at the university.
- (6) *Model identification*. Past research has shown that by identifying with someone else, we may turn the apparent consequences of their actions into lessons for our own lives (Messaris, 1997). Here, models from the target audience were used in the hope that the students would identify with them. The postcards needed to be appealing and the images easily recognizable to the students. Therefore, images of objects such as condoms and a pint of beer were used.
- (7) *Apparent contradictions*. Advertising imagery can grab attention by its incongruity, as the audience attempts to understand the contradiction (Williamson, 1995). Here, the slogan 'Beer: the cure for depression' was used.
- (8) *Marketing hope*. Past health campaigns have successfully used hope to appeal to their target audience (e.g. loveLife's 'Love to be there' campaign, 2005). Here, the final postcard depicted a happy graduation scene, implying that depression could be treated and academic goals achieved.

First, a questionnaire was administered to the target audience, recruited from one of the excluded University of Oxford colleges. This questionnaire enquired about current knowledge and attitudes to depression and its treatments to identify gaps or errors in knowledge, and inform the intervention's content. Second, a focus group comprising the target audience was established to select the intervention's media,

and to generate possible images for presentation. Third, the images were presented to a group of Masters in Business Administration (MBA) students who had previously worked in marketing, and their comments were used to refine the designs. Finally, members of the focus group were asked to comment on the proposed designs and content.

The final intervention comprised two posters and four postcards. The posters supporting the campaign were displayed in communal areas in the intervention colleges. The first poster was designed to trigger interest in the campaign and was displayed 1 week before the postcards were distributed. The second poster reinforced the information presented on the postcards and was displayed during the campaign. The postcards contained brief information on depression including: (a) its frequency among students; (b) its symptoms; (c) its treatments, including effective treatments and common misunderstandings; and (d) where to go for help. The 5257 undergraduate students in the colleges randomized to receive the intervention were sent all four postcards.

#### **Treatment allocation**

Contamination occurs when members of the control group are also exposed to the intervention. To minimize contamination, randomization was of the colleges that accept undergraduate students, rather than of undergraduates themselves. Oxford undergraduates mostly live, socialize and study within their college, thus we judged that the potential for contamination between colleges was small. Eighteen of the university's 46 colleges were excluded from the trial, including permanent private halls, exclusively postgraduate colleges, and R.M. and J.P.'s college. The remaining 28 colleges were randomized by an independent statistician using block randomization with computer-generated random numbers. All included colleges had similar characteristics, and therefore stratified randomization was not performed.

#### **Data collection**

The questionnaire used by MORI to evaluate the effectiveness of the Defeat Depression Campaign (Paykel *et al.* 1998) was modified for this study's purposes and distributed before and after the intervention period. To improve the

response rate, the size of the questionnaire was reduced. The questionnaire was then piloted with 60 undergraduate students from one of the excluded colleges. Minor changes to the wording were subsequently made.

Half of the students, randomly selected by the university, received the questionnaire before the intervention, and half after the intervention. Pre-intervention questionnaires were posted at the start of Trinity (summer) term 2004. Three weeks later, the postcards were distributed. Any pre-intervention questionnaires received after postcard distribution were excluded. Post-intervention questionnaires were posted 1 week later.

### Outcome measures

The primary outcome was the proportion of participants responding positively to the question 'Can depression be effectively treated?' Secondary outcomes included the correct recognition of the symptoms of depression and knowledge of its treatments, including two common misperceptions.

### Sample size

The study was designed to have 80% power of detecting a change from 40% to 55% in the primary outcome at the 5% level of statistical significance. With 28 colleges, and assuming an intra-cluster correlation coefficient of 0.05, 60 students from each college needed to respond to the questionnaire (30 pre- and 30 post-intervention) to deliver the necessary power. To comply with the 1998 Data Protection Act, questionnaires were sent by the university's central office rather than by the researchers. Previous university postal questionnaires received a response rate of about 15%, therefore 400 students needed to be mailed, half before and half after the intervention. As the number of undergraduates in each college varied between 193 and 454, all students were posted a questionnaire.

### Statistical analysis

SPSS version 11.5 (SPSS, Chicago, IL, USA) and STATA version 8.0 (StataCorp, College Station, TX, USA) were used. All analyses were conducted on an intention-to-treat basis. To account for cluster randomization, the data were aggregated and analysed at the college

level using a *t* test, weighted by the number of students in each college (Bland & Kerry, 1998). Summary statistics at the student level were calculated, as were the weighted mean difference, *p* values and confidence intervals (CIs) obtained from weighted analyses conducted at the cluster level post-intervention. Levene's test was applied to test for equality of variances and, where significant heterogeneity was found ( $p < 0.1$ ), a Mann-Whitney test was applied to the cluster proportions. Normality was assumed unless the mean proportion was less than 10% or greater than 90%, when a Mann-Whitney test was applied. We have adhered to the principles outlined in the CONSORT statement for reporting cluster randomized trials (Campbell *et al.* 2004).

### Ethics approval

The Oxford Applied and Qualitative Research Ethics Committee approved the study, A03.040.

## RESULTS

Thirty questionnaires were excluded from the analysis because of missing college affiliation. The response rate was 1829/5122 (35.7%) pre-intervention and 1484/5137 (28.9%) post-intervention. Fig. 1 shows the flow of clusters and individual participants through each stage of the trial. One college in the control group was lost post-intervention, as the college did not distribute the questionnaires. Intervention and control clusters were similar (Table 1).

### Intervention receipt and recall

In the intervention group, 659 (94%) participants reported receiving the postcards, compared to seven (0.9%) participants in the control group. Most intervention group participants (484, 69%) reported that they had read the postcards, whereas only seven (0.9%) in the control group reported that they had done so.

### Primary outcome

Pre-intervention, less than half of the participants reported that depression can be treated effectively, and the proportion was similar in control and intervention groups. Post-intervention, again less than half of participants in each group reported that depression can be treated effectively, and there was no statistically

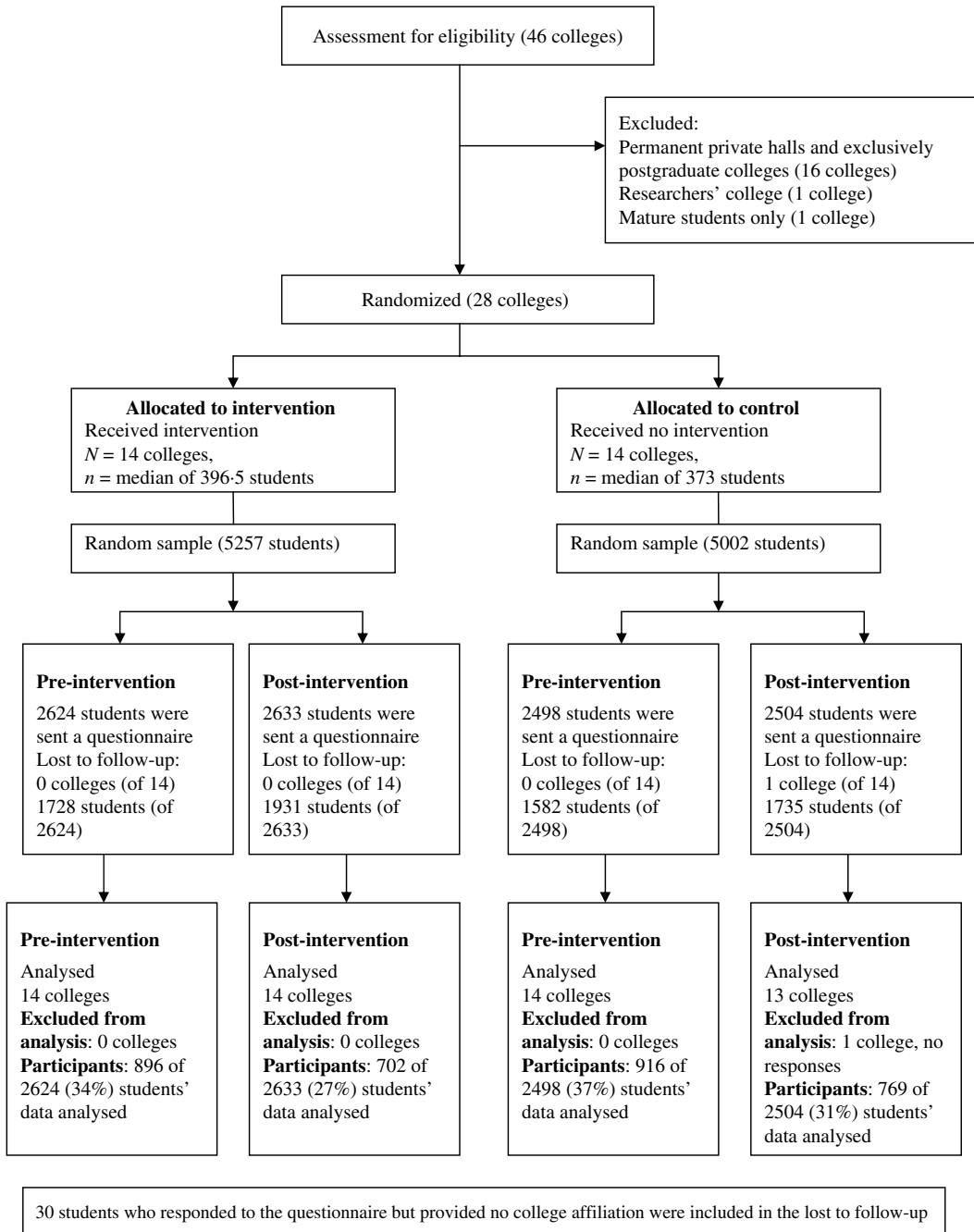


FIG. 1. Flow chart of participants.

significant difference in proportion between the groups (Table 2). To adjust for the different proportions of participants who agreed with

the statement in the pre-intervention questionnaire, a weighted linear regression was conducted, but did not materially affect the results

Table 1. *Characteristics of participants*

	Pre-intervention		Post-intervention	
	Control	Intervention	Control	Intervention
<i>N</i> (colleges)	14	14	13	14
<i>n</i> (participants)	916	896	769	702
Male, <i>n</i> (%)	427 (46.7)	393 (44.0)	382 (49.7)	369 (56.2)
Degree subject				
Science, <i>n</i> (%)	433 (47.3)	409 (45.9)	359 (46.7)	306 (43.6)
Arts, <i>n</i> (%)	459 (50.1)	459 (51.5)	382 (49.7)	369 (52.6)
Science and Arts, <i>n</i> (%)	24 (2.6)	24 (2.7)	28 (3.6)	27 (3.8)
Ethnicity				
Non-white, <i>n</i> (%)	112 (12.2)	89 (9.9)	85 (11.1)	92 (13.1)

Data were missing for gender (3), degree subject (4) and ethnicity (9).

Table 2. *Primary outcome: awareness that depression can be treated effectively*

	Pre-intervention		Post-intervention		Analysis at cluster level post-intervention		
	Control	Intervention	Control	Intervention	Difference in means	95% CI	<i>p</i>
Agreement that depression can be treated effectively, <i>n</i> (%)	390 (42.6)	407 (45.7)	379 (49.7)	341 (49.1)	-0.7	-5.1 to 3.7	0.76 <sup>a</sup>

<sup>a</sup> Levene's test  $p < 0.1$ . Mann-Whitney  $U$  test ( $p = 0.92$ ). Median difference 0.7; 95% confidence interval (CI) -4.0 to +6.9. Analysis not weighted for cluster size.

Estimated intra-cluster correlation coefficient: pre-intervention = 0.007; post-intervention = -0.007.

(difference = -0.9%, 95% CI -5.5 to +3.6,  $p = 0.68$ ).

### Recognition of depressive symptoms

There was evidence that the intervention improved recognition of depressive symptoms (Table 3). Of the seven depressive symptoms presented in the postcards, five were statistically significantly better recognized in intervention participants following the intervention. The two other symptoms had very high levels of recognition pre-intervention. This contrasted with the seven depressive symptoms not presented in the postcards, of which only one was significantly better recognized afterwards.

### Knowledge of treatments for depression

Pre-intervention, counselling (81.5%) was usually reported as effective, and statistically significantly more frequently than either anti-depressants (66.8%) or exercise (65.9%) (Table 4). However, St John's Wort (13.1%) was

rarely reported as effective. Post-intervention, cluster level analysis demonstrated no statistically significant difference in participants' report of the effectiveness of the three treatments endorsed by the postcards. However, there was strong evidence to suggest that the intervention increased participants' awareness that anti-depressants are not addictive (difference in means 7.7%, 99% CI 1.7-13.7,  $p < 0.001$ ) (Table 4). Furthermore, fewer participants in the intervention colleges agreed that anti-depressants should not be taken long term, although this trend did not reach statistical significance (difference in means 4.7%, 99% CI -2.4 to 11.8,  $p = 0.08$ ).

### Cost

We estimate that the postcards and the posters cost just under £3500. This figure includes the cost of the focus group, design and printing of the intervention, postage and university administrative staff time.



Table 3. Recognition of depressive symptoms

	Pre-intervention		Post-intervention		Analysis at cluster level post-intervention <sup>a</sup>		
	Control n (%)	Intervention n (%)	Control n (%)	Intervention n (%)	Difference	99% CI	p value
Presented in postcards							
Physical aches and pains	321 (35.0)	283 (31.6)	249 (32.4)	342 (48.8)	+16.4	7.1 to 23.5	<0.001
Reduced interest in sex	554 (60.5)	517 (57.7)	487 (63.3)	515 (73.5)	+10.1	2.4 to 17.8	0.001
Feeling anxious or worried	725 (79.1)	727 (81.1)	595 (77.4)	590 (84.2)	+6.8	0.7 to 12.9	0.005
Nothing feeling good any more	781 (85.3)	765 (85.4)	658 (85.6)	626 (89.3)	+3.7	0.2 to 7.2	0.007
Reduced physical energy levels	702 (76.6)	674 (75.2)	586 (76.2)	575 (82.0)	+5.8	0.02 to 11.6	0.01
Difficulty coping with life	840 (91.7)	817 (91.2)	688 (89.5)	649 (92.6)	+3.1	-2.2 to 8.4	0.12 <sup>b</sup>
Problems with sleep	713 (77.8)	743 (82.9)	633 (82.3)	591 (84.3)	+2.0	-2.6 to 6.6	0.24
Not presented in postcards							
Difficulty concentrating	706 (77.1)	672 (75.0)	595 (77.4)	577 (82.3)	+4.9	-0.4 to 10.2	0.02
Tearfulness	676 (73.8)	650 (72.5)	578 (75.2)	555 (79.2)	+4.0	-2.0 to 10.2	0.08
Feeling guilty	490 (53.5)	488 (54.5)	405 (52.7)	395 (56.3)	+3.7	-2.3 to 9.7	0.10
Feeling agitated	534 (58.3)	492 (54.9)	438 (57.0)	424 (60.5)	+3.5	-2.6 to 9.6	0.12
Reduced motivation	840 (91.7)	807 (90.1)	695 (90.4)	649 (92.6)	+2.2	-2.7 to 7.1	0.22 <sup>b</sup>
Difficulty making decisions	573 (62.6)	533 (59.5)	475 (61.8)	445 (63.5)	+1.7	-5.1 to 8.5	0.49
Eating too much or too little	673 (73.5)	672 (75.0)	601 (78.2)	552 (78.7)	+0.6	-5.3 to 6.5	0.78 <sup>c</sup>

<sup>a</sup> p value obtained from weighted *t* test unless otherwise indicated.

<sup>b</sup> Mann-Whitney *U* test. Median difference and 99% confidence interval (CI) for median difference reported. Analysis not weighted for cluster size.

<sup>c</sup> Levene's test  $p < 0.1$ . Mann-Whitney *U* test ( $p = 0.92$ ). Median difference 0.2; 99% CI -7.1 to +7.9. Analysis not weighted for cluster size.

Table 4. Knowledge of treatments for depression

	Pre-intervention		Post-intervention		Analysis at cluster level post-intervention <sup>a</sup>		
	Control n (%)	Intervention n (%)	Control n (%)	Intervention n (%)	Difference	99% CI	p
Positive correct response							
Antidepressants are effective <sup>b</sup>	608 (67.0)	594 (66.6)	521 (68.6)	498 (71.1)	2.6	-2.8 to 8.0	0.20 <sup>c</sup>
Counselling is effective <sup>b</sup>	751 (82.6)	718 (80.4)	621 (81.3)	569 (81.9)	0.6	-4.8 to 6.0	0.77
Exercise is effective <sup>b</sup>	585 (64.3)	604 (67.5)	503 (65.7)	444 (63.7)	-2.0	-9.4 to 5.4	0.47
St John's Wort is effective	114 (12.6)	121 (13.5)	97 (12.8)	90 (13.1)	0.3	-5.8 to 6.4	0.90
Negative correct response							
Antidepressants are addictive <sup>b</sup>	442 (48.6)	401 (45.0)	349 (45.5)	264 (37.8)	-7.7	-13.7 to -1.7	<0.001
Antidepressants should not be taken long term <sup>b</sup>	676 (74.3)	658 (73.8)	566 (73.9)	484 (69.1)	-4.7	-11.8 to 2.4	0.08

<sup>a</sup> p value obtained from weighted *t* test unless otherwise indicated.

<sup>b</sup> This information was presented in postcard 3.

<sup>c</sup> Levene's test  $p < 0.1$ . Mann-Whitney *U* test ( $p = 0.2$ ). Median difference -0.2%, 99% confidence interval (CI) for median difference -7.9 to +7.1. Analysis not weighted for cluster size.

## DISCUSSION

A social marketing intervention comprising posters and postcards failed to increase the proportion of students reporting that depression can be treated effectively. This failure to influence the primary outcome occurred despite most of the students in the intervention group

reporting that they had read the postcards. Of the three endorsed treatments, counselling was most frequently reported as effective, followed by antidepressants and exercise. Post-intervention, the differences between the groups in reported effectiveness of each pair of these treatments were not statistically significant. However, intervention group participants were

more aware of depressive symptoms and less likely to believe that antidepressants were addictive.

### Strengths and limitations of the study

This paper reports on a large randomized trial that adopted a cluster randomized design to minimize contamination between control and intervention groups. The intervention was developed using a systematic process that incorporated qualitative research. The intervention was designed using established marketing techniques. The intervention was inexpensive, costing less than £3500, including the design, printing and delivery to over 10 000 students. However, a formal cost-effectiveness analysis was not performed, as the study was not powered to detect differences in economic outcomes. Intervention delivery and data gathering were completed within 2 months, and therefore conclusions can be drawn about possible associations. In addition, the trial design was robust and addressed several methodological weaknesses frequently reported by cluster randomized controlled trials, such as by taking into account the clustered nature of the data in the analysis.

We based our power calculation on a difference of 15% in the primary outcome measure, which may be unrealistic for an educational intervention. However, with the higher than anticipated response rate and observed estimate of the intra-cluster correlation coefficient (0.007 pre-intervention), retrospectively our sample size had 80% power to detect a difference of 10% (40–50%) at the 5% significance level. It is questionable whether a 10% improvement is the minimum deemed worthwhile for such an intervention, and perhaps 5–7% would be more realistic. However, our study provides evidence that, for the primary outcome alone, an improvement of this magnitude is unlikely. We also have strong evidence that, in a number of secondary outcomes, the intervention led to an improvement considered to be of clinical relevance.

This study had a response rate of over 30%. Nearly 70% of participants in the intervention group claimed to have read the postcards; however, we are unable to determine whether a similar number from the considerable number of non-respondents did the same. The long-term impact of the intervention may be lower; the

effect reported in this paper, measured directly after the students had received the intervention, may be short lived and may not result in actual behavioural change. The intervention may have had more long-term impact if it had been one element in a more comprehensive social marketing campaign. The intervention may also have been more effective for those students who are directly or indirectly affected by depressive disorders. However, the caseness of the respondents was not assessed. Finally, we did not consider the possible influence of gender on outcomes.

The finding that less than half of participants reported that depression can be treated effectively is important. This widely held belief might lead to feelings of helplessness and hopelessness and reduce the likelihood of depressed students seeking help. However, the intervention successfully increased recognition of depressive symptoms, especially when pre-intervention recognition was poor. This finding opens up the possibility that similar campaigns may increase the proportion of students recognizing that they have depression. Unfortunately, little benefit may accrue from this if the belief remains that depression is untreatable.

It is unclear why the intervention did not change beliefs about treatability but did improve recognition of symptoms and change beliefs about addictiveness. The statement 'clinical depression can be treated' was written on each of the postcards, but only one postcard gave details of treatments. By contrast, instead of simply listing depressive symptoms, the postcards drew attention to less well-known symptoms, such as aches and pains and reduced sex drive. Beliefs about addictiveness may have been influenced by explicitly comparing antidepressants with alcohol and street drugs.

A relatively high proportion of the students regarded antidepressants as effective, compared with subjects in other surveys of this type (Paykel *et al.* 1998; Hegerl *et al.* 2003; Riedel-Heller *et al.* 2005). It is unclear why this might be. Clearly the characteristics of the population may be relevant – they are young students in a British university with high entrance criteria, and may therefore not be broadly representative. Alternatively, attitudes to antidepressants in the UK may have changed since the Defeat Depression Campaign.

Exercise was reported by participants as being as effective as antidepressants. However, there is uncertainty about the effectiveness of exercise as a treatment for depression (Butler *et al.* 2005), partly due to concerns about acceptability. The findings here suggest that this may be less of a concern than in some other patient groups, and this raises the possibility of exercise being an acceptable treatment for student depression.

### Implications for practice and future research

This study demonstrates that many university students lack knowledge about depression and its treatment. It supports the recommendation of the Royal College of Psychiatrists' report on student mental health (2003) that mental health education in universities should be prioritized. However, health education is costly, and educational campaigns about depression need to be demonstrably effective and cost-effective. Incorporation of social marketing techniques into the design of the intervention may increase effectiveness, such as by increasing exposure to the intervention. Simple and cheap media, such as postcards and posters, may be effective in this target group when the existing knowledge base is poor.

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### DECLARATION OF INTEREST

The funders did not have any role in the design, conduct, interpretation, review or approval of this article. R.M., J.M. and J.P. have no competing interests. J.G. has received research funding (including funding of staff) and support from Sanofi-Aventis and GlaxoSmithKline and has received funding for organizing workshops

and presenting lectures from Eli Lilly and Sanofi-Aventis.

### NOTE

Supplementary information accompanies this paper on the Journal's website (<http://journals.cambridge.org>).

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