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ORIGINAL PAPER

Long-term effects of filmed social contact or internet-based self-study on mental health-related stigma: a 2-year follow-up of a randomised controlled trial

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Abstract

Purpose There is a critical need to clarify the long-term effects of anti-stigma interventions. The study aimed to assess the long-term effects of repeated filmed social contact or internet-based self-study on mental health-related stigma through a randomised controlled trial with 2-year follow-up.

Methods We randomly allocated 259 university or college students to a filmed social contact group, an internet-based self-study group, or a control group. The filmed social contact and internet-based self-study groups each received a 30-min initial intervention followed by emailed interventions every 2 months over a 12-month period. The Japanese version of the Reported and Intended Behaviour Scale (RIBS-J) and the Mental Illness and Disorder Understanding Scale (MIDUS) were used to assess behaviour, behavioural intentions (attitudes), and knowledge regarding mental health.

Results Of the 259 original participants, 187 completed the 24-month follow-up assessment. Mean scores for the RIBS-J future domain and MIDUS peaked at 1 month after initial intervention. Compared with baseline, at 24-month follow-up, we found a significant difference in RIBS-J future domain scores between the filmed social contact and control groups at 24-month follow-up ($B = 0.95$, 95% CI = 0.01,1.90, $p = 0.049$), while MIDUS scores in the filmed social contact group ($B = -4.59$, 95%CI = −6.85, −2.33, $p < 0.001$) and the internet-based self-study group ($B = -4.51$, 95%CI = −6.86, −2.15, $p < 0.001$) significantly decreased compared with the control group.

Conclusion While outcome scores peaked at 1 month after initial intervention, results suggest that filmed social contact might have a long-term effect on behavioural intentions, and both filmed social contact and internet-based self-study may contribute to improved knowledge of mental health.

Keywords Filmed social contact · Internet-based self-study · Long-term effect · Randomised controlled trial · Stigma

Introduction

Among members of the general public, mental health-related stigma, which consists of knowledge problems (ignorance), attitude problems (prejudice), and behaviour problems (discrimination), is a serious issue globally [1], as it has adverse impacts on the entire lives of people with mental health problems [2]. Mental health-related stigma also negatively affects people's intentions or behaviours related to seeking or using mental health services [3, 4]. Although the peak time for clinical onset of multiple mental health problems occurs during childhood and adolescence [5], a systematic review revealed that young people display negative attitudes and discriminatory behaviours towards people with mental health problems [6]. Therefore, they comprise a major target population group for anti-stigma efforts [7].

Over the past half-century, numerous studies have addressed mental health-related stigma among the general public, including young people. Several systematic reviews and meta-analyses have suggested that social contact or filmed social contact interventions are most effective in reducing mental health-related stigma in adults and youths

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[8–14], particularly when incorporating mental health education by professionals [11]. On the other hand, studies have also pointed out the limited effects of one-time interventions, and the need for continuous interventions [12, 15]. In addition, most of the existing systematic reviews that focus on young people have consistently noted methodological weaknesses (e.g., non-random design, use of non-validated measures, and high attrition rates) in trials reviewed [8–13, 16–20].

Moreover, reviews have critically and repeatedly emphasised the lack of evidence for the long-term effects of anti-stigma interventions [8–13, 16–20]. Indeed, two recent systematic reviews note that RCTs for direct social contact or filmed social contact examined only short- or medium-term effects (having follow-up periods of 6 months or less) [8, 10]. In particular, one systematic review of filmed social contact interventions in young people revealed that only one study assessed medium-term (4-month) effects [8]. In short, although filmed social contact is a useful way of delivering an intervention to a wide audience [21, 22], evidence for its long-term effects is still unclear, particularly in youth samples.

To address these issues, we conducted a randomised controlled trial (RCT) with 1-year follow-up that used validated measures to compare a filmed social contact intervention, an internet-based self-study intervention, and a non-active control group. We found that the filmed social contact group experienced a greater positive impact on behavioural intentions and knowledge of mental health problems than the other two groups [21]. However, it was not clear whether intervention effects would be maintained over the long term. We, therefore, conducted additional follow-up assessments 14 months after the final e-mail interventions (24 months after the initial intervention). Using these 2-year follow-up data, the present study aimed to assess the longer-term effects of repeated filmed social contact and internet-based self-study on mental health-related stigma, particularly in the area of behavioural intentions, in a university and college student sample.

Methods

Design

We conducted an individual-level RCT with a parallel-group design, 1:1:1 allocation ratio, and 24 months of follow-up. The study was conducted in Tokyo, and had three groups: filmed social contact, internet-based self-study, and non-active control. Stigma-related outcomes were evaluated five times: at baseline (T1), immediately after initial intervention (T2), and then 1 month (T3), 12 months (T4), and 24 months (T5) after initial intervention. The T1 assessment, initial intervention, and T2 assessment were conducted on eight separate days between November 2013 and July 2014 at The University of Tokyo. In addition, participants in the filmed social contact and internet-based self-study groups received five follow-up interventions sent by email every 2 months after completion of the initial intervention. We conducted web-based follow-up assessments at T3, T4, and T5. The study protocol was registered with the University Hospital Medical Information Network Clinical Trials Registry before beginning the initial survey (No. UMIN000012239). Detailed results up to the 12-month follow-up point have been reported previously [21].

Participants

We recruited undergraduate and graduate students from 20 colleges and universities located within 60 min by public transportation of the intervention site through the website of an employment agency sanctioned by over 200 colleges and universities in Japan (Nasic I Support Co. Ltd.). When recruiting potential participants, we did not inform them that this study was related to mental health-related stigma, but explained that the project explored the effects of different learning methods. The study set three exclusion criteria: students who had not graduated from junior high and high school in Japan; those who did not plan to be a student in Japan 1 year after participation; and those who were in the third year or later of medicine or psychology programmes, as these students undergo professional education related to mental health. Potential participants were given a full description of the study and the ethical issues involved, and written informed consent was obtained. The study was approved by the Research Ethics Committee in the Office for Life Science Research Ethics and Safety at The University of Tokyo (Nos. 14–112 and 14–116).

Sample size

Sample size was determined based on the results of a preliminary pilot study. The pilot study compared filmed social contact and internet-based self-study in 29 undergraduates, and found a 1.55 mean difference in future domain scores of the RIBS-J between groups immediately after interventions. Detecting this difference with 80% power at a 5% significance level (two-sided) would require 61 participants. Assuming a 20% attrition rate, the final number of participants required was estimated to be approximately 83 in each of the three groups (249 in total).

Randomisation

A research assistant (RA), who did not participate in the interventions, assessments, or data analysis, created a

computer-generated allocation list of random permuted blocks with block sizes of six or nine stratified by sex using a website (http://www.randomization.com), to ensure concealment. The RA also prepared opaque and sealed envelopes with participant allocation results. Three authors (SY, KO, and SA) handed out the envelopes to individual participants, and then participants were assigned to one of the three intervention groups during the baseline assessment. Participant allocation was concealed until completion of the baseline assessment. Allocation was also masked to researchers involved in processing and analysing the data until all participants had completed the baseline assessment.

Interventions

In the filmed social contact group, after baseline assessment, participants watched a 30-min film which consisted of interviews of two men with schizophrenia, a portrayal of a woman with obsessive–compulsive disorder, and educational lecture slides with an audio explanation of mental health, accompanied by information on help-seeking and mental health service providers. Interview video clips came from the JPOP-VOICE website (http://jpop-voice.jp/index.html), which features messages related to social inclusion and content related to recovery experiences of people who have experienced a diagnosis of schizophrenia or cancer. This study used only the interview video clips of people with schizophrenia; no material from people with cancer was included. In terms of the educational lecture slides, the film provided four key messages, including 'see the PERSON rather than a person with SCHIZOPHRENIA'; 'people with mental illness can recover socially'; 'importance of social inclusion and human rights'; and 'high prevalence of mental disorders', based on a past consensus development study [23]. After the initial intervention, participants received five follow-up interventions every 2 months via email. The follow-up interventions contained URLs of websites showing interviews with people with schizophrenia, major depression, panic disorder, and obsessive–compulsive disorder, but implementation methods in the present study did not allow for monitoring of whether each participant actually accessed the websites and watched the interviews. Participants did not receive any interventions between the 12-month and 24-month follow-up points.

As the initial intervention, participants in the internet-based self-study group were provided with laptop computers and two keywords, 'schizophrenia' and 'mental illness', and were asked to search for relevant information on the internet using these keywords for 30 min. Subsequently, they received five emailed follow-up interventions every 2 months after the initial intervention. Each email provided keywords of disease names corresponding to the contents of the follow-up interventions in the filmed social contact group and encouraged the participants to conduct internet searches using the keywords. As with the filmed social contact group, we did not track whether participants actually did this work. This group, too, did not receive any interventions after the 12-month follow-up point.

In the control group, participants played computer games using laptop computers for 30 min during the initial intervention. They did not receive any follow-up interventions.

Outcome measures

To assess stigma-related outcomes, we employed two scales: the Japanese version of the Reported and Intended Behaviour Scale (RIBS-J), and the Mental Illness and Disorder Understanding Scale (MIDUS).

The RIBS-J consists of two subscales, one focused on reported behaviour, and the other on intended behaviour [24]. The reported behaviour subscale comprises four items asking whether a respondent has ever experienced social contact with people with mental health problems in the past. The intended behaviour subscale also consists of four items; these assess a respondent's future behavioural intentions on a five-point Likert scale. Higher scores on the subscales indicate more social contact experience and more positive intentions, respectively. The RIBS-J was created based on the original RIBS, which was developed in the UK [25]. Factorial validity, convergent validity, and good internal consistency for RIBS-J were demonstrated in a previous study [24]. We also confirmed reasonable test–retest reliability for RIBS-J, even though the RIBS-J past domain asks participants to look back at their whole lives, rather than a particular brief period [24]. The RIBS-J intended behaviour subscale score was used as the primary outcome.

The Mental Illness and Disorder Understanding Scale (MIDUS) was employed to assess mental health-related knowledge (e.g., 'mental illness is treatable', 'mental illnesses are common'); it consists of 15 items on a five-point Likert scale. Higher scores indicate less knowledge of mental illness. MIDUS was originally developed in Japan, and its factorial validity and moderate internal consistency have been confirmed [26].

Statistical analysis

To test the differences in sample characteristics and baseline scores between groups, or between those who completed the 24-month follow-up assessment and those who did not, we used ANOVA, *t* tests, Chi-square tests, and Fisher's exact test, accordingly. We included in our analyses all participants who properly completed the outcome assessment at the 24-month follow-up point, although some of them may not have watched the videos or performed the internet searches contained in the follow-up interventions. For the

main analyses, we used a mixed model repeated measures model for the RIBS-J intended behaviour subscale (primary outcome) and MIDUS, and a generalised estimating equations model for the RIBS-J reported behaviour subscale to examine intervention effects. Each model included group, time (T1 and T5 only), interaction for group and time, and baseline score. We also conducted supplemental analysis using all assessment point data (T1, T2, T3, T4, and T5) to test intervention effects over time, especially whether effects would be maintained over the 24-month (T5) follow-up period. In addition, sensitivity analyses were conducted for the main and supplemental analyses, controlling for demographic variables at baseline. Specifically, we adjusted for sex, age, experience of having own mental health problems, experience of receiving a lecture on mental health, experience of watching media describing people with mental health problem, and RIBS-J reported behaviour subscale scores at baseline, which were regarded as potential confounders or effect modifiers from past studies [12, 16, 19, 21, 22]. Statistical significance was set at 5% ($p < 0.05$). One author (TS), who was blinded to group allocation, conducted all analyses using Stata version 12.

Results

Figure 1 shows the recruitment process for this study using a CONSORT flow diagram. We received applications to participate in this study from 575 university or college students via a website. Of these, 258 students were excluded due to study criteria or the survey schedule. The remaining 317 students were assigned appointments, and 259 came to the intervention site. These participants received baseline (T1) assessments and were then randomly allocated to one of the three intervention groups. There were 199 participants who completed the 24-month follow-up assessment, with 187 of these included in our analysis (attrition rate 27.8%). There were no significant differences in socio-demographics and outcome scores between the analysed sample and the drop-out sample.

At baseline, around 40% of participants were female, and mean age was approximately 20 years in all three groups. Other socio-demographic variables and baseline scores in each group are shown in Table 1. There were no significant between-group differences in these variables

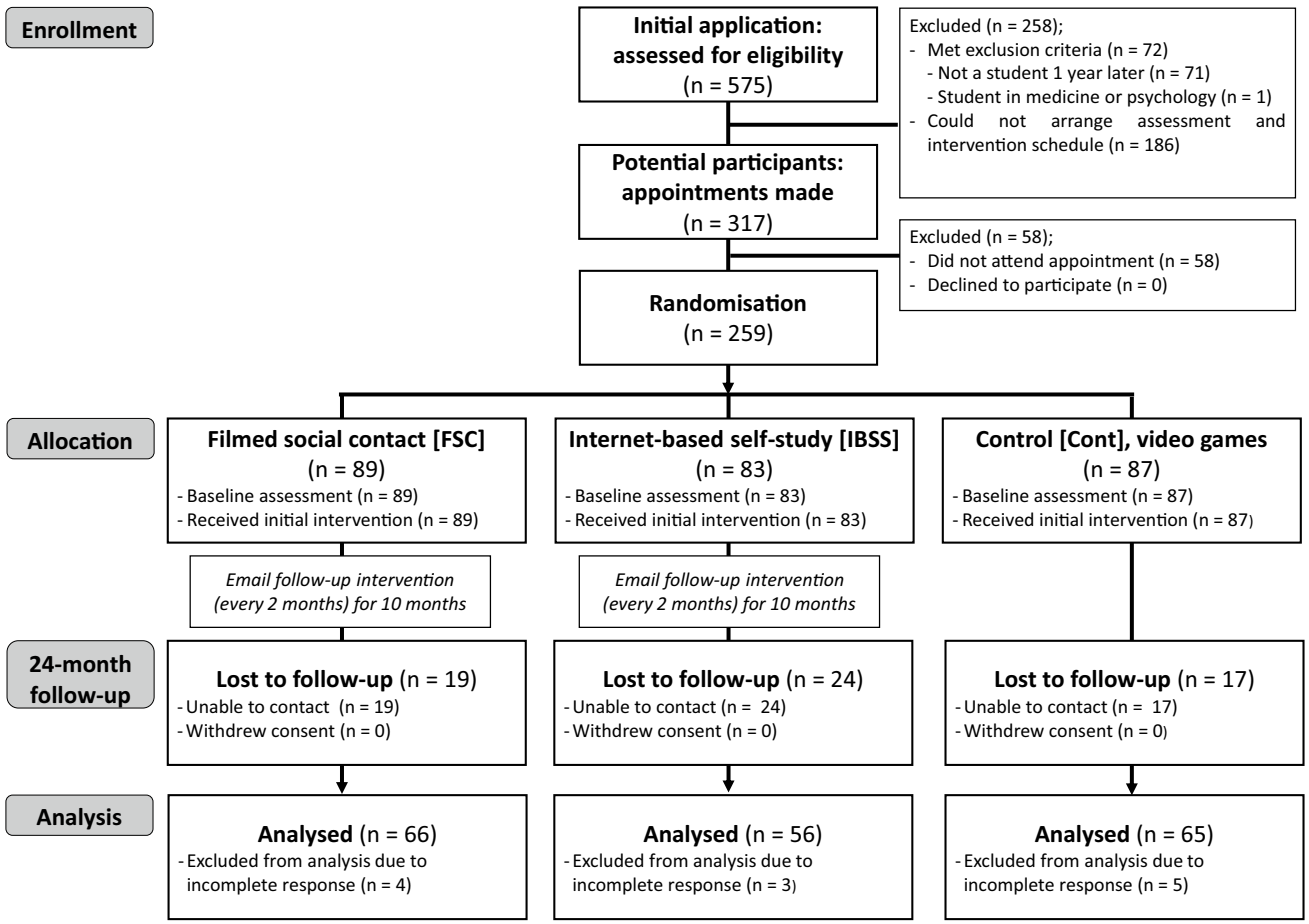

Fig. 1 CONSORT flow diagram for the recruitment process

Table 1 Characteristics of participants by group

	Filmed social contact		Internet-based self-study		Control		Stats	
	$n=66$		$n=56$		$n=65$			
	M (*n*)	SD (%)	*M* (*n*)	SD (%)	*M* (*n*)	SD (%)		
Sex, female (*n*, %)	26	39.39	26	46.43	28	43.08	$X^2=0.616$	$p=0.735$
Mean age (mean, SD)	20.31	1.10	20.25	1.31	20.12	1.16	$F=0.46$	$p=0.633$
Past experience of (*n*, %)								
Having mental health problems	10	15.15	6	10.71	12	18.46	$X^2=1.421$	$p=0.491$
Receiving care/treatment from professionals	5	7.58	4	7.14	6	9.23	$X^2=0.205$	$p=0.902$[b]
Attending a lecture about mental health problems	32	48.48	27	48.21	35	53.85	$X^2=0.511$	$p=0.774$
Viewing media describing an individual with mental health problems[a]	56	84.85	46	82.14	51	78.46	$X^2=0.904$	$p=0.636$
Visiting a psychiatric hospital	9	13.64	5	8.93	10	15.38	$X^2=1.180$	$p=0.554$[b]
Visiting a community mental health facility	1	1.52	3	5.36	4	6.15	$X^2=1.948$	$p=0.378$[b]
RIBS-J (mean, SD)								
Reported behaviour subscale	0.52	0.71	0.38	0.68	0.55	0.66	$F=1.12$	$p=0.328$[b]
Intended behaviour subscale	11.73	2.75	11.79	3.00	12.58	3.12	$F=1.68$	$p=0.190$
MIDUS (mean SD)	19.00	6.48	19.16	5.92	16.86	5.65	$F=2.86$	$p=0.060$

MIDUS mental illness and disorder understanding scale, *RIBS-J* Japanese version of Reported and Intended Behaviour Scale

[a]Media includes television, newspaper, internet, etc.

[b]Fisher's exact test or Kruskal-Wallis test also show non-significant differences in the responses between the groups

at baseline. Changes in scores for each outcome measure are shown in Table 2. In all groups, the highest mean scores on the RIBS-J intended behaviour subscale were observed 1 month after initial intervention. Similarly, MIDUS scores in the two intervention groups were the lowest at the 1-month follow-up point.

The main analysis, which included only T1 and T5 data, found a significant difference in RIBS-J intended behaviour subscale scores between the filmed social contact group and the control group ($B=0.95$, 95% CI = 0.01, 1.90; $p=0.049$; see Table 2). We also found that MIDUS scores in the filmed social contact group (B = −4.59, 95% CI = −6.85, −2.33; $p<0.001$) and internet-based self-study group ($B=-4.51$, 95% CI = −6.86, −2.15; $p<0.001$) significantly decreased compared to those in the control group. There were no significant differences in scores for each measure in other comparisons.

The supplemental analysis, which included all T1 to T5 data, revealed a significant improvement in RIBS-J intended behaviour subscale scores in the filmed social contact group compared to scores in the control group at 24-month follow-up ($B=0.95$, 95% CI = 0.06, 1.84; $p=0.036$). Trends in supplemental analysis results for other measures at the 24-month follow-up point were similar to those of the main analysis (Supplementary Table 1). In addition, sensitivity analyses conducted after adjusting for socio-demographic variables confirmed that the results remained significant in both main and supplemental analyses.

Discussion

This trial evaluated the long-term effects of two anti-stigma interventions, namely, filmed social contact and internet-based self-study, on mental health-related stigma. At the 24-month follow-up point, we observed a significant positive effect for filmed social contact on the primary outcome of behavioural intentions, in comparison with the non-active control group. We found no effects of the two interventions on behaviour in terms of past contact experiences, while significant positive effects on knowledge of mental health problems were observed in both the filmed social contact and internet-based self-study groups, as compared with the control group.

Behavioural outcomes

Over the past few decades, social contact, including filmed social contact, has come to be considered an evidential strategy to lessen mental health-related stigma in the short or medium-term [8–14]. The results of the present study strengthen the evidence that well-designed filmed social contact and repeated follow-up interventions may be effective in improving behavioural intentions over the long term, as well. However, it should be noted that the difference in RIBS-J intended behaviour scores between intervention and control groups was only borderline significant ($p=0.049$) in

Table 2 Interventions effects between the three groups at baseline and 24-month follow-up

	Filmed social contact		Internet-based self-study		Control		Stats		
	n = 66		*n* = 56		*n* = 65		GEE/MMRM, group and time interaction[a]		
	M	SD	*M*	SD	*M*	SD	*B* (95% CI), *P*		
RIBS-J past domain							FSC vs Cont	IBSS vs Cont	FSC vs IBSS
T1, Baseline	0.52	0.71	0.38	0.68	0.55	0.66	0.04 (−0.22, 0.30)	0.13 (−0.14, 0.40)	−0.09 (−0.36, 0.18)
T2, Post-intervention	0.56	0.70	0.39	0.71	0.55	0.66	*p* = 0.743	*p* = 0.337	*p* = 0.517
T3, 1-month follow-up	0.53	0.79	0.50	0.83	0.52	0.62			
T4, 12-month follow-up	0.67	0.86	0.41	0.60	0.48	0.60			
T5, 24-month follow-up	0.71	0.78	0.66	0.98	0.71	0.86			
RIBS-J future domain							FSC vs Cont	IBSS vs Cont	FSC vs IBSS
T1, Baseline	11.73	2.75	11.79	3.00	12.58	3.12	0.95 (0.01, 1.90)	0.81 (−0.18, 1.80)	0.15 (−0.84, 1.14)
T2, Post-intervention	14.33	2.86	13.13	2.84	13.13	3.30	*p* = 0.049	*p* = 0.111	*p* = 0.769
T3, 1-month follow-up	14.48	3.05	13.77	3.02	13.86	3.41			
T4, 12-month follow-up	13.90	3.00	12.80	3.59	13.17	3.58			
T5, 24-month follow-up	13.70	3.05	13.61	3.46	13.60	3.16			
MIDUS							FSC vs Cont	IBSS vs Cont	FSC vs IBSS
T1, Baseline	19.00	6.48	19.16	5.92	16.86	5.65	−4.59 (−6.85, −2.33)	−4.51 (−6.86, −2.15)	−0.08 (−2.43, 2.27)
T2, Post-intervention	9.09	5.86	11.63	6.75	16.09	6.13	*p* < 0.001	*p* < 0.001	*p* = 0.947
T3, 1-month follow-up	8.44	6.12	11.21	6.23	14.86	5.55			
T4, 12-month follow-up	12.53	6.75	14.13	6.80	14.60	5.57			
T5, 24-month follow-up	12.24	7.25	12.48	6.05	14.69	6.12			

Cont control (group), *FSC* filmed social contact (group), *GEE* generalised estimating equations model, *IBSS* internet-based self-study (group), *MIDUS* mental illness and disorder understanding scale, *MMRM* mixed model repeated measure, *RIBS-J* Japanese version of reported and intended behaviour scale

[a]Multivariate analysis included group, time (T1 and T5) and group and time interaction

the main analysis, although supplemental analysis yielded a more robust significant difference. In addition, the improved mean score on the RIBS-J intended behaviour subscale in the filmed social contact group peaked at 1-month post-intervention, and then declined over the 24-month follow-up period. This echoes past studies with a 3-month follow-up period, which reported that the largest score changes in stigma-related measures were observed at the post-intervention survey point, rather than the mid-term follow-up [15, 22, 27]. These results suggest in particular a limited effect for follow-up interventions that arrange for participants to view interviews of people with mental health problems, without any mental health education, as described in a meta-analysis that concluded that the effectiveness of social contact alone was unclear [11]. This highlights an important area for future study, namely, the long-term effect on behavioural intentions of well-designed ongoing interventions that incorporate both information and filmed social contact, such as the initial filmed social contact interventions in this study.

In contrast to the significant difference seen in intended behaviour scores, no significant change in scores on the RIBS-J reported behaviour subscale, which assesses actual behaviour and contact experiences with people with mental health problems, was observed in the two intervention groups, as compared to the control group. It may be difficult to change problematic behaviour via an intervention that targets only individuals, since stigmatising behaviour and discrimination are likely due to public or social structural factors, not solely individual factors [2, 28]. In addition, the 2-year follow-up period may be too short in terms of behaviour change, particularly among university students, as they may not experience any dramatic change in their environment that would lead to having more opportunities to work or live with people with mental health problems [24]. On the other hand, since a change in people's attitudes generally predicts future behaviour [29], change in behavioural intentions may be an important indicator in studies of mental health-related stigma, instead of measuring behaviour itself [19]. In the context of mental health-related behaviour, however, the link between intentions and actual resulting behaviour is still not completely clear, and therefore, it is important to continue efforts to develop interventions that connect more directly with actual behaviour change.

Knowledge outcomes

In contrast to the behavioural outcomes, improved knowledge scores as assessed by MIDUS in both filmed social contact and internet-based self-study groups were sustained compared to the control group at the 24-month follow-up point. When anti-stigma interventions target younger people, mental health education is sometimes more effective than social contact [14], particularly on knowledge outcomes [30]. In the initial filmed social contact intervention, participants received messages related to social recovery and the high prevalence of mental disorders. This one-time intervention may contribute to maintaining positively oriented knowledge even over the long-term, and repeated mail-based follow-up interventions may facilitate self-learning by participants.

Similarly, the internet-based self-study participants also maintained their improved knowledge scores. There are two possible reasons for this. First, whereas the information found on websites varies considerably, and is often controversial or one-sided, the quality of websites—including Wikipedia—has not been poor in terms of mental illness [31, 32]. Indeed, when we conducted an internet search using Google and the keywords 'schizophrenia' and 'mental illness' in Japanese, pages from the websites of the Japanese Ministry of Health, Labour and Welfare; Wikipedia; and Japanese Society of Psychiatry and Neurology appeared within the first three results (accessed December 2016 and December 2017). Our participants may have obtained positively oriented, evidence-based information from these websites.

Second, internet-based self-study could be considered a form of active learning, which has been reported to be more effective than passive learning [33]. Asking participants to actively look for relevant information on the internet may have contributed to their improved knowledge outcomes over the long term.

On the other hand, there are still questions regarding whether amount of knowledge is related to attitudinal and behavioural change [34, 35]. Indeed, the internet-based self-study group had improved knowledge outcomes, but not behavioural outcomes, compared to the control group. Further studies are needed to confirm whether knowledge acquisition and maintenance are associated with other dimensions of mental health-related stigma.

Filmed social contact versus internet-based self-study

In this study, filmed social contact did not demonstrate superior effects on any outcome measures compared to internet-based self-study at the 24-month follow-up point, in contrast to the comparisons between each intervention group and the non-active control group. There are some assumptions associated with this result. Since only filmed social contact showed a significant improvement in behavioural intentions at 24-month follow-up compared to the control group, the effect of filmed social contact might be somewhat larger than that of internet-based self-study. On the other hand, the fact that filmed social contact had a greater effect on improving behavioural intentions than internet-based self-study

at the 12-month follow-up point [21] suggests that it may be difficult for participants to sustain improved attitudes after interventions have concluded. In other words, ongoing implementation of interventions may be key to maintaining meaningful effects, although the quality or content of follow-up interventions and social contact may also affect the long-term effects of interventions [11, 36], as noted above. Identifying more effective anti-stigma intervention content, as well as systems or methods for maintaining effects over the long term, remain issues for the future.

Strengths and limitations

Strengths of the present study include the fact that it was conducted with long-term follow-up, and that it employed a random design with validated measures, thereby addressing weaknesses that have been frequently noted in studies over the past few decades [8–13, 16–20]. Furthermore, our follow-up rate was over 70%.

At the same time, we recognise the limitations of this study. First, the follow-up interventions in the filmed social contact and internet-based self-study groups were not tracked. We could not identify how many participants actually watched the videos or performed internet searches in accordance with the follow-up emails. Similarly, we did not manage the web pages viewed or search methods used in the internet-based self-study groups. In both groups, it is likely that adherence to the intervention programme, and the number of interventions that participants completed, varied between individuals over the course of the follow-up period. Therefore, intervention content was not uniform across or within groups: Some participants may have watched videos or conducted internet searches in all the follow-up interventions, while others may have participated only partially, or not at all, but still participated in the 24-month follow-up assessment. If we assume that some participants did not complete all the interventions, our results may differ from the scenario in which all participants complete all interventions. In the latter case, it is possible that outcome scores would have been worse than those currently reported. However, the analyses in this study included all participants who completed the 24-month follow-up, regardless of intervention adherence. Generally, such an analysis is considered to be able to rigorously judge intervention effects in a real-world setting, compared to an analysis which includes only participants who complete all interventions [37]. Future research may address the issue of engagement quantitatively using participant log data gathered via an online learning management system or e-learning software [38, 39]; subjective or qualitative data on participant engagement may also be obtained via a survey instrument similar to the Online Student Engagement Scale [40] that asks about the level or degree of participation in a particular intervention.

Second, the effects of social desirability and repetitive assessments using the same scales cannot be ignored. Although one study reported that the RIBS is less likely to be affected by social desirability, particularly when conducting a web-based survey [41], the baseline (T1) and post-intervention (T2) assessments in this study were conducted at the intervention site, rather than via a web-based survey.

Finally, generalisability of our findings may be limited. Our sample was composed of university or college students and may not be representative of all young people.

Conclusion

This study reports on potentially practical effects of interventions to reduce some aspects of mental health-related stigma. Filmed social contact may affect behavioural intentions over the long term, and both filmed social contact and internet-based self-study may contribute to improved knowledge of mental health. However, in the present study, the effects of filmed social contact were not substantially larger than those of internet-based self-study. To accurately assess intervention effects, future studies need to address the issue of monitoring adherence to interventions, particularly when delivering them via a medium such as the internet. It is also important that future research identify more effective long-term social contact interventions.

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Compliance with ethical standards

Ethical standards The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Conflict of interest The authors have no conflicts of interest to declare.

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