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A comparative study on persuasive health message design: effects of message framing and formatting on comprehensibility, persuasiveness, emotion, intention, and action.

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ABSTRACT

Objective: To examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages.

Design: Cross-sectional followed by 2-month follow-up study

Setting and participants: A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. Of 1,957 eligible respondents without psychiatric history, 1,805 people (92.2%) completed the 2-month follow-up questionnaire.

Main outcome measures: Six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). Participants were asked to rate the messages in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Subsequent 2-month help-seeking action for their own mental health (medical service use) was monitored by the follow-up survey.

Results: Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced emotions and consequently increased help-seeking intentions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the emotional responses. Any messages had little effect on maintaining help-seeking intention or increasing help-seeking action.

Conclusion: The results of this study confirmed the effectiveness of depression help-seeking messages in middle-aged Japanese people. Providers should consider that message framing and formatting may have a significant effect on persuasive message effectiveness, when they design their messages. Further studies are needed to identify the most effective pattern of message frame and format for changing people's behaviors toward mental illness.

Key words: depression, help-seeking, persuasive message, questionnaire survey

STRENGTH AND LIMITATIONS

- Health communication research has revealed that the effect of persuasive messages can depend on message characteristics, but less is known about what kind of message will more satisfactorily motivate people to seek mental health care. This study represents the first attempt to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages.
- The experimental comparison of 6 differently framed and formatted messages successfully revealed that message framing and message formatting would play different roles in the persuasion process.
- The study participants were limited to 35-45 years old selected from a nationwide panel of a research company. It is uncertain whether the messages will work equally well in other age groups or in other settings.

Introduction

Health communication is the study and use of communication strategies to inform and influence individual and community decisions that enhance health [1]. Communicating persuasive messages is a critical component of public health programs, which can produce beneficial changes in people's behaviors toward health issues [2,3]. Failure and delay in initial treatment contact for mental disorders has been recognized as an important public health problem [4,5], and some public health programs have been launched to tackle this problem [6]. Meanwhile previous studies have suggested that depression help-seeking messages have the potential to backfire; exposure to the messages may result in increased self-stigma and increased reluctance to help-seeking (i.e. boomerang effect) [7,8]. Further evidence is needed to identify strategies for successful public health messaging with the aim of promoting access to mental health care.

Health communication research has revealed that the effect of persuasive messages can depend on message characteristics. Well known is the framing effect, that is, health messages framed to highlight either the benefits of performing a behavior (i.e. gain-framed) or the consequences of not performing a behavior (i.e. loss-framed) will lead to different decisions and different health behaviors [9]. Gain-framed messages are more likely than loss-framed messages to promote prevention behaviors [10]. Meanwhile there seems to be some contexts in which loss-framed messages are equally or more effective than gain-framed messages [10,11]. It is uncertain whether gain-framed messages will more satisfactorily motivate people to seek mental health care.

Reading a message is the first step of the persuasion process. If recipients find difficulty in reading and understanding the given message, it is unlikely to have any persuasive impact. The Centers for Disease Control and Prevention (CDC) proposed a set of evidence-based criteria to develop and assess public health communication materials for diverse audiences,

namely the Clear Communication Index [12]. The Index represents the most important items that enhance clarity and aid understanding of public health messages and materials. The six core items applicable to all materials are: 1) include one main message statement, 2) put the main message first, 3) use visual cues to emphasize the main message, 4) include a visual that conveys the main massage, 5) include one call to action, and 6) use active voice. Applying the Index items probably help develop audience-appropriate health messages and materials [13]. However, to our knowledge, there have been no attempts to confirm whether health messages designed to conform to the Index items function better as a stimulus to change people's behaviors toward health issues. Moreover, little is known about the interaction between message frame and message format. If message format significantly influences the comprehensibility of health message, it is likely to modify the framing effect of health message to some extent.

The objective of this study was to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. Although the mechanism of persuasive message effectiveness has not been clearly elucidated, a number of factors can serve to mediate or moderate the effect of persuasive messages. Emotional responses to messages influence perceptions of effectiveness of messages [14,15]. Perceived message effectiveness is strongly correlated with and may be casually related to actual message effectiveness [15,16]. Intention is the best determinant of behavior in a wide range of health domains [17], and it has been commonly used as an outcome measure in health communication research [10]. We previously found that reading comprehension of health information was significantly associated with recognition of health risk and intention to perform health behaviors [18]. Based on these findings, the present study compared audience's responses to 6 differently framed and formatted messages in terms of comprehensibility, persuasiveness, emotion, intention, and action.

1. Methods

We launched a research project to develop effective health communication interventions for encouraging help-seeking in people at risk of suicide. As the first step in the research project, we developed rating scales for measuring audience's perceptions of effectiveness of health messages in Japanese people [19]. Using these and other quantitative assessment tools, we pretested 3 differently framed texts of depression help-seeking messages (neutral-, loss-, and gain-framed) by possible audience members [20]. The present study attempted to clarify further details about the recipients' responses to the depression help-seeking messages, focusing especially on difference between the formatted and unformatted messages.

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

2.1 Messages

In order to examine the effects of message framing and formatting, six messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). The aim of messaging was to increase people's help-seeking intentions for depression. The target audience were either depressed or non-depressed people. The messages were designed as print advertisements to be inserted in the form of web-based surveys.

The preparation of 3 differently framed texts of depression help-seeking messages were described previously [20]. In brief, the main message statements were selected from the text message list developed by Bell and colleagues [21] so as to be matched against the beliefs related to the top 3 reasons for having no help-seeking intention for depression, respectively [22]: 1) depression can happen to anyone, 2) depression needs treatment, and 3) depression improves with treatment. The first one (Message 1) was neutral-framed with additional

information on incidence of depression: about one out of 15 people experience depression during their lifetime. The second one (Message 2) was loss-framed (thereat appeal) with additional information on prognosis of untreated patients: about 80% of untreated patients will not recover. The third one (Message 3) was gain-framed (benefit appeal) with additional information on prognosis of treated patients: about 80% of treated patients will recover. Each message consisted of three part. The first part was the main message statement. The second part provided information on early signs of depression: depression can be recognized early by mental symptoms such as depressed mood, loss of interest, etc. and physical symptoms such as disturbed sleep, increased fatigue, etc. The last part was the call to action: if you suspect your depression, consult your family doctor.

For each of the 3 differently framed text, the formatted (P) and unformatted (N) messages were prepared containing the identical sentences. The formatted messages (Messages 1P, 2P, and 3P) were visually designed in accordance with the CDC Clear Communication Index User Guide [12]. The unformatted messages (Messages 1N, 2N, and 3N) were in plain text without any colors or visuals. The formatted versions of depression help-seeking messages were shown in Appendix A.

2.2 Participants

A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years [20]. Participants in the survey were recruited from an online research panel of a leading research company in Japan (Cross Marketing Inc., Tokyo, Japan). Medical professionals were excluded through a prescreening process. Applicants for participation in the survey were accepted in the order of receipt until the number of participants reached the quotas for gender, area, and K6 score (a measurements of depressive status). A total of 2,520 responses were obtained over two days of recruitment.

A follow-up survey was conducted in September 2017 to monitor subsequent changes in help-seeking intention and action. Of the 2,520 participants in the initial survey, 2,315 people (91.9%) completed the follow-up questionnaire.

All participants voluntarily agreed to participate in the survey after reading a description of the purpose and procedure of the survey. Consent to participate was implied by the completion and submission of the survey.

Excluding those who had an experience of receiving treatment for their mental illness, the remaining 1,957 participants were included in the study. The 2-month follow-up data were available for 1,805 people (92.2%).

2.3 Measures

Participants were randomly assigned to one of the depression help-seeking messages. After they read the message for at least 15 seconds, they were asked to rate it in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Moreover, participants in the 2-month follow-up survey were asked about help-seeking intention for depression and help-seeking action for their own mental health (medical service use).

The web questionnaire forms presented the questions one by one through the operation of a 'Next' button. Respondents answered one question per page and could not go back to the previous page.

2.3.1 Comprehensibility

Using the perceived effectiveness rating scales [19], the five items asked how easy or hard the information is to: 1) read, 2) understand, 3) remember, 4) locate important information,

and 5) keep for future reference. All item scores (range 1-5 points) were averaged to produce the comprehensibility score.

2.3.2 Persuasiveness

Using the perceived effectiveness rating scales [19], the seven items asked to what extent they agree or disagree that the information is: 1) believable, 2) convincing, 3) important to me, 4) help me feel confident about how best to do, 5) would help my family and friends, 6) put thoughts in my mind about wanting to do, and 7) agreeable. All item scores (range 1-5 points) were averaged to produce the persuasiveness score.

2.3.3 Emotional responses

Participants were asked 'when you read the message, to what extent you feel: 1) surprise, 2) anger, 3) fear, 4) sadness, 5) guilt, 6) anxiety, and 7) happiness?' [14,15]. Response options were from 1 (not at all) to 5 (extremely).

2.3.4 Design quality

Participants were asked to rate the message on a 5-point scale in terms of 1) organization, 2) attractiveness, 3) size, 4) tone, 5) helpfulness, and 6) spacing [23]. Higher scores indicate higher quality.

2.3.5 Intended future use

Participants were asked 'If you saw the information in a newspaper or magazine, how likely would you [use, read, and keep] it?' [23]. Response options were from 1(very unlikely) to 5 (very likely).

2.3.6 Help-seeking intention

Help-seeking intention for depression was measured using vignette methodology. Participants were presented with a vignette describing a man (or woman) with depression and were then asked 'If you had health problems right now like Mr. A (or Ms. A), would you see a doctor?' [19,20,22]. Those who gave affirmative answers (certainly yes and probably yes) were counted as having a positive help-seeking intention.

2.3.7 Help-seeking action

Help-seeking action for their own mental health was measured in the follow-up survey by asking participants whether they had seen a doctor for their mental health problem in the previous 2 months.

2.4 Statistical Analysis

All statistical analyses were performed using the SAS ver. 9.4 (SAS Institute, Cary, NC, USA). Main and interaction effects of frame and format were assessed using two-way analysis of variance. The proportions of people who reported a positive help-seeking intention for depression before and after exposure to the messages were compared using McNemar test. Multiple logistic regression analysis was conducted to identify the effects of frame and format on help-seeking intention for depression. Odds ratios (ORs) with 95% confidence intervals (CIs) for help-seeking intention for depression were calculated with adjustment for gender, depressive status, and underlying help-seeking intention. Significant levels were set at $p<0.05$.

3. Results

Table 1 shows the characteristics of the study participants. According to the national census [24], the percentage of the Japanese population aged 35-44 years with university

degrees were 22.0% in 2010, considerably lower than that of this study (45.6%). However, we confirmed that the distribution of HLS-14 score (a measurement of generic health literacy) in the study participants is quite similar to that obtained from our previous paper-based survey in a Japanese healthcare facility [25]. The numbers of participants assigned to Messages 1P, 1N, 2P, 2N, 3P, and 3N were 335, 317, 325, 324, 323, and 333 people, respectively. There were no significant differences between the message groups in sociodemographic characteristics.

Table 2 shows the assessment of the depression help-seeking messages. The comprehensibility and persuasiveness scores showed no significant differences between the frames or between the formats. For the emotional responses, significant main effects of frame were observed in 5 out of 7 items (surprise, fear, sadness, anxiety, and happiness). There were a significant effect of format on 'surprise' and significant frame×format interaction effects on 'happiness' and 'anxiety'. Compared with the neutral-framed (Message 1), the loss-framed message (Message 2) and the gain-framed message (Message 3) showed significant enhancements of emotional responses to the formatted messages (P). For the design quality, significant main effects of format were observed in 4 out of 6 items (attractiveness, size, helpfulness, and spacing). There were significant main effects of frame on 3 items (attractiveness, tone, and helpfulness) but no significant frame×format interaction. For the intended future use, a significant main effect of format was observed in 1 out of 3 items (read). There were no significant main effects of frame and no significant frame×format interaction.

Table 3 shows the changes in help-seeking intension for depression before and after exposure to the messages. All messages except Message 1N produced significant increase in help-seeking intention. Since our previous study suggested that depressed people are likely to be more susceptible to persuasive messages [20], the changes in help-seeking intension were further examined in participants stratified into depressed (K6≥5) and non-depressed (K6<5) groups. Significant increase in help-seeking intention was observed in all messages except

Message 1N in the depressed group, whereas significant changes were observed in Messages 2P and 3N in the non-depressed group.

Of the 1,805 participants in the 2-month follow-up survey, 1,141 people had not possessed help-seeking intention before exposure to the messages, and 249 people (21.8%) developed their help-seeking intentions after exposure to the messages. Of these, 143 people (57.4%) reported a positive help-seeking intention for depression again at the follow-up survey. The proportion of participants with stable help-seeking intention was 55.8% (58/104) in the depressed group and 58.6% (85/145) in the non-depressed group. These proportions were not significantly different by message frame or message format regardless of depressive status ($p=0.227$ and $p=0.939$, respectively in the depressed group; $p=0.760$ and $p=0.931$, respectively in the non-depressed group).

There were 66 people (3.7%) who had seen a doctor for their mental health problem during the follow-up period. The proportion of participants with help-seeking action was 5.5% (42/769) in the depressed group compared with 2.3% (24/1,036) in the non-depressed group ($p<0.001$). This proportion was not significantly different across the given messages regardless of depressive status ($p=0.516$ in the depressed group; $p=0.708$ in the non-depressed group).

4. Discussion

This study examined audience's responses to 6 differently framed and formatted messages which targeted either depressed or non-depressed people and aimed at increasing their help-seeking intentions for depression. The results of this study successfully confirmed the effectiveness of depression help-seeking messages in middle-aged Japanese people. The main message statements were respectively matched against the beliefs related to the top 3 reasons for having no help-seeking intention for depression [22], so that most of the messages could

make the recipients change their help-seeking intentions. Although depression help-seeking messages have the potential to backfire [7,8], such boomerang effect was not evident in this study.

The differently framed messages brought different emotional responses in a predictable way. The loss-framed message (Message 2) more strongly induced negative emotions (surprise, fear, sadness, and anxiety), while the gain-framed message (Message 3) more strongly induced a positive emotion (happiness). There was no significant difference in persuasiveness, however, significant increase in help-seeking intention was observed among those who read the loss-framed (Message 2) and gain-framed (Message 3) messages. Previous studies have suggested that emotional responses play a significant role in the persuasion process [14,15]. Compared with the neutral-framed (Message 1), the loss-framed (Message 2) and the gain-framed (Message 3) messages more strongly influenced the recipients' emotions and were consequently more likely brought out the recipients' help-seeking intentions. A literature review suggested that gain-framed messages are more likely than loss-framed messages to promote prevention behaviors [10]. However, there was no marked difference between the loss-framed (Message 2) and the gain-framed (Message 3) messages in help-seeking intention. According to these results, it is still unclear which message frame is recommendable for depression help-seeking messages, loss frame or gain frame.

The formatted messages (Messages 1P, 2P, and 3P) were judged superior to the unformatted messages (Messages 1N, 2N, and 3N) in design quality. The formatted messages consequently succeeded in increasing the likelihood that the message will be read. The significant frame×format interaction effects on 'happiness' and 'anxiety' indicated that the message formatting enhanced the recipients'emotional responses, both negative and positive. These results support the effectiveness of the CDC Clear Communication Index which helps provide easily understandable health messages and materials [12]. However, the effect of

message format was not significantly observed in persuasiveness, help-seeking intention, or help-seeking action. A literature review suggested that adding pictures to written text will increase the likelihood that the text will be read, however, the effects of pictures on comprehension, recall, and adherence have not yet been established [26]. The results of this study are insufficient to conclude, but it is likely that message formatting has a limited impact on the persuasion process.

Of those who developed their help-seeking intention after exposure to the messages, 57.4% kept their help-seeking intention up to the 2-month follow-up survey. This proportion was not significantly different across the given messages. The depression help-seeking messages succeeded in possessing help-seeking intention for a short time after exposure, but the effect could not be sustained over time. Moreover, those who had taken help-seeking action during the 2-month follow-up period accounted for 5.5% of the depressed (K6≥5) group compared with 2.3% of the non-depressed (K6<5) group. Seeing a message only once may be insufficient to induce help-seeking action. Although a number of interventions have been conducted to promote access to mental health care, very little is known about what interventions increase help-seeking action [27]. To our knowledge, there is no successful precedent that proved the effect of public health messaging on help-seeking action. Further studies are needed to find out effective strategies for maintaining help-seeking intention and increasing help-seeking action.

This study provides evidence for the effectiveness of depression help-seeking messages in middle-aged Japanese people. On the contrary, it has a number of potential limitations. First, the web-based survey was self-administered, so that the accuracy of responses would depend on participants' understanding of the questions and their motivation to answer questions accurately. The understandability of the wording of items was checked prior to the survey. The use of the Internet and the provision of anonymity would be expected to elicit more

truthful responses, by minimizing social desirability pressures [28]. However, it is almost impossible to eliminate the information bias completely. Second, the study participants were limited to 35-45 years old selected from a nationwide panel of a research company. The results of this study demonstrated the effectiveness of depression help-seeking messages, however, it is uncertain whether the messages will work equally well in other age groups or in other settings. Moreover, because of cultural differences, the findings from this study may not be applicable to non-Japanese populations. Now we are planning to conduct a population-based interventional study to assess the effectiveness of a public health communication program using the depression help-seeking messages. We will discuss the channels and activities that will be most likely to successfully reach target audience in the future study.

5. Conclusion

This study examined the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. The experimental comparison of 6 differently framed and formatted messages revealed that compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced the recipients' emotions and were consequently more likely to bring out the recipients' help-seeking intentions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the recipients' emotional responses. According to these results, communicating persuasive messages will change people's attitudes and intentions toward help-seeking for depression if the messages are developed carefully and appropriately. Providers should consider that message framing and formatting may have a significant effect on persuasive message effectiveness, when they design their messages. Unfortunately, any messages had little effect

on maintaining help-seeking intention or increasing help-seeking action. Further studies are needed to identify the most effective pattern of message frame and format for changing people's behaviors toward mental illness.

Contributors

MS was responsible for the design and conduct of the study, the collection, analysis, and interpretation of data, and the writing of the article. TY and HY contributed to the data interpretation and discussion of the implications of this work. All authors read and approved the final manuscript.

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Competing interest

The authors declare that they have no competing interest.

Ethics approval

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

Data sharing statement

No additional data are available.

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Table 1 Characteristics of the study participants

		N	
Gender	Male	980	49.8%
	Female	987	50.2%
Age	Mean (SD)	40.9	(3.0)
Education	Compulsory education/high school	540	27.6%
	Junior college/vocational school	524	26.8%
	University or higher	893	45.6%
Marital status	Married	1101	56.3%
	Unmarried	767	39.2%
	Divorced/widowed	89	4.5%
Occupation	Full-time job	1176	60.1%
	Temporary or part-time job	329	16.8%
	No occupation	452	23.1%
Household income	<2.0 million yen †	230	11.8%
	2.0-3.9 million	394	20.1%
	4.0-5.9 million	552	28.2%
	6.0-7.9 million	400	20.4%
	8.0-9.9 million	205	10.5%
	10.0+ million	161	8.2%
	Missing	15	0.8%

†1 million yen was about 10,000 U.S. dollars at the time of the survey.

Table 2 Assessment of the depression help-seeking messages

		Message						p		
		1N	1P	2N	2P	3N	3P	Frame (A)	Format (B)	A × B
Comprehensibility										
	Mean	3.74	3.81	3.79	3.80	3.82	3.82	0.554	0.472	0.757
	SD	0.79	0.78	0.87	0.83	0.83	0.78			
Persuasiveness										
	Mean	3.15	3.13	3.20	3.18	3.10	3.17	0.168	0.732	0.352
	SD	0.59	0.63	0.66	0.62	0.67	0.64			
Emotional responses										
1) surprise	Mean	2.47	2.57	2.60	2.81	2.49	2.63	0.005	0.002	0.636
	SD	1.03	1.10	1.06	1.01	1.10	1.02			
2) anger	Mean	1.91	1.91	1.94	2.01	1.90	1.99	0.411	0.202	0.596
	SD	0.95	0.92	0.92	0.96	0.92	0.93			
3) fear	Mean	2.51	2.43	2.55	2.64	2.22	2.41	<0.001	0.163	0.061
	SD	1.03	1.05	1.06	1.07	1.01	0.98			
4) sadness	Mean	2.44	2.43	2.53	2.61	2.24	2.38	<0.001	0.124	0.413
	SD	1.03	1.10	1.05	1.04	1.01	0.95			
5) guilt	Mean	2.09	2.07	2.08	2.18	2.02	2.09	0.326	0.247	0.440
	SD	0.91	0.96	0.93	0.94	0.92	0.86			
6) anxiety	Mean	2.63	2.50	2.59	2.74	2.34	2.45	<0.001	0.370	0.035
	SD	1.04	1.12	1.06	1.08	1.02	1.03			
7) happy	Mean	1.93	1.83	1.99	1.98	2.17	2.35	<0.001	0.657	0.024
	SD	0.96	0.92	0.98	0.98	0.98	0.95			
Design quality										
1) organization	Mean	3.67	3.65	3.72	3.80	3.64	3.71	0.113	0.258	0.557
	SD	0.87	0.90	0.91	0.84	0.88	0.87			
2) attractiveness	Mean	3.10	3.22	3.18	3.37	3.08	3.26	0.029	<0.001	0.749
	SD	0.84	0.89	0.86	0.84	0.91	0.90			
3) size	Mean	3.38	3.38	3.37	3.52	3.32	3.41	0.177	0.037	0.296
	SD	0.81	0.88	0.91	0.86	0.79	0.86			
4) tone	Mean	3.16	3.11	3.20	3.13	3.22	3.33	0.004	0.966	0.084
	SD	0.72	0.79	0.82	0.83	0.77	0.83			
5) helpfulness	Mean	3.38	3.36	3.39	3.57	3.37	3.48	0.048	0.019	0.109
	SD	0.82	0.84	0.90	0.80	0.87	0.87			
6) spacing	Mean	3.35	3.50	3.26	3.56	3.24	3.52	0.633	<0.001	0.220
	SD	0.77	0.80	0.91	0.78	0.85	0.80			
Intended future use										
1) read	Mean	3.17	3.23	3.28	3.28	3.12	3.36	0.286	0.016	0.052
	SD	0.90	0.91	0.92	0.95	0.95	0.87			
2) use	Mean	2.77	2.71	2.87	2.83	2.72	2.86	0.063	0.666	0.065
	SD	0.84	0.86	0.84	0.85	0.82	0.79			
3) keep	Mean	2.36	2.34	2.38	2.48	2.34	2.46	0.332	0.142	0.332
	SD	0.98	0.95	0.97	0.98	0.91	0.90			

Message 1P, 2P, and 3P were visually formatted versions of Message 1N, 2N, and 3N, respectively. All items were scored on a 1-to-5 point scale. Two-way analysis of variance was used to assess main and interaction effects of frame and format.

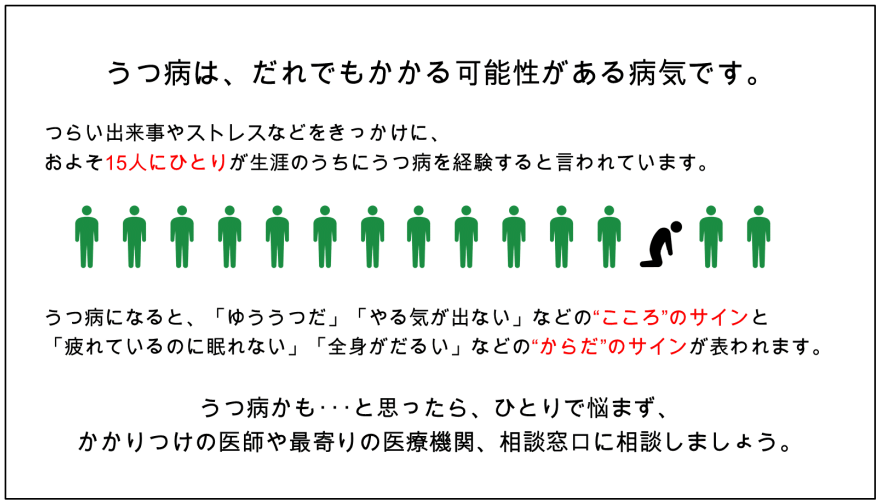
Table 3 Changes in help-seeking intention for depression

Message	All					Non-depressed (K6<5)					Depressed (K6≥5)				
	N	Positive intention			p	N	Positive intention			p	N	Positive intention			p
		Before	After	Change			Before	After	Change			Before	After	Change	
1N	335	115	128		0.128	193	75	80		0.456	142	40	48		0.131
		34.3%	38.2%	11.3%			38.9%	41.5%	6.7%			28.2%	33.8%	20.0%	
1P	317	116	139		0.003	189	82	87		0.384	128	34	52		<0.001
		36.6%	43.8%	19.8%			43.4%	46.0%	6.1%			26.6%	40.6%	52.9%	
2N	325	126	146		0.017	195	85	95		0.149	130	41	51		0.033
		38.8%	44.9%	15.9%			43.6%	48.7%	11.8%			31.5%	39.2%	24.4%	
2P	324	117	151		<0.001	187	77	95		0.009	137	40	56		0.003
		36.1%	46.6%	29.1%			41.2%	50.8%	23.4%			29.2%	40.9%	40.0%	
3N	323	117	144		0.001	186	81	96		0.029	137	36	48		0.011
		36.2%	44.6%	23.1%			43.5%	51.6%	18.5%			26.3%	35.0%	33.3%	
3P	333	135	158		0.003	183	77	86		0.128	150	58	72		0.004
		40.5%	47.4%	17.0%			42.1%	47.0%	11.7%			38.7%	48.0%	24.1%	

Message 1P, 2P, and 3P were visually formatted versions of Message 1N, 2N, and 3N, respectively. Help-seeking intension for depression was assessed before and after exposure to the messages. McNemar test was used to assess changes in help-seeking intention

Appendix A. Depression help-seeking messages (formatted versions)

Message 1P - Depression can happen to anyone (neutral-framed message)



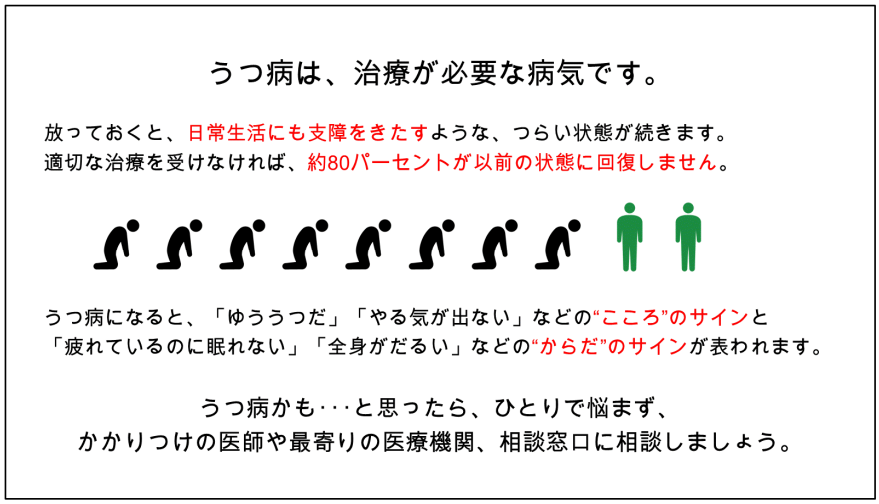
Main message

- Depression happens to one out of 15 people.

Information on early signs of depression

Call to action

Message 2P - Depression needs treatment (loss-framed message)



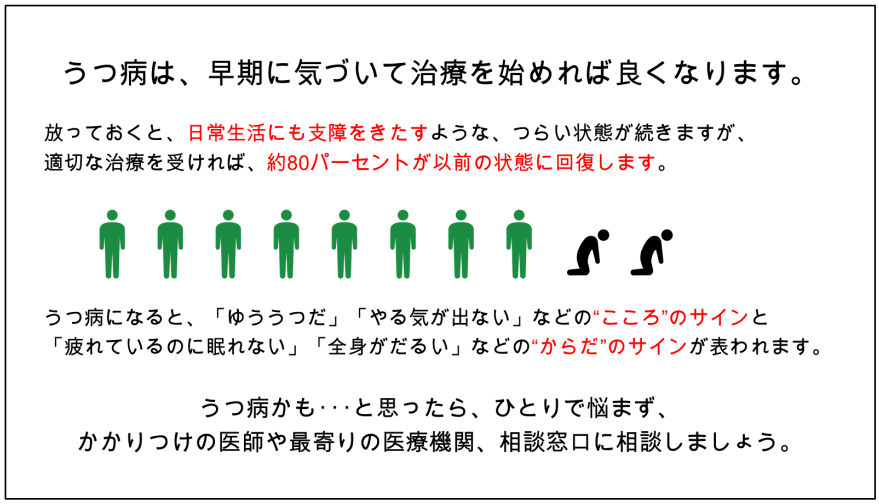
Main message

- If not treated, 80% cannot recover from depression.

Information on early signs of depression

Call to action

Message 3P - Depression improves with treatment (gain-framed message)



Main message

- If treated, 80% can recover from depression.

Information on early signs of depression

Call to action

BMJ Open

A comparative study on persuasive health message design: effects of message framing and formatting on comprehensibility, persuasiveness, emotion, intention, and action

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A comparative study on persuasive health message design: effects of message framing and formatting on comprehensibility, persuasiveness, emotion, intention, and action.

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ABSTRACT

Objective: To examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages.

Design: Cross-sectional followed by 2-month follow-up study

Setting and participants: A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. Of 1,957 eligible respondents without psychiatric history, 1,805 people (92.2%) completed the 2-month follow-up questionnaire.

Main outcome measures: Six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). Participants were asked to rate the messages in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Subsequent 2-month help-seeking action for their own mental health (medical service use) was monitored by the follow-up survey.

Results: Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced emotions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the emotional responses. Multiple logistic regression analysis revealed that the loss-framed formatted message had much effect on increasing help-seeking intention for depression. All messages had little effect on maintaining help-seeking intention or increasing help-seeking action.

Conclusion: Communicating persuasive messages will change people's intentions toward help-seeking for depression if the messages are developed carefully and appropriately. Providers should consider that message framing and formatting influence persuasive message effectiveness when they design their messages. It would be recommendable to apply

loss-framing and formatting to depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Key words: depression, help-seeking, persuasive message, questionnaire survey

STRENGTH AND LIMITATIONS

- Health communication research has revealed that the effect of persuasive messages can depend on message characteristics, but less is known about what kind of message will more satisfactorily motivate people to seek mental health care. This study represents the first attempt to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages.
- The experimental comparison of 6 differently framed and formatted messages successfully revealed that message framing and formatting would play different roles in the persuasion process.
- The study participants were limited to 35-45 years old selected from a nationwide panel of a research company. It is uncertain whether the messages will work equally well in other age groups or in other settings.

Introduction

Mental disorders are the leading cause of disability worldwide, accounting for 21% of all non-fatal burden [1]. Failure and delay in initial treatment contact for mental disorders has been recognized as an important public health problem [2,3]. A systematic review and meta-analysis revealed that negative attitudes toward mental illness and help-seeking are associated with less active help-seeking in the general population [4]. There is a possibility that interventions for improving people's attitudes and intentions toward help-seeking could facilitate access to mental health care, in addition to those targeting the behavior itself.

A number of public health programs have been launched to eliminate negative attitudes toward mental illness and help-seeking to facilitate access to mental health care [5]. Communication is one of the components necessary for effective public health program implementation [6].With better information, individuals and communities can make better decisions about their own health. Effective communication produce beneficial changes in people's behaviors toward health issues [7,8]. A systematic review revealed that communicating persuasive messages is effective in improving attitudes toward help-seeking for depression [9]. Meanwhile, previous studies have suggested that depression help-seeking messages have the potential to backfire; exposure to the messages may result in increased self-stigma and increased reluctance to help-seeking (i.e. boomerang effect) [10,11]. Further evidence is needed to identify strategies for successful public health messaging with the aim of promoting access to mental health care.

Health communication research has revealed that the effect of persuasive messages can depend on message characteristics. Well known is the framing effect, that is, health messages framed to highlight either the benefits of performing a behavior (i.e. gain-framed) or the consequences of not performing a behavior (i.e. loss-framed) will lead to different decisions and different health behaviors [12]. A systematic review and meta-analysis revealed that

gain-framed messages are more likely than loss-framed messages to promote prevention behaviors, particularly for skin cancer prevention, smoking cessation, and physical activity [13]. Meanwhile, the Cochrane Review group reported that loss-framed messages led to more positive perception of effectiveness than gain-framed messages for screening messages and tended to be more persuasive for treatment messages [14]. These results do not unequivocally support the framing effect of health message. There seems to be some contexts in which loss-framed messages are equally or more effective than gain-framed messages. It is uncertain which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame.

Reading a message is the first step of the persuasion process. If recipients find difficulty in reading and understanding the given message, it is unlikely to have any persuasive impact. The Centers for Disease Control and Prevention (CDC) proposed a set of evidence-based criteria to plan and assess public health communication materials for diverse audiences, namely the Clear Communication Index [15]. On the basis of existing research-based evidence, the Index represents the most important items that enhance clarity and aid understanding of public health messages and materials. The six core items applicable to all materials are: 1) include one main message statement, 2) put the main message first, 3) use visual cues to emphasize the main message, 4) include a visual that conveys the main message, 5) include one call to action, and 6) use active voice. Previous studies have demonstrated that the materials revised using the Index are rated more favorably than the originals by possible audience members. The application of the Index makes it more likely that audience can correctly identify the intended main message and understand the words in the materials [16,17]. However, to our knowledge, there have been no attempts to confirm whether health messages designed to conform to the Index items function better as a stimulus to change people's behaviors toward health issues. Moreover, little is known about the interaction between message frame and format. If message format

significantly influences the comprehensibility of health message, it is likely to modify the framing effect of health message to some extent.

The objective of this study was to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. Although the mechanism of persuasive message effectiveness has not been clearly elucidated, a number of factors can serve to mediate or moderate the effect of persuasive messages. Emotional responses to messages influence perceptions of effectiveness of messages [18,19]. Perceived message effectiveness is strongly correlated with and may be causally related to actual message effectiveness [19,20]. Intention is the best determinant of behavior in a wide range of health domains [21], and it has been commonly used as an outcome measure in health communication research [13]. We previously found that reading comprehension of health information was significantly associated with recognition of health risk and intention to perform health behaviors [22]. On the basis of these findings, the present study compared audience's responses to 6 differently framed and formatted messages in terms of comprehensibility, persuasiveness, emotion, intention, and action.

1. Methods

We launched a research project to develop effective health communication interventions for encouraging help-seeking in people at risk of suicide. As the first step in the research project, we developed rating scales for measuring audience's perceptions of effectiveness of health messages in Japanese people [23]. At the second step, we intended to develop effective public health messages that increase people's help-seeking intentions for depression. We created different kinds of depression help-seeking messages on the basis of our previous findings [24] and conducted a web-based survey to rate them by possible audience members. Data from the survey were analyzed to achieve the two intended objectives. One was to

examine the effects of message framing and formatting on the effectiveness of depression help-seeking messages, as reported in this paper. Another objective was to determine whether the effects of depression help-seeking messages are influenced by audience's depressive status, as reported elsewhere [25].

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

2.1 Patient and public involvement

There were no patients involved in the design of the study or the recruitment to and conduct of the study.

2.2 Messages

In order to examine the effects of message framing and formatting, six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). The aim of messaging was to increase people's help-seeking intentions for depression. The target audience were either depressed or non-depressed people. The messages were designed as print advertisements to be inserted in the form of web-based surveys.

The formatted versions of depression help-seeking messages were shown in Appendix A. Each message consisted of three parts. The first part was the main message statement. The second part provided information on early signs of depression: depression can be recognized early by mental symptoms such as depressed mood, loss of interest, etc. and physical symptoms such as disturbed sleep, increased fatigue, etc. The last part was the call to action: if you suspect your depression, consult your family doctor.

The 3 main message statements were selected from the text message list developed by Bell and colleagues [26] so as to be matched against the beliefs related to the top 3 reasons for having no help-seeking intention for depression, respectively [24]: 1) depression can happen to anyone, 2) depression needs treatment, and 3) depression improves with treatment. The first one was neutral-framed with additional information on incidence of depression: about one out of 15 people experience depression during their lifetime. The second one was loss-framed (thereat appeal) with additional information on prognosis of untreated patients: about 80% of untreated patients will not recover. The third one was gain-framed (benefit appeal) with additional information on prognosis of treated patients: about 80% of treated patients will recover.

For each of the 3 differently framed messages, the formatted and unformatted versions were prepared. The formatted (visual) messages were visually designed in accordance with the CDC Clear Communication Index User Guide [15]. The unformatted (plain) messages were in plain text without any colors or visuals.

2.3 Participants

A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. The Comprehensive Survey of Living Conditions revealed that people who were feeling stressed or distressed were most frequently observed in the 40-49 age group (58.7% in men and 48.6% in women) [27]. In addition, the World Mental Health Japan Survey revealed that the 12-month prevalence of mental disorders was significantly higher in the younger age groups [28]. Therefore, people aged 35-45 years seemed to be a suitable target for persuasive messages encouraging help-seeking for depression.

Participants in the survey were recruited from an online research panel of a leading research company in Japan (Cross Marketing Inc., Tokyo, Japan). Medical professionals were

excluded through a prescreening process. Applicants for participation in the survey were accepted in the order of receipt until the number of participants reached the quotas for gender, area, and K6 score (1-4 and 5≤ points). The Japanese version of the 6-item Kessler Psychological Distress Scale (K6) has been established as a screener for depression in Japan [29]. A validation study revealed that a K6 score ≥5 is a reasonable cutoff to distinguish between depressed and non-depressed people [30]. A total of 2,520 responses were obtained over two days of recruitment.

A follow-up survey was conducted in September 2017 to monitor subsequent changes in help-seeking intention and action. Of the 2,520 participants in the initial survey, 2,315 people (91.9%) completed the follow-up questionnaire.

All participants voluntarily agreed to participate in the survey after reading a description of the purpose and procedure of the survey. Consent to participate was implied by the completion and submission of the survey.

2.4 Measures

Participants in the initial survey were asked to rate one of the depression help-seeking messages after they read the message for at least 15 seconds, in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Moreover, participants in the follow-up survey were asked about help-seeking intention for depression and help-seeking action for their own mental health (medical service use) during the 2-month follow-up period.

The web questionnaire forms presented the questions one by one through the operation of a 'Next' button. Respondents answered one question per page and could not go back to the previous page.

2.4.1 Comprehensibility

Using the perceived effectiveness rating scales [23], the five items asked how easy or hard the information is to: 1) read, 2) understand, 3) remember, 4) locate important information, and 5) keep for future reference. All item scores (range 1-5 points) were averaged to produce the comprehensibility score.

2.4.2 Persuasiveness

Using the perceived effectiveness rating scales [23], the seven items asked to what extent they agree or disagree that the information is: 1) believable, 2) convincing, 3) important to me, 4) help me feel confident about how best to do, 5) would help my family and friends, 6) put thoughts in my mind about wanting to do, and 7) agreeable. All item scores (range 1-5 points) were averaged to produce the persuasiveness score.

2.4.3 Emotional responses

Participants were asked 'when you read the message, to what extent you feel: 1) surprise, 2) anger, 3) fear, 4) sadness, 5) guilt, 6) anxiety, and 7) happiness?' [18,19]. Response options were from 1 (not at all) to 5 (extremely).

2.4.4 Design quality

Six items for design quality were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked to rate the message on a 5-point scale in terms of 1) organization, 2) attractiveness, 3) size, 4) tone, 5) helpfulness, and 6) spacing. Higher scores indicate higher quality.

2.4.5 Intended future use

Three items for intended future use were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked 'If you saw the information in a newspaper or magazine, how likely would you [use, read, and keep] it?'. Response options were from 1(very unlikely) to 5 (very likely).

2.4.6 Help-seeking intention

Help-seeking intention for depression was measured using vignette methodology. Participants were presented with a vignette describing a man (or woman) with depression and were then asked 'If you had health problems right now like Mr. A (or Ms. A), would you see a doctor?' [23,24,25]. Participants answered the question on a four-point scale (certainly yes/probably yes/probably not/certainly not). Those who gave affirmative answers (certainly yes and probably yes) were counted as having a positive help-seeking intention.

Help-seeking intention for depression was measured at three time points: 1) before exposure to the messages in the initial survey, 2) after exposure to the messages in the initial survey, and 3) at the follow-up survey. Those who had a positive help-seeking intention at the second point but did not at the first point were counted as developing help-seeking intentions after exposure to the message. Those who had a positive help-seeking intention both at the second and third points were counted as maintaining help-seeking intention.

2.4.7 Help-seeking action

Help-seeking action for their own mental health was measured in the follow-up survey by asking participants whether they had seen a doctor for their mental health problem in the previous 2 months.

2.5 Statistical Analysis

All statistical analyses were performed using the SAS ver. 9.4 (SAS Institute, Cary, NC, USA). Main and interaction effects of frame and format were assessed using two-way analysis of variance. The proportions of people who reported a positive help-seeking intention for depression before and after exposure to the messages were compared using McNemar test. Multiple logistic regression analysis was further conducted to compare the effects of 6 differently framed and formatted messages on help-seeking intention for depression. Odds ratios with 95% confidence intervals for help-seeking intention for depression were calculated with adjustment for gender, depressive status, and help-seeking intention before exposure the messages. Significant levels were set at $p<0.05$.

3. Results

Figure 1 shows the flow of participants through the study. In the initial survey, 2520 participants were randomly assigned to one of the 6 message groups. Excluding those who had an experience of receiving treatment for their mental illness, the remaining 1,957 participants were included in the study. Of these, 1,805 people (92.2%) who completed the follow-up questionnaire were included in the analysis of the follow-up data.

Table 1 shows the characteristics of the study participants. Of the 1,957 participants, 45.6% had a university degree, 56.3% were married, and 60.1% had a full-time job. As a result of the random assignment of participants to 6 message groups, no significant differences between the message groups were observed in sociodemographic characteristics.

Table 2 shows the assessment of the depression help-seeking messages. The comprehensibility and persuasiveness scores showed no significant differences between the frames or between the formats. For the emotional responses, significant main effects of frame were observed in 5 out of 7 items (surprise, fear, sadness, anxiety, and happiness). There were

a significant effect of format on ‘surprise’ and significant frame×format interaction effects on ‘anxiety’ and ‘happiness’. Compared with the neutral-framed, the loss- and gain-framed messages showed significant enhancements of emotional responses to the formatted messages.

Table 1 Characteristics of the study participants

		N	
Gender	Male	980	50.1%
	Female	977	49.9%
Age	Mean (SD)	40.9	(3.0)
Education	Compulsory education/high school	540	27.6%
	Junior college/vocational school	524	26.8%
	University or higher	893	45.6%
Marital status	Married	1101	56.3%
	Unmarried	767	39.2%
	Divorced/widowed	89	4.5%
Occupation	Full-time job	1176	60.1%
	Temporary or part-time job	329	16.8%
	No occupation	452	23.1%
Household income	<2.0 million yen †	230	11.8%
	2.0-3.9 million	394	20.1%
	4.0-5.9 million	552	28.2%
	6.0-7.9 million	400	20.4%
	8.0-9.9 million	205	10.5%
	10.0+ million	161	8.2%
	Missing	15	0.8%

†1 million yen was about 10,000 U.S. dollars at the time of the survey.

Table 2 Assessment of the depression help-seeking messages

		Message						p		
		Neutral – plain	Neutral – visual	Loss –plain	Loss –visual	Gain –plain	Gain –visual	Frame (A)	Format (B)	A × B
Comprehensibility										
	Mean	3.74	3.81	3.79	3.80	3.82	3.82	0.554	0.472	0.757
	SD	0.79	0.78	0.87	0.83	0.83	0.78			
Persuasiveness										
	Mean	3.15	3.13	3.20	3.18	3.10	3.17	0.168	0.732	0.352
	SD	0.59	0.63	0.66	0.62	0.67	0.64			
Emotional responses										
1) surprise	Mean	2.47	2.57	2.60	2.81	2.49	2.63	0.005	0.002	0.636
	SD	1.03	1.10	1.06	1.01	1.10	1.02			
2) anger	Mean	1.91	1.91	1.94	2.01	1.90	1.99	0.411	0.202	0.596
	SD	0.95	0.92	0.92	0.96	0.92	0.93			
3) fear	Mean	2.51	2.43	2.55	2.64	2.22	2.41	<0.001	0.163	0.061
	SD	1.03	1.05	1.06	1.07	1.01	0.98			
4) sadness	Mean	2.44	2.43	2.53	2.61	2.24	2.38	<0.001	0.124	0.413
	SD	1.03	1.10	1.05	1.04	1.01	0.95			
5) guilt	Mean	2.09	2.07	2.08	2.18	2.02	2.09	0.326	0.247	0.440
	SD	0.91	0.96	0.93	0.94	0.92	0.86			
6) anxiety	Mean	2.63	2.50	2.59	2.74	2.34	2.45	<0.001	0.370	0.035
	SD	1.04	1.12	1.06	1.08	1.02	1.03			
7) happy	Mean	1.93	1.83	1.99	1.98	2.17	2.35	<0.001	0.657	0.024
	SD	0.96	0.92	0.98	0.98	0.98	0.95			
Design quality										
1) organization	Mean	3.67	3.65	3.72	3.80	3.64	3.71	0.113	0.258	0.557
	SD	0.87	0.90	0.91	0.84	0.88	0.87			
2) attractiveness	Mean	3.10	3.22	3.18	3.37	3.08	3.26	0.029	<0.001	0.749
	SD	0.84	0.89	0.86	0.84	0.91	0.90			
3) size	Mean	3.38	3.38	3.37	3.52	3.32	3.41	0.177	0.037	0.296
	SD	0.81	0.88	0.91	0.86	0.79	0.86			
4) tone	Mean	3.16	3.11	3.20	3.13	3.22	3.33	0.004	0.966	0.084
	SD	0.72	0.79	0.82	0.83	0.77	0.83			
5) helpfulness	Mean	3.38	3.36	3.39	3.57	3.37	3.48	0.048	0.019	0.109
	SD	0.82	0.84	0.90	0.80	0.87	0.87			
6) spacing	Mean	3.35	3.50	3.26	3.56	3.24	3.52	0.633	<0.001	0.220
	SD	0.77	0.80	0.91	0.78	0.85	0.80			
Intended future use										
1) read	Mean	3.17	3.23	3.28	3.28	3.12	3.36	0.286	0.016	0.052
	SD	0.90	0.91	0.92	0.95	0.95	0.87			
2) use	Mean	2.77	2.71	2.87	2.83	2.72	2.86	0.063	0.666	0.065
	SD	0.84	0.86	0.84	0.85	0.82	0.79			
3) keep	Mean	2.36	2.34	2.38	2.48	2.34	2.46	0.332	0.142	0.332
	SD	0.98	0.95	0.97	0.98	0.91	0.90			

All items were scored on a 1-to-5 point scale. Two-way analysis of variance was used to assess main and interaction effects of frame and format.

For the design quality, significant main effects of format were observed in 4 out of 6 items (attractiveness, size, helpfulness, and spacing). There were significant main effects of frame on 3 items (attractiveness, tone, and helpfulness) but no significant frame×format interaction. For the intended future use, a significant main effect of format was observed in 1 out of 3 items (read). There were no significant main effects of frame and no significant frame×format interaction.

Table 3 shows the changes in help-seeking intension for depression before and after exposure to the messages. All messages except the neutral-plain message produced significant increase in help-seeking intention. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

Multiple logistic regression analysis was further conducted to compare the effects of 6 differently framed and formatted messages on help-seeking intention for depression. Compared with the neutral-plain message as a reference group, the loss-visual message had a significantly greater effect, but the others did not: the adjusted odds ratios (95% confidence intervals) of the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 1.31 (0.89-1.92), 1.29 (0.88-1.89), 1.57 (1.07-2.29), 1.39 (0.95-2.04) and 1.41 (0.97-2.06), respectively.

Of the 1,805 participants in the follow-up survey, 1,141 people had not possessed help-seeking intention before exposure to the messages, and 249 people (21.8%) developed their help-seeking intentions after exposure to the messages. Of these, 143 people (57.4%) maintained their help-seeking intentions up to the follow-up survey. The proportion of participants who maintain their help-seeking intentions was not significantly different across the given messages: the percentages for the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 65.7% (23/35), 57.9% (22/38), 48.0% (25/50), 23/44 (52.3%) and 67.5% (27/40), respectively (p=0.423).

Table 3 Changes in help-seeking intention for depression

Message	All					Depressed (K6 score ≥5)				
	N	Positive intention			p	N	Positive intention			p
		Before	After	Change			Before	After	Change	
Neutral	335	115	128		0.128	142	40	48		0.131
−plain		34.3%	38.2%	+11.3%			28.2%	33.8%	+20.0%	
Neutral	317	116	139		0.003	128	34	52		<0.001
−visual		36.6%	43.8%	+19.8%			26.6%	40.6%	+52.9%	
Loss	325	126	146		0.017	130	41	51		0.033
−plain		38.8%	44.9%	+15.9%			31.5%	39.2%	+24.4%	
Loss	324	117	151		<0.001	137	40	56		0.003
−visual		36.1%	46.6%	+29.1%			29.2%	40.9%	+40.0%	
Gain	323	117	144		0.001	137	36	48		0.011
−plain		36.2%	44.6%	+23.1%			26.3%	35.0%	+33.3%	
Gain	333	135	158		0.003	150	58	72		0.004
−visual		40.5%	47.4%	+17.0%			38.7%	48.0%	+24.1%	

Help-seeking intension for depression was assessed before and after exposure to the messages. McNemar test was used to assess changes in help-seeking intention.

Table 4 Help-seeking action during the follow-up period

Message	All		Depressed (K6 score ≥5)	
	N	Action	N	Action
Neutral	307	12	132	8
−plain		3.9%		6.1%
Neutral	295	12	121	5
−visual		4.1%		4.1%
Loss	296	8	120	4
−plain		2.7%		3.3%
Loss	305	9	128	6
−visual		3.0%		4.7%
Gain	301	14	127	11
−plain		4.7%		8.7%
Gain	301	11	141	8
−visual		3.7%		5.7%
	p=0.815		p=0.516	

Help-seeking action for their own mental health in the previous 2 months was measured in the follow-up survey.

Table 4 shows the help-seeking action during the follow-up period. There were 66 people (3.7%) who had seen a doctor for their mental health problem during the follow-up period. The proportion of participants with help-seeking action was not significantly different across the given messages. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

4. Discussion

This study examined audience's responses to 6 differently framed and formatted messages that were developed with the aim of increasing people's help-seeking intentions for depression. Although depression help-seeking messages have the potential to backfire [10,11], such boomerang effect was not evident in this study. All messages except the neutral-plain message produced significant increase in help-seeking intention after exposure to the messages. This result supports the effectiveness of communicating persuasive messages for increasing people's help-seeking intentions for depression. Moreover, multiple logistic regression analysis indicated that the loss-visual message worked better than the other messages. Despite the potential limitations of this study, it would be recommendable to apply loss-framing and formatting to depression help-seeking messages.

The differently framed messages brought different emotional responses in a predictable way. Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced the recipients' emotions. The loss-framed messages more strongly induced negative emotions (surprise, fear, sadness, and anxiety), while the gain-framed messages more strongly induced a positive emotion (happiness). Previous studies have suggested that emotional responses play a significant role in the persuasion process [18,19]. There was no significant difference in persuasiveness, however, the loss- and gain-framed messages seemed more likely to bring out the recipients' help-seeking intentions by inducing emotional

responses than the neutral-framed messages.

The formatted messages were judged superior to the unformatted messages in design quality. The formatted messages consequently succeeded in increasing the likelihood that the message will be read. These results support the effectiveness of the CDC Clear Communication Index which helps provide easily understandable health messages and materials [16,17]. The significant frame×format interaction effects on 'anxiety' and 'happiness' indicated that the message formatting enhanced the recipients'emotional responses, both negative and positive. There was no significant difference in persuasiveness, however, the formatted messages seemed more likely to be perceived as attractive and helpful by audience than the unformatted messages.

As for the percentage changes in help-seeking intention for depression by message group (Table 3), it is hard to say that the loss-framed messages were more effective than the gain-framed messages or vice versa. The loss-plain message showed a smaller percentage increase than the gain-plain message (15.9% vs. 23.1%), and the proportions of participants who reported a positive help-seeking intension after exposure these messages were equivalent (44.9% vs. 44.6%). Meanwhile, the loss-visual message showed a greater percentage increase than the gain-visual message (29.1% vs. 17.0%), and the proportions of participants who reported a positive help-seeking intension after exposure these messages were equivalent (46.6% vs. 47.4%). The respective effects of loss-framing and formatting on help-seeking intention were not preeminent, but multiple logistic regression analysis revealed that the loss-visual message had much effect on increasing help-seeking intention. Previous studies have not provided a conclusive answer as to which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame [13,14]. A literature review suggested that adding pictures to written text will increase the likelihood that the text will be read, however, the effects of pictures on comprehension, recall, and adherence have

not yet been established [32]. The results of this study are insufficient to conclude, but it is likely that loss-framing and formatting act synergistically to increase help-seeking intention for depression. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least.

Of those who developed their help-seeking intention after exposure to the messages, 43.6% did not maintain their help-seeking intentions up to the 2-month follow-up survey. The depression help-seeking messages succeeded in possessing help-seeking intention for a short time after exposure, but the effect could not be sustained over time. Moreover, those who had taken help-seeking action during the 2-month follow-up period accounted for 3.7% of the total and for 5.5% of those who were depressed (K6 score ≥5). Seeing a message only once may be insufficient to induce help-seeking action. Although a number of interventions have been conducted to promote access to mental health care, very little is known about what interventions increase help-seeking action [9]. To our knowledge, there is no successful precedent that proved the effect of public health messaging on help-seeking action. Further studies are needed to find out effective strategies for maintaining help-seeking intention and increasing help-seeking action.

This study provides evidence for the effectiveness of depression help-seeking messages in middle-aged Japanese people. On the contrary, it has a number of potential limitations. First, the web-based survey was self-administered, so that the accuracy of responses would depend on participants' understanding of the questions and their motivation to answer questions accurately. The understandability of the wording of items was checked prior to the survey. The use of the Internet and the provision of anonymity would be expected to elicit more truthful responses, by minimizing social desirability pressures [33]. However, it is almost impossible to eliminate the information bias completely. Second, the study participants were selected from a nationwide panel of a research company. According to the national census

[34], the percentage of the Japanese population aged 35-44 years with university degrees were 22.0% in 2010, considerably lower than that of this study (45.6%). The selection bias may have influenced the results to some extent. Third, the study participants were limited to 35-45 years old. It is uncertain whether the messages will work equally well in other age groups. Moreover, because of cultural differences, the findings from this study may not be applicable to non-Japanese populations. Now we are planning to conduct a population-based interventional study to assess the effectiveness of a public health communication program using the depression help-seeking messages. We will discuss the channels and activities that will be most likely to successfully reach target audience in the future study.

5. Conclusion

This study examined the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced the recipients' emotions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the recipients' emotional responses. Consequently, the loss-framed formatted message had much effect on increasing help-seeking intention. According to these results, communicating persuasive messages will change people's attitudes and intentions toward help-seeking for depression if the messages are developed carefully and appropriately. Providers should consider that message framing and formatting influence persuasive message effectiveness when they design their messages. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Contributors

MS was responsible for the design and conduct of the study, the collection, analysis, and interpretation of data, and the writing of the article. TY and HY contributed to the data interpretation and discussion of the implications of this work. All authors read and approved the final manuscript.

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Competing interest

The authors declare that they have no competing interest.

Ethics approval

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

Data sharing statement

No additional data are available.

Figure legend

Figure 1 Flow of participants through the study

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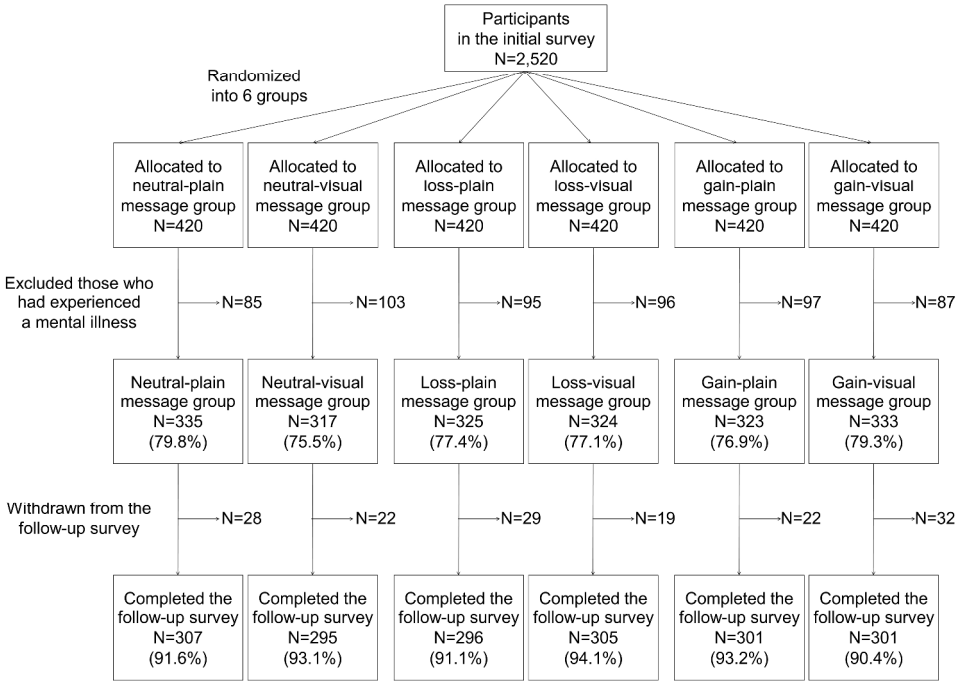
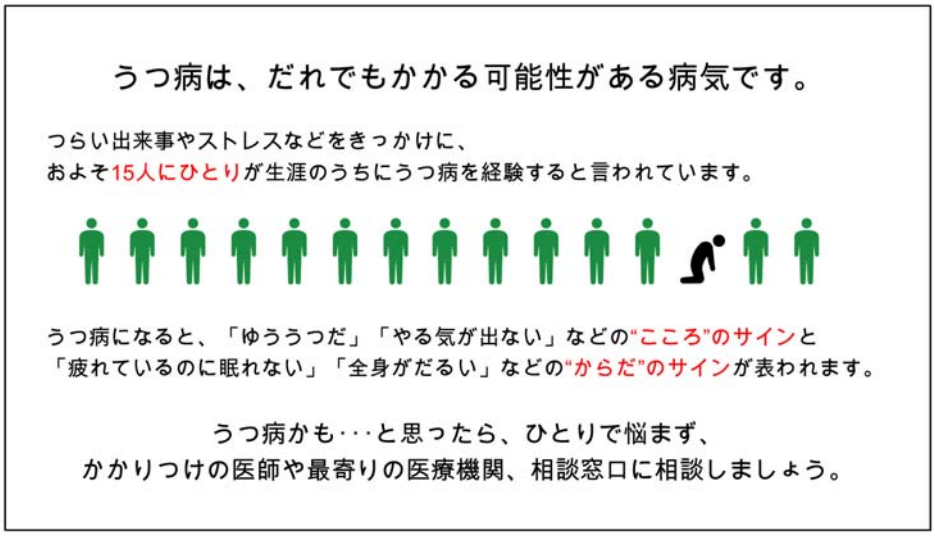


Figure 1 Flow of participants through the study

1200x900mm (96 x 96 DPI)

Appendix A. Depression help-seeking messages (formatted versions)

Neutral-framed message - “Depression can happen to anyone”



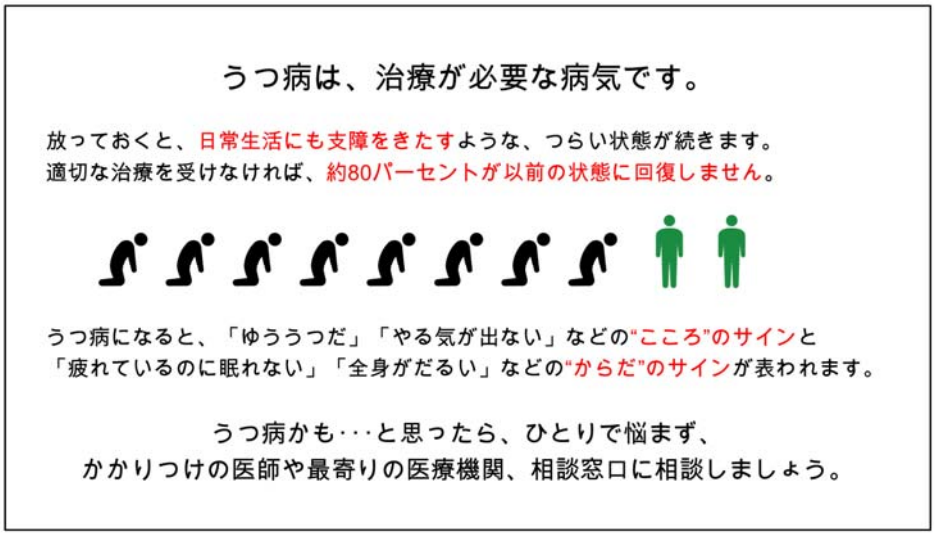
Main message

- Depression happens to one out of 15 people.

Information on early signs of depression

Call to action

Loss-framed message - “Depression needs treatment”



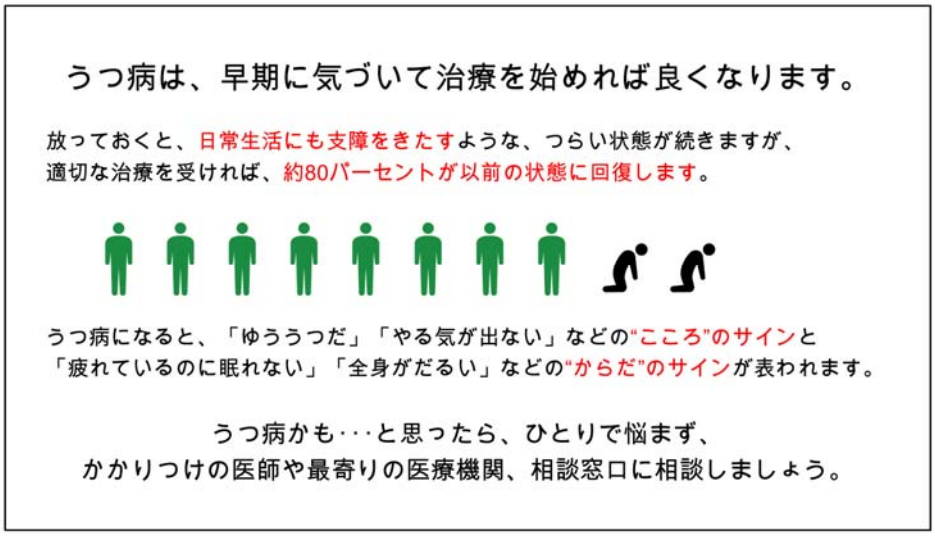
Main message

- If not treated, 80% cannot recover from depression.

Information on early signs of depression

Call to action

Gain-framed message - “Depression improves with treatment”



Main message

- If treated, 80% can recover from depression.

Information on early signs of depression

Call to action

BMJ Open

Effects of message framing and formatting on comprehensibility, persuasiveness, emotion, intention, and action in Japanese adults: a cross-sectional study with 2-month follow-up

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Secondary Subject Heading:	Mental health, Public health
Keywords:	depression, help-seeking, persuasive message, questionnaire survey

Effects of message framing and formatting on comprehensibility, persuasiveness, emotion, intention, and action in Japanese adults: a cross-sectional study with 2-month follow-up.

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ABSTRACT

Objective: To examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages.

Design: Cross-sectional followed by 2-month follow-up study

Setting and participants: A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. Of 1,957 eligible respondents without psychiatric history, 1,805 people (92.2%) completed the 2-month follow-up questionnaire.

Main outcome measures: Six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). Participants were asked to rate the messages in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Subsequent 2-month help-seeking action for their own mental health (medical service use) was monitored by the follow-up survey.

Results: Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced emotions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the emotional responses. Multiple logistic regression analysis revealed that the loss-framed formatted message had much effect on increasing help-seeking intention for depression. All messages had little effect on maintaining help-seeking intention or increasing help-seeking action.

Conclusion: Communicating persuasive messages will change people's intentions toward help-seeking for depression if the messages are developed carefully and appropriately. Providers should consider that message framing and formatting influence persuasive message effectiveness when they design their messages. It would be recommendable to apply

loss-framing and formatting to depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Key words: depression, help-seeking, persuasive message, questionnaire survey

STRENGTH AND LIMITATIONS

- This study represents the first attempt to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. The experimental comparison of 6 differently framed and formatted messages successfully revealed that message framing and formatting would play different roles in the persuasion process.
- This study relied on self-reported information. It is almost impossible to eliminate the information bias completely.
- The study participants were limited to 35-45 years old selected from a nationwide panel of a research company. It is uncertain whether the messages will work equally well in other age groups or in other settings.

Introduction

Mental disorders are the leading cause of disability worldwide, accounting for 21% of all non-fatal burden [1]. Failure and delay in initial treatment contact for mental disorders has been recognized as an important public health problem [2,3]. A systematic review and meta-analysis revealed that negative attitudes toward mental illness and help-seeking are associated with less active help-seeking in the general population [4]. There is a possibility that interventions for improving people's attitudes and intentions toward help-seeking could facilitate access to mental health care, in addition to those targeting people's behaviors toward mental illness itself.

A number of public health programs have been launched to eliminate negative attitudes toward mental illness and help-seeking to facilitate access to mental health care [5]. Communication is one of the components necessary for effective public health program implementation [6].With better information, individuals and communities can make better decisions about their own health. Effective communication produce beneficial changes in people's behaviors toward health issues [7,8]. A systematic review revealed that communicating persuasive messages is effective in improving attitudes toward help-seeking for depression [9]. Meanwhile, previous studies have suggested that depression help-seeking messages have the potential to backfire; exposure to the messages may result in increased self-stigma and increased reluctance to help-seeking (i.e. boomerang effect) [10,11]. Further evidence is needed to identify strategies for successful public health messaging with the aim of promoting access to mental health care.

Health communication research has revealed that the effect of persuasive messages can depend on message characteristics. Well known is the framing effect, that is, health messages framed to highlight either the benefits of performing a behavior (i.e. gain-framed) or the consequences of not performing a behavior (i.e. loss-framed) will lead to different decisions

and different health behaviors [12]. A systematic review and meta-analysis revealed that gain-framed messages are more likely than loss-framed messages to promote prevention behaviors, particularly for skin cancer prevention, smoking cessation, and physical activity [13]. Meanwhile, the Cochrane Review group reported that loss-framed messages led to more positive perception of effectiveness than gain-framed messages for screening messages and tended to be more persuasive for treatment messages [14]. These results do not unequivocally support the framing effect of health message. There seems to be some contexts in which loss-framed messages are equally or more effective than gain-framed messages. It is uncertain which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame.

Reading a message is the first step of the persuasion process. If recipients find difficulty in reading and understanding the given message, it is unlikely to have any persuasive impact. The Centers for Disease Control and Prevention (CDC) proposed a set of evidence-based criteria to plan and assess public health communication materials for diverse audiences, namely the Clear Communication Index [15]. On the basis of existing research-based evidence, the Index represents the most important items that enhance clarity and aid understanding of public health messages and materials. The six core items applicable to all materials are: 1) include one main message statement, 2) put the main message first, 3) use visual cues to emphasize the main message, 4) include a visual that conveys the main message, 5) include one call to action, and 6) use active voice. Previous studies have demonstrated that the materials revised using the Index are rated more favorably than the originals by possible audience members. The application of the Index makes it more likely that audience can correctly identify the intended main message and understand the words in the materials [16,17]. However, to our knowledge, there have been no attempts to confirm whether health messages designed to conform to the Index items function better as a stimulus to change people's behaviors toward health issues. Moreover,

little is known about the interaction between message frame and format. If message format significantly influences the comprehensibility of health message, it is likely to modify the framing effect of health message to some extent.

The objective of this study was to examine the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. Although the mechanism of persuasive message effectiveness has not been clearly elucidated, a number of factors can serve to mediate or moderate the effect of persuasive messages. Emotional responses to messages influence perceptions of effectiveness of messages [18,19]. Perceived message effectiveness is strongly correlated with and may be causally related to actual message effectiveness [19,20]. Intention is the best determinant of behavior in a wide range of health domains [21], and it has been commonly used as an outcome measure in health communication research [13]. We previously found that reading comprehension of health information was significantly associated with recognition of health risk and intention to perform health behaviors [22]. On the basis of these findings, the present study compared audience's responses to 6 differently framed and formatted messages in terms of comprehensibility, persuasiveness, emotion, intention, and action.

1. Methods

We launched a research project to develop effective health communication interventions for encouraging help-seeking in people at risk of suicide. As the first step in the research project, we developed rating scales for measuring audience's perceptions of effectiveness of health messages in Japanese people [23]. At the second step, we intended to develop effective public health messages that increase people's help-seeking intentions for depression. We created different kinds of depression help-seeking messages on the basis of our previous findings [24] and conducted a web-based survey to rate them by possible audience members.

Data from the survey were analyzed to achieve the two intended objectives. One was to examine the effects of message framing and formatting on the effectiveness of depression help-seeking messages, as reported in this paper. Another objective was to determine whether the effects of depression help-seeking messages are influenced by audience's depressive status, as reported elsewhere [25].

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

2.1 Patient and public involvement

There were no patients involved in the design of the study or the recruitment to and conduct of the study.

2.2 Messages

In order to examine the effects of message framing and formatting, six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). The aim of messaging was to increase people's help-seeking intentions for depression. The target audience were either depressed or non-depressed people. The messages were designed as print advertisements to be inserted in the form of web-based surveys.

The formatted versions of depression help-seeking messages were shown in Appendix A. Each message consisted of three parts. The first part was the main message statement. The second part provided information on early signs of depression: depression can be recognized early by mental symptoms such as depressed mood, loss of interest, etc. and physical symptoms such as disturbed sleep, increased fatigue, etc. The last part was the call to action:

if you suspect your depression, consult your family doctor.

The 3 main message statements were selected from the text message list developed by Bell and colleagues [26] so as to be matched against the beliefs related to the top 3 reasons for having no help-seeking intention for depression, respectively [24]: 1) depression can happen to anyone, 2) depression needs treatment, and 3) depression improves with treatment. The first one was neutral-framed with additional information on incidence of depression: about one out of 15 people experience depression during their lifetime. The second one was loss-framed (thereat appeal) with additional information on prognosis of untreated patients: about 80% of untreated patients will not recover. The third one was gain-framed (benefit appeal) with additional information on prognosis of treated patients: about 80% of treated patients will recover.

For each of the 3 differently framed messages, the formatted and unformatted versions were prepared. The formatted (visual) messages were visually designed in accordance with the CDC Clear Communication Index User Guide [15]. The unformatted (plain) messages were in plain text without any colors or visuals.

2.3 Participants

A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. The Comprehensive Survey of Living Conditions revealed that people who were feeling stressed or distressed were most frequently observed in the 40-49 age group (58.7% in men and 48.6% in women) [27]. In addition, the World Mental Health Japan Survey revealed that the 12-month prevalence of mental disorders was significantly higher in the younger age groups [28]. Therefore, people aged 35-45 years seemed to be a suitable target for persuasive messages encouraging help-seeking for depression.

Participants in the survey were recruited from an online research panel of a leading

research company in Japan (Cross Marketing Inc., Tokyo, Japan). Medical professionals were excluded through a prescreening process. Applicants for participation in the survey were accepted in the order of receipt until the number of participants reached the quotas for gender, area, and K6 score (1-4 and 5≤ points). The Japanese version of the 6-item Kessler Psychological Distress Scale (K6) has been established as a screener for depression in Japan [29]. A validation study revealed that a K6 score ≥5 is a reasonable cutoff to distinguish between depressed and non-depressed people [30]. A total of 2,520 responses were obtained over two days of recruitment.

A follow-up survey was conducted in September 2017 to monitor subsequent changes in help-seeking intention and action. Of the 2,520 participants in the initial survey, 2,315 people (91.9%) completed the follow-up questionnaire.

All participants voluntarily agreed to participate in the survey after reading a description of the purpose and procedure of the survey. Consent to participate was implied by the completion and submission of the survey.

2.4 Measures

Participants in the initial survey were asked to rate one of the depression help-seeking messages after they read the message for at least 15 seconds, in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Moreover, participants in the follow-up survey were asked about help-seeking intention for depression and help-seeking action for their own mental health (medical service use) during the 2-month follow-up period.

The web questionnaire forms presented the questions one by one through the operation of a ‘Next’ button. Respondents answered one question per page and could not go back to the

previous page.

2.4.1 Comprehensibility

Using the perceived effectiveness rating scales [23], the five items asked how easy or hard the information is to: 1) read, 2) understand, 3) remember, 4) locate important information, and 5) keep for future reference. All item scores (range 1-5 points) were averaged to produce the comprehensibility score.

2.4.2 Persuasiveness

Using the perceived effectiveness rating scales [23], the seven items asked to what extent they agree or disagree that the information is: 1) believable, 2) convincing, 3) important to me, 4) help me feel confident about how best to do, 5) would help my family and friends, 6) put thoughts in my mind about wanting to do, and 7) agreeable. All item scores (range 1-5 points) were averaged to produce the persuasiveness score.

2.4.3 Emotional responses

Participants were asked 'when you read the message, to what extent you feel: 1) surprise, 2) anger, 3) fear, 4) sadness, 5) guilt, 6) anxiety, and 7) happiness?' [18,19]. Response options were from 1 (not at all) to 5 (extremely).

2.4.4 Design quality

Six items for design quality were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked to rate the message on a 5-point scale in terms of 1) organization, 2) attractiveness, 3) size, 4) tone, 5) helpfulness, and 6) spacing. Higher scores indicate higher quality.

2.4.5 Intended future use

Three items for intended future use were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked 'If you saw the information in a newspaper or magazine, how likely would you [use, read, and keep] it?'. Response options were from 1(very unlikely) to 5 (very likely).

2.4.6 Help-seeking intention

Help-seeking intention for depression was measured using vignette methodology. Participants were presented with a vignette describing a man (or woman) with depression and were then asked 'If you had health problems right now like Mr. A (or Ms. A), would you see a doctor?' [23,24,25]. Participants answered the question on a four-point scale (certainly yes/probably yes/probably not/certainly not). Those who gave affirmative answers (certainly yes and probably yes) were counted as having a positive help-seeking intention.

Help-seeking intention for depression was measured at three time points: 1) before exposure to the messages in the initial survey, 2) after exposure to the messages in the initial survey, and 3) at the follow-up survey. Those who had a positive help-seeking intention at the second point but did not at the first point were counted as developing help-seeking intentions after exposure to the message. Those who had a positive help-seeking intention both at the second and third points were counted as maintaining help-seeking intention.

2.4.7 Help-seeking action

Help-seeking action for their own mental health was measured in the follow-up survey by asking participants whether they had seen a doctor for their mental health problem in the previous 2 months.

2.5 Statistical Analysis

All statistical analyses were performed using the SAS ver. 9.4 (SAS Institute, Cary, NC, USA). Main and interaction effects of frame and format were assessed using two-way analysis of variance. The proportions of people who reported a positive help-seeking intention for depression before and after exposure to the messages were compared using McNemar test. Multiple logistic regression analysis was further conducted to compare the effects of 6 differently framed and formatted messages on help-seeking intention for depression. Odds ratios with 95% confidence intervals for help-seeking intention for depression were calculated with adjustment for gender, depressive status, and help-seeking intention before exposure the messages. Significant levels were set at $p<0.05$.

3. Results

Figure 1 shows the flow of participants through the study. In the initial survey, 2520 participants were randomly assigned to one of the 6 message groups. Excluding those who had an experience of receiving treatment for their mental illness, the remaining 1,957 participants were included in the study. Of these, 1,805 people (92.2%) who completed the follow-up questionnaire were included in the analysis of the follow-up data.

Table 1 shows the characteristics of the study participants. Of the 1,957 participants, 45.6% had a university degree, 56.3% were married, and 60.1% had a full-time job. As a result of the random assignment of participants to 6 message groups, no significant differences between the message groups were observed in sociodemographic characteristics.

Table 1 Characteristics of the study participants

		N	
Gender	Male	980	50.1%
	Female	977	49.9%
Age	Mean (SD)	40.9	(3.0)
Education	Compulsory education/high school	540	27.6%
	Junior college/vocational school	524	26.8%
	University or higher	893	45.6%
Marital status	Married	1101	56.3%
	Unmarried	767	39.2%
	Divorced/widowed	89	4.5%
Occupation	Full-time job	1176	60.1%
	Temporary or part-time job	329	16.8%
	No occupation	452	23.1%
Household income	<2.0 million yen †	230	11.8%
	2.0-3.9 million	394	20.1%
	4.0-5.9 million	552	28.2%
	6.0-7.9 million	400	20.4%
	8.0-9.9 million	205	10.5%
	10.0+ million	161	8.2%
	Missing	15	0.8%

†1 million yen was about 10,000 U.S. dollars at the time of the survey.

Table 2 Assessment of the depression help-seeking messages

		Message						p		
		Neutral – plain	Neutral – visual	Loss –plain	Loss –visual	Gain –plain	Gain –visual	Frame (A)	Format (B)	A × B
Comprehensibility										
	Mean	3.74	3.81	3.79	3.80	3.82	3.82	0.554	0.472	0.757
	SD	0.79	0.78	0.87	0.83	0.83	0.78			
Persuasiveness										
	Mean	3.15	3.13	3.20	3.18	3.10	3.17	0.168	0.732	0.352
	SD	0.59	0.63	0.66	0.62	0.67	0.64			
Emotional responses										
1) surprise	Mean	2.47	2.57	2.60	2.81	2.49	2.63	0.005	0.002	0.636
	SD	1.03	1.10	1.06	1.01	1.10	1.02			
2) anger	Mean	1.91	1.91	1.94	2.01	1.90	1.99	0.411	0.202	0.596
	SD	0.95	0.92	0.92	0.96	0.92	0.93			
3) fear	Mean	2.51	2.43	2.55	2.64	2.22	2.41	<0.001	0.163	0.061
	SD	1.03	1.05	1.06	1.07	1.01	0.98			
4) sadness	Mean	2.44	2.43	2.53	2.61	2.24	2.38	<0.001	0.124	0.413
	SD	1.03	1.10	1.05	1.04	1.01	0.95			
5) guilt	Mean	2.09	2.07	2.08	2.18	2.02	2.09	0.326	0.247	0.440
	SD	0.91	0.96	0.93	0.94	0.92	0.86			
6) anxiety	Mean	2.63	2.50	2.59	2.74	2.34	2.45	<0.001	0.370	0.035
	SD	1.04	1.12	1.06	1.08	1.02	1.03			
7) happy	Mean	1.93	1.83	1.99	1.98	2.17	2.35	<0.001	0.657	0.024
	SD	0.96	0.92	0.98	0.98	0.98	0.95			
Design quality										
1) organization	Mean	3.67	3.65	3.72	3.80	3.64	3.71	0.113	0.258	0.557
	SD	0.87	0.90	0.91	0.84	0.88	0.87			
2) attractiveness	Mean	3.10	3.22	3.18	3.37	3.08	3.26	0.029	<0.001	0.749
	SD	0.84	0.89	0.86	0.84	0.91	0.90			
3) size	Mean	3.38	3.38	3.37	3.52	3.32	3.41	0.177	0.037	0.296
	SD	0.81	0.88	0.91	0.86	0.79	0.86			
4) tone	Mean	3.16	3.11	3.20	3.13	3.22	3.33	0.004	0.966	0.084
	SD	0.72	0.79	0.82	0.83	0.77	0.83			
5) helpfulness	Mean	3.38	3.36	3.39	3.57	3.37	3.48	0.048	0.019	0.109
	SD	0.82	0.84	0.90	0.80	0.87	0.87			
6) spacing	Mean	3.35	3.50	3.26	3.56	3.24	3.52	0.633	<0.001	0.220
	SD	0.77	0.80	0.91	0.78	0.85	0.80			
Intended future use										
1) read	Mean	3.17	3.23	3.28	3.28	3.12	3.36	0.286	0.016	0.052
	SD	0.90	0.91	0.92	0.95	0.95	0.87			
2) use	Mean	2.77	2.71	2.87	2.83	2.72	2.86	0.063	0.666	0.065
	SD	0.84	0.86	0.84	0.85	0.82	0.79			
3) keep	Mean	2.36	2.34	2.38	2.48	2.34	2.46	0.332	0.142	0.332
	SD	0.98	0.95	0.97	0.98	0.91	0.90			

All items were scored on a 1-to-5 point scale. Two-way analysis of variance was used to assess main and interaction effects of frame and format.

Table 2 shows the assessment of the depression help-seeking messages. The comprehensibility and persuasiveness scores showed no significant differences between the frames or between the formats. For the emotional responses, significant main effects of frame were observed in 5 out of 7 items (surprise, fear, sadness, anxiety, and happiness). There were a significant effect of format on 'surprise' and significant frame×format interaction effects on 'anxiety' and 'happiness'. Compared with the neutral-framed, the loss- and gain-framed messages showed significant enhancements of emotional responses to the formatted messages. For the design quality, significant main effects of format were observed in 4 out of 6 items (attractiveness, size, helpfulness, and spacing). There were significant main effects of frame on 3 items (attractiveness, tone, and helpfulness) but no significant frame×format interaction. For the intended future use, a significant main effect of format was observed in 1 out of 3 items (read). There were no significant main effects of frame and no significant frame×format interaction.

Table 3 shows the changes in help-seeking intention for depression before and after exposure to the messages. All messages except the neutral-plain message produced significant increase in help-seeking intention. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

Multiple logistic regression analysis was further conducted to compare the effects of 6 differently framed and formatted messages on help-seeking intention for depression. Compared with the neutral-plain message as a reference group, the loss-visual message had a significantly greater effect, but the others did not: the adjusted odds ratios (95% confidence intervals) of the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 1.31 (0.89-1.92), 1.29 (0.88-1.89), 1.57 (1.07-2.29), 1.39 (0.95-2.04) and 1.41 (0.97-2.06), respectively.

Table 3 Changes in help-seeking intention for depression

Message	All					Depressed (K6 score ≥5)				
	N	Positive intention			p	N	Positive intention			p
		Before	After	Change			Before	After	Change	
Neutral	335	115	128		0.128	142	40	48		0.131
−plain		34.3%	38.2%	+11.3%			28.2%	33.8%	+20.0%	
Neutral	317	116	139		0.003	128	34	52		<0.001
−visual		36.6%	43.8%	+19.8%			26.6%	40.6%	+52.9%	
Loss	325	126	146		0.017	130	41	51		0.033
−plain		38.8%	44.9%	+15.9%			31.5%	39.2%	+24.4%	
Loss	324	117	151		<0.001	137	40	56		0.003
−visual		36.1%	46.6%	+29.1%			29.2%	40.9%	+40.0%	
Gain	323	117	144		0.001	137	36	48		0.011
−plain		36.2%	44.6%	+23.1%			26.3%	35.0%	+33.3%	
Gain	333	135	158		0.003	150	58	72		0.004
−visual		40.5%	47.4%	+17.0%			38.7%	48.0%	+24.1%	

Help-seeking intention for depression was assessed before and after exposure to the messages. McNemar test was used to assess changes in help-seeking intention.

Table 4 Help-seeking action during the follow-up period

Message	All		Depressed (K6 score ≥5)	
	N	Action	N	Action
Neutral	307	12	132	8
−plain		3.9%		6.1%
Neutral	295	12	121	5
−visual		4.1%		4.1%
Loss	296	8	120	4
−plain		2.7%		3.3%
Loss	305	9	128	6
−visual		3.0%		4.7%
Gain	301	14	127	11
−plain		4.7%		8.7%
Gain	301	11	141	8
−visual		3.7%		5.7%
	p=0.815		p=0.516	

Help-seeking action for their own mental health in the previous 2 months was measured in the follow-up survey.

Of the 1,805 participants in the follow-up survey, 1,141 people had not possessed help-seeking intention before exposure to the messages, and 249 people (21.8%) developed their help-seeking intentions after exposure to the messages. Of these, 143 people (57.4%) maintained their help-seeking intentions up to the follow-up survey. The proportion of participants who maintain their help-seeking intentions was not significantly different across the given messages: the percentages for the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 65.7% (23/35), 57.9% (22/38), 48.0% (25/50), 23/44 (52.3%) and 67.5% (27/40), respectively (p=0.423).

Table 4 shows the help-seeking action during the follow-up period. There were 66 people (3.7%) who had seen a doctor for their mental health problem during the follow-up period. The proportion of participants with help-seeking action was not significantly different across the given messages. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

4. Discussion

This study examined audience's responses to 6 differently framed and formatted messages that were developed with the aim of increasing people's help-seeking intentions for depression. Although depression help-seeking messages have the potential to backfire [10,11], such boomerang effect was not evident in this study. All messages except the neutral-plain message produced significant increase in help-seeking intention after exposure to the messages. This result supports the effectiveness of communicating persuasive messages for increasing people's help-seeking intentions for depression. Moreover, multiple logistic regression analysis indicated that the loss-visual message worked better than the other messages. Despite the potential limitations of this study, it would be recommendable to apply loss-framing and formatting to depression help-seeking messages.

The differently framed messages brought different emotional responses in a predictable way. Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced the recipients' emotions. The loss-framed messages more strongly induced negative emotions (surprise, fear, sadness, and anxiety), while the gain-framed messages more strongly induced a positive emotion (happiness). Previous studies have suggested that emotional responses play a significant role in the persuasion process [18,19]. There was no significant difference in persuasiveness, however, the loss- and gain-framed messages seemed more likely to bring out the recipients' help-seeking intentions by inducing emotional responses than the neutral-framed messages.

The formatted messages were judged superior to the unformatted messages in design quality. The formatted messages consequently succeeded in increasing the likelihood that the message will be read. These results support the effectiveness of the CDC Clear Communication Index which helps provide easily understandable health messages and materials [16,17]. The significant frame×format interaction effects on 'anxiety' and 'happiness' indicated that the message formatting enhanced the recipients'emotional responses, both negative and positive. There was no significant difference in persuasiveness, however, the formatted messages seemed more likely to be perceived as attractive and helpful by audience than the unformatted messages.

As for the percentage changes in help-seeking intention for depression by message group (Table 3), it is hard to say that the loss-framed messages were more effective than the gain-framed messages or vice versa. The loss-plain message showed a smaller percentage increase than the gain-plain message (15.9% vs. 23.1%), and the proportions of participants who reported a positive help-seeking intention after exposure these messages were equivalent (44.9% vs. 44.6%). Meanwhile, the loss-visual message showed a greater percentage increase than the gain-visual message (29.1% vs. 17.0%), and the proportions of participants who

reported a positive help-seeking intention after exposure these messages were equivalent (46.6% vs. 47.4%). The respective effects of loss-framing and formatting on help-seeking intention were not preeminent, but multiple logistic regression analysis revealed that the loss-visual message had much effect on increasing help-seeking intention. Previous studies have not provided a conclusive answer as to which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame [13,14]. A literature review suggested that adding pictures to written text will increase the likelihood that the text will be read, however, the effects of pictures on comprehension, recall, and adherence have not yet been established [32]. The results of this study are insufficient to conclude, but it is likely that loss-framing and formatting act synergistically to increase help-seeking intention for depression. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least.

Of those who developed their help-seeking intention after exposure to the messages, 43.6% did not maintain their help-seeking intentions up to the 2-month follow-up survey. The depression help-seeking messages succeeded in possessing help-seeking intention for a short time after exposure, but the effect could not be sustained over time. Moreover, those who had taken help-seeking action during the 2-month follow-up period accounted for 3.7% of the total and for 5.5% of those who were depressed (K6 score ≥5). Seeing a message only once may be insufficient to induce help-seeking action. Although a number of interventions have been conducted to promote access to mental health care, very little is known about what interventions increase help-seeking action [9]. To our knowledge, there is no successful precedent that proved the effect of public health messaging on help-seeking action. Further studies are needed to find out effective strategies for maintaining help-seeking intention and increasing help-seeking action.

This study provides evidence for the effectiveness of depression help-seeking messages in

middle-aged Japanese people. On the contrary, it has a number of potential limitations. First, the web-based survey was self-administered, so that the accuracy of responses would depend on participants' understanding of the questions and their motivation to answer questions accurately. The understandability of the wording of items was checked prior to the survey. The use of the Internet and the provision of anonymity would be expected to elicit more truthful responses, by minimizing social desirability pressures [33]. However, it is almost impossible to eliminate the information bias completely. Second, the study participants were selected from a nationwide panel of a research company. According to the national census [34], the percentage of the Japanese population aged 35-44 years with university degrees were 22.0% in 2010, considerably lower than that of this study (45.6%). The selection bias may have influenced the results to some extent. Third, the study participants were limited to 35-45 years old. It is uncertain whether the messages will work equally well in other age groups. Moreover, because of cultural differences, the findings from this study may not be applicable to non-Japanese populations. Now we are planning to conduct a population-based interventional study to assess the effectiveness of a public health communication program using the depression help-seeking messages. We will discuss the channels and activities that will be most likely to successfully reach target audience in the future study.

5. Conclusion

This study examined the effects of message framing and formatting on persuasive message effectiveness in the context of developing depression help-seeking messages. Compared with the neutral-framed, the loss- and gain-framed messages more strongly influenced the recipients' emotions. The message formatting applied the CDC Clear Communication Index increased the likelihood that the message will be read and enhanced the recipients' emotional responses. Consequently, the loss-framed formatted message had

much effect on increasing help-seeking intention. According to these results, communicating persuasive messages will change people's attitudes and intentions toward help-seeking for depression if the messages are developed carefully and appropriately. Providers should consider that message framing and formatting influence persuasive message effectiveness when they design their messages. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Contributors

MS was responsible for the design and conduct of the study, the collection, analysis, and interpretation of data, and the writing of the article. TY and HY contributed to the data interpretation and discussion of the implications of this work. All authors read and approved the final manuscript.

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Competing interest

The authors declare that they have no competing interest.

Ethics approval

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

Data sharing statement

No additional data are available.

Figure legend

Figure 1 Flow of participants through the study

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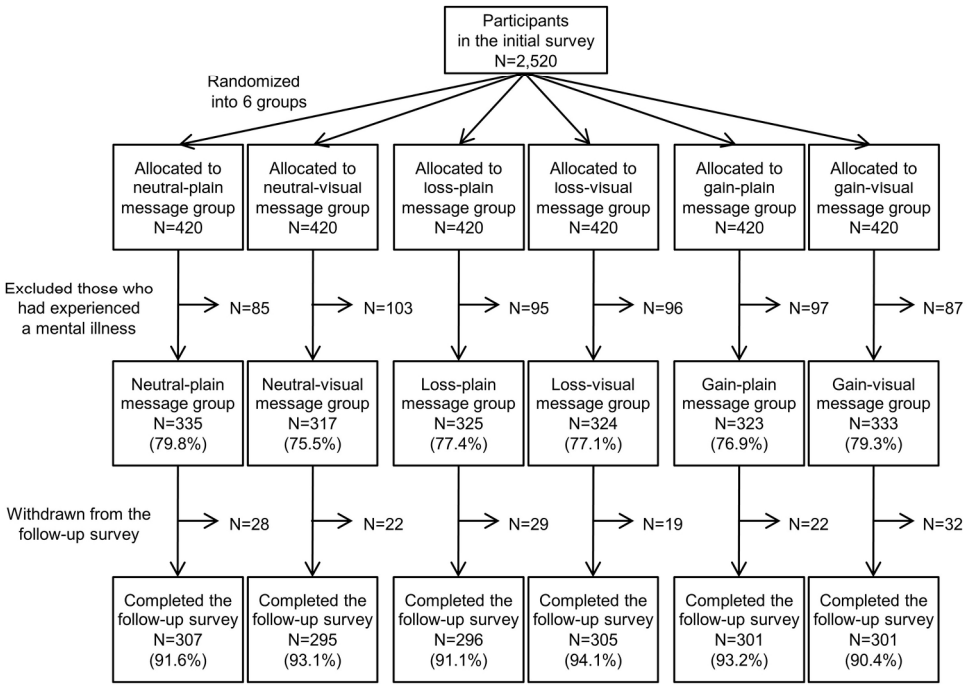
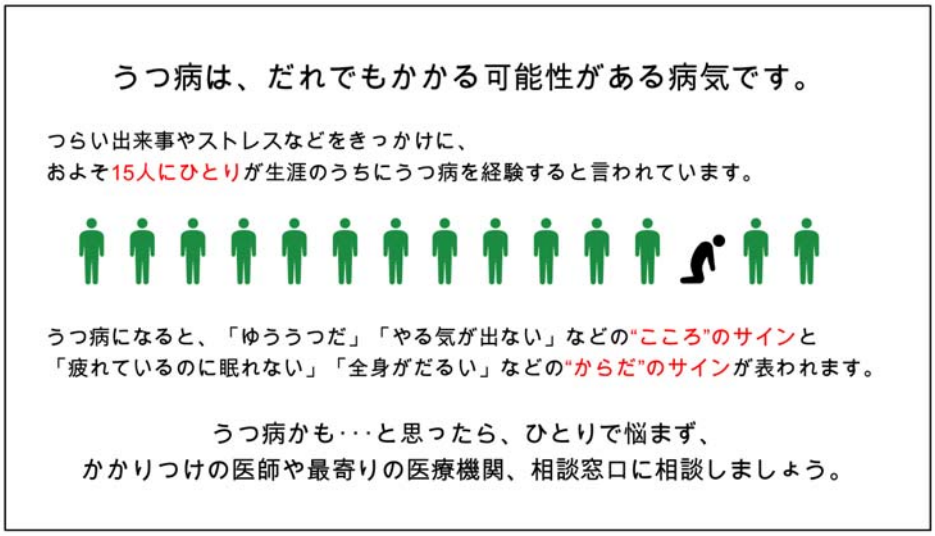


Figure 1 Flow of participants through the study

190x142mm (300 x 300 DPI)

Appendix A. Depression help-seeking messages (formatted versions)

Neutral-framed message - “Depression can happen to anyone”



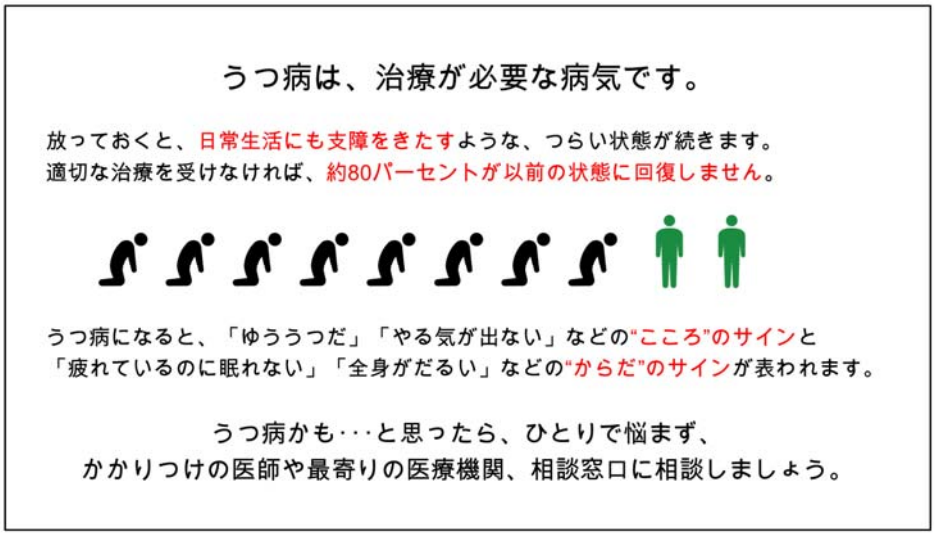
Main message

- Depression happens to one out of 15 people.

Information on early signs of depression

Call to action

Loss-framed message - “Depression needs treatment”



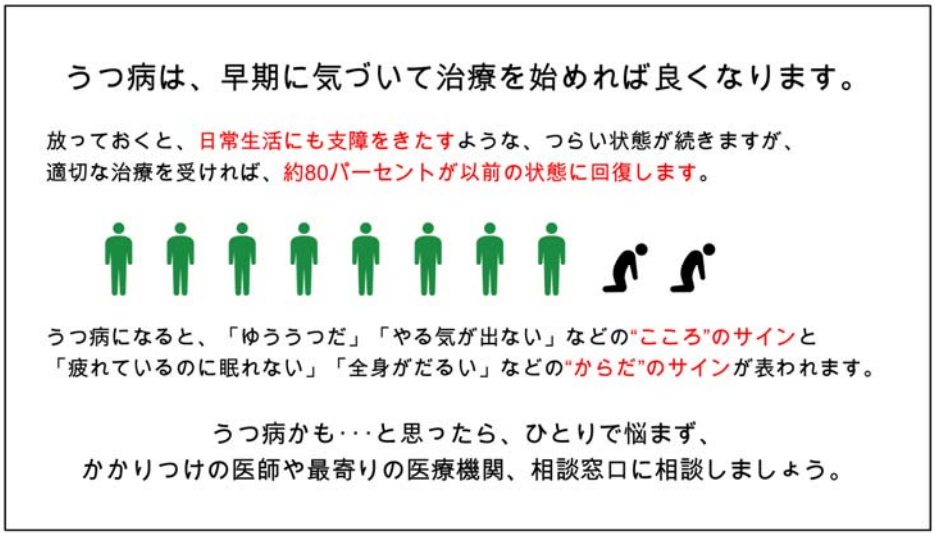
Main message

- If not treated, 80% cannot recover from depression.

Information on early signs of depression

Call to action

Gain-framed message - “Depression improves with treatment”



Main message

- If treated, 80% can recover from depression.

Information on early signs of depression

Call to action

BMJ Open

Comparing responses to differently framed and formatted persuasive messages to encourage help-seeking for depression in Japanese adults: a cross-sectional study with 2-month follow-up

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Comparing responses to differently framed and formatted persuasive messages to encourage help-seeking for depression in Japanese adults: a cross-sectional study with 2-month follow-up.

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ABSTRACT

Objective: To examine audience's responses to differently framed and formatted persuasive messages in the context of developing depression help-seeking messages.

Design: Cross-sectional followed by 2-month follow-up study

Setting and participants: A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. There were 1,957 eligible respondents without psychiatric history. Of these, 1,805 people (92.2%) completed the 2-month follow-up questionnaire.

Main outcome measures: Six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). Participants were asked to rate one of the messages in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Subsequent 2-month help-seeking action for their own mental health (medical service use) was monitored by the follow-up survey.

Results: The loss-framed messages more strongly induced negative emotions (surprise, fear, sadness, and anxiety), while the gain-framed messages more strongly induced a positive emotion (happiness). The message formatting applied the CDC Clear Communication Index enhanced the emotional responses and increased the likelihood that the message will be read. The loss-framed formatted message alone had a significantly greater odds ratio of having help-seeking intention for depression compared with the neutral-framed unformatted message as a reference group. All messages had little impact on maintaining help-seeking intention or increasing help-seeking action.

Conclusion: Message framing and formatting may influence emotional responses to the depression help-seeking message, willingness to read the message, and intention to seek help for depression. It would be recommendable to apply loss-framing and formatting to

depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Key words: depression, help-seeking, persuasive message, questionnaire survey

STRENGTH AND LIMITATIONS

- This study represents the first attempt to compare audience's responses to 6 depression help-seeking messages with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted).
- The 2-month follow-up survey was conducted to monitor changes in help-seeking intention and action after exposure to the messages.
- This study relied on self-reported information. It is almost impossible to eliminate the information bias completely.
- The study participants were limited to 35-45 years old selected from a nationwide panel of a research company. It is uncertain whether the messages will work equally well in other age groups or in other settings.

Introduction

Mental disorders are the leading cause of disability worldwide, accounting for 21% of all non-fatal burden [1]. Failure and delay in initial treatment contact for mental disorders has been recognized as an important public health problem [2,3]. A systematic review and meta-analysis revealed that negative attitudes toward mental illness and help-seeking are associated with less active help-seeking in the general population [4]. There is a possibility that interventions for improving people's attitudes and intentions toward help-seeking could facilitate access to mental health care, in addition to those targeting people's behaviors itself.

A number of public health programs have been launched to eliminate negative attitudes toward mental illness and help-seeking to facilitate access to mental health care [5]. Communication is one of the components necessary for effective public health program implementation [6].With better information, individuals and communities can make better decisions about their own health. Effective communication produce beneficial changes in people's behaviors toward health issues [7,8]. A systematic review revealed that communicating persuasive messages is effective in improving attitudes toward help-seeking for depression [9]. Meanwhile, previous studies have suggested that depression help-seeking messages have the potential to backfire; exposure to the messages may result in increased self-stigma and increased reluctance to help-seeking (i.e. boomerang effect) [10,11]. Further evidence is needed to identify strategies for successful public health messaging with the aim of promoting access to mental health care.

Health communication research has revealed that the effect of persuasive messages can depend on message characteristics. Well known is the framing effect, that is, health messages framed to highlight either the benefits of performing a behavior (i.e. gain-framed) or the consequences of not performing a behavior (i.e. loss-framed) will lead to different decisions and different health behaviors [12]. A systematic review and meta-analysis revealed that

gain-framed messages are more likely than loss-framed messages to promote prevention behaviors, particularly for skin cancer prevention, smoking cessation, and physical activity [13]. Meanwhile, the Cochrane Review group reported that loss-framed messages led to more positive perception of effectiveness than gain-framed messages for screening messages and tended to be more persuasive for treatment messages [14]. These results do not unequivocally support the framing effect of health message. There seems to be some contexts in which loss-framed messages are equally or more effective than gain-framed messages. It is uncertain which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame.

Reading a message is the first step of the persuasion process. If recipients find difficulty in reading and understanding the given message, it is unlikely to have any persuasive impact. The Centers for Disease Control and Prevention (CDC) proposed a set of evidence-based criteria to plan and assess public health communication materials for diverse audiences, namely the Clear Communication Index [15]. On the basis of existing research-based evidence, the Index represents the most important items that enhance clarity and aid understanding of public health messages and materials. The six core items applicable to all materials are: 1) include one main message statement, 2) put the main message first, 3) use visual cues to emphasize the main message, 4) include a visual that conveys the main message, 5) include one call to action, and 6) use active voice. Previous studies have demonstrated that the materials revised using the Index are rated more favorably than the originals by possible audience members. The application of the Index makes it more likely that audience can correctly identify the intended main message and understand the words in the materials [16,17]. However, to our knowledge, there have been no attempts to confirm whether health messages designed to conform to the Index items function better as a stimulus to change people's behaviors toward health issues. Moreover, little is known about the interaction between message frame and format. If message format

significantly influences the comprehensibility of health message, it is likely to modify the framing effect of health message to some extent.

The objective of this study was to examine whether message framing and formatting are related to persuasive message effectiveness in the context of developing depression help-seeking messages. Although the mechanism of persuasive message effectiveness has not been clearly elucidated, a number of factors can serve to mediate or moderate the effect of persuasive messages. Emotional responses to messages influence perceptions of effectiveness of messages [18,19]. Perceived message effectiveness is strongly correlated with and may be causally related to actual message effectiveness [19,20]. Intention is the best determinant of behavior in a wide range of health domains [21], and it has been commonly used as an outcome measure in health communication research [13]. We previously found that reading comprehension of health information was significantly associated with recognition of health risk and intention to perform health behaviors [22]. On the basis of these findings, the present study compared audience's responses to six depression help-seeking messages with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted) in terms of comprehensibility, persuasiveness, emotion, intention, and action.

1. Methods

We launched a research project to develop effective health communication interventions for encouraging help-seeking in people at risk of suicide. As the first step in the research project, we developed rating scales for measuring audience's perceptions of effectiveness of health messages in Japanese people [23]. At the second step, we intended to develop effective public health messages that increase people's help-seeking intentions for depression. We created different kinds of depression help-seeking messages on the basis of our previous findings [24] and conducted a web-based survey to rate them by possible audience members.

Data from the survey were analyzed to achieve the two intended objectives. One was to examine whether message framing and formatting are related to the effectiveness of depression help-seeking messages, as reported in this paper. Another objective was to determine whether the effectiveness of depression help-seeking messages are influenced by audience's depressive status, as reported elsewhere [25].

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

2.1 Patient and public involvement

There were no patients involved in the design of the study or the recruitment to and conduct of the study.

2.2 Messages

In order to examine the effects of message framing and formatting, six depression help-seeking messages were prepared with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). The aim of messaging was to increase people's help-seeking intentions for depression. The target audience were either depressed or non-depressed people. The messages were designed as print advertisements to be inserted in the form of web-based surveys.

The formatted versions of depression help-seeking messages were shown in Appendix A. Each message consisted of three parts. The first part was the main message statement. The second part provided information on early signs of depression: depression can be recognized early by mental symptoms such as depressed mood, loss of interest, etc. and physical symptoms such as disturbed sleep, increased fatigue, etc. The last part was the call to action:

if you suspect your depression, consult your familiar primary care doctor.

The 3 main message statements were selected from the text message list developed by Bell and colleagues [26] so as to be matched against the beliefs related to the top 3 reasons for having no help-seeking intention for depression, respectively [24]: 1) depression can happen to anyone, 2) depression needs treatment, and 3) depression improves with treatment. The first one was neutral-framed with additional information on incidence of depression: about one out of 15 people experience depression during their lifetime. The second one was loss-framed (thereat appeal) with additional information on prognosis of untreated patients: about 80% of untreated patients will not recover. The third one was gain-framed (benefit appeal) with additional information on prognosis of treated patients: about 80% of treated patients will recover.

For each of the 3 differently framed messages, the formatted and unformatted versions were prepared. The formatted (visual) messages were visually designed in accordance with the CDC Clear Communication Index User Guide [15]. The unformatted (plain) messages were in plain text without any colors or visuals.

2.3 Participants

A web-based survey was conducted in July 2017 among Japanese adults aged 35-45 years. The Comprehensive Survey of Living Conditions revealed that people who were feeling stressed or distressed were most frequently observed in the 40-49 age group (58.7% in men and 48.6% in women) [27]. In addition, the World Mental Health Japan Survey revealed that the 12-month prevalence of mental disorders was significantly higher in the younger age groups [28]. Therefore, people aged 35-45 years seemed to be a suitable target for persuasive messages encouraging help-seeking for depression.

Participants in the survey were recruited from an online research panel of a leading

research company in Japan (Cross Marketing Inc., Tokyo, Japan). Medical professionals were excluded through a prescreening process. Applicants for participation in the survey were accepted in the order of receipt until the number of participants reached the quotas for gender, area, and K6 score (1-4 and 5≤ points). The Japanese version of the 6-item Kessler Psychological Distress Scale (K6) has been established as a screener for depression in Japan [29]. A validation study revealed that a K6 score ≥5 is a reasonable cutoff to distinguish between depressed and non-depressed people [30]. A total of 2,520 responses were obtained over two days of recruitment.

A follow-up survey was conducted in September 2017 to monitor subsequent changes in help-seeking intention and action. Of the 2,520 participants in the initial survey, 2,315 people (91.9%) completed the follow-up questionnaire.

All participants voluntarily agreed to participate in the survey after reading a description of the purpose and procedure of the survey. Consent to participate was implied by the completion and submission of the survey.

2.4 Measures

Participants in the initial survey were randomly assigned to one of the six depression help-seeking messages. After they read the message for at least 15 seconds, they were asked to rate it in terms of comprehensibility, persuasiveness, emotional responses, design quality, and intended future use. Help-seeking intention for depression was measured using vignette methodology before and after exposure to the messages. Moreover, participants in the follow-up survey were asked about help-seeking intention for depression and help-seeking action for their own mental health (medical service use) during the 2-month follow-up period.

The web questionnaire forms presented the questions one by one through the operation of a 'Next' button. Respondents answered one question per page and could not go back to the

previous page.

2.4.1 Comprehensibility

Using the perceived effectiveness rating scales [23], the five items asked how easy or hard the information is to: 1) read, 2) understand, 3) remember, 4) locate important information, and 5) keep for future reference. All item scores (range 1-5 points) were averaged to produce the comprehensibility score.

2.4.2 Persuasiveness

Using the perceived effectiveness rating scales [23], the seven items asked to what extent they agree or disagree that the information is: 1) believable, 2) convincing, 3) important to me, 4) help me feel confident about how best to do, 5) would help my family and friends, 6) put thoughts in my mind about wanting to do, and 7) agreeable. All item scores (range 1-5 points) were averaged to produce the persuasiveness score.

2.4.3 Emotional responses

Participants were asked 'when you read the message, to what extent you feel: 1) surprise, 2) anger, 3) fear, 4) sadness, 5) guilt, 6) anxiety, and 7) happiness?' [18,19]. Response options were from 1 (not at all) to 5 (extremely).

2.4.4 Design quality

Six items for design quality were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked to rate the message on a 5-point scale in terms of 1) organization, 2) attractiveness, 3) size, 4) tone, 5) helpfulness, and 6) spacing. Higher scores indicate higher quality.

2.4.5 Intended future use

Three items for intended future use were derived from the Consumer Information Rating Form developed by Krass and colleagues [31]. Participants were asked 'If you saw the information in a newspaper or magazine, how likely would you [use, read, and keep] it?'. Response options were from 1(very unlikely) to 5 (very likely).

2.4.6 Help-seeking intention

Help-seeking intention for depression was measured using vignette methodology. Participants were presented with a vignette describing a man (or woman) with depression and were then asked 'If you had health problems right now like Mr. A (or Ms. A), would you see a doctor?' [23,24,25]. Participants answered the question on a four-point scale (certainly yes/probably yes/probably not/certainly not). Those who gave affirmative answers (certainly yes and probably yes) were counted as having a positive help-seeking intention.

Help-seeking intention for depression was measured at three time points: 1) before exposure to the messages in the initial survey, 2) after exposure to the messages in the initial survey, and 3) at the follow-up survey. Those who had a positive help-seeking intention at the second point but did not at the first point were counted as developing help-seeking intentions after exposure to the message. Those who had a positive help-seeking intention both at the second and third points were counted as maintaining help-seeking intention.

2.4.7 Help-seeking action

Help-seeking action for their own mental health was measured in the follow-up survey by asking participants whether they had seen a doctor for their mental health problem in the previous 2 months.

2.5 Statistical Analysis

All statistical analyses were performed using the SAS ver. 9.4 (SAS Institute, Cary, NC, USA). Main and interaction effects of frame and format were assessed using two-way analysis of variance. The proportions of people who reported a positive help-seeking intention for depression before and after exposure to the messages were compared using McNemar test. Multiple logistic regression analysis was further conducted to compare the likelihood of having help-seeking intention for depression across the differently framed and formatted messages. Odds ratios with 95% confidence intervals for help-seeking intention for depression were calculated with adjustment for gender, depressive status, and help-seeking intention before exposure the messages. Significant levels were set at $p<0.05$.

A statistical power analysis was carried out using Cohen's tables [32], because there was no existing research to indicate a likely effect size. To detect a small-sized difference between independent means ($d=0.20$), 393 samples in each group give an alpha of 0.05 with a power of 0.80; the necessary sample size was 310 at an alpha of 0.10 and 586 at an alpha of 0.01 with the same power. The number of participants in each group ranged between 267 and 382, which were adequate to detect small effects at an alpha of 0.05.

3. Results

Figure 1 shows the flow of participants through the study. In the initial survey, 2520 participants were randomly assigned to one of the 6 message groups. Excluding those who had an experience of receiving treatment for their mental illness, the remaining 1,957 participants were included in the study. Of these, 1,805 people (92.2%) who completed the follow-up questionnaire were included in the analysis of the follow-up data.

Table 1 shows the characteristics of the study participants. Of the 1,957 participants,

45.6% had a university degree, 56.3% were married, and 60.1% had a full-time job. As a result of the random assignment of participants to 6 message groups, no significant differences between the message groups were observed in sociodemographic characteristics.

Table 2 shows the assessment of the depression help-seeking messages. The comprehensibility and persuasiveness scores showed no significant differences between the frames or between the formats. For the emotional responses, significant main effects of frame were observed in 5 out of 7 items (surprise, fear, sadness, anxiety, and happiness). There were a significant effect of format on 'surprise' and significant frame×format interaction effects on 'anxiety' and 'happiness'. Compared with the neutral-framed, the loss- and gain-framed messages showed significant enhancements of emotional responses to the formatted messages. For the design quality, significant main effects of format were observed in 4 out of 6 items (attractiveness, size, helpfulness, and spacing). There were significant main effects of frame on 3 items (attractiveness, tone, and helpfulness) but no significant frame×format interaction. For the intended future use, a significant main effect of format was observed in 1 out of 3 items (read). There were no significant main effects of frame and no significant frame×format interaction.

Table 3 shows the changes in help-seeking intention for depression before and after exposure to the messages. All messages except the neutral-plain message produced significant increase in help-seeking intention. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

Table 1 Characteristics of the study participants

		N	
Gender	Male	980	50.1%
	Female	977	49.9%
Age	Mean (SD)	40.9	(3.0)
Education	Compulsory education/high school	540	27.6%
	Junior college/vocational school	524	26.8%
	University or higher	893	45.6%
Marital status	Married	1101	56.3%
	Unmarried	767	39.2%
	Divorced/widowed	89	4.5%
Occupation	Full-time job	1176	60.1%
	Temporary or part-time job	329	16.8%
	No occupation	452	23.1%
Household income	<2.0 million yen †	230	11.8%
	2.0–3.9 million	394	20.1%
	4.0–5.9 million	552	28.2%
	6.0–7.9 million	400	20.4%
	8.0–9.9 million	205	10.5%
	10.0+ million	161	8.2%
	Missing	15	0.8%

†1 million yen was about 10,000 U.S. dollars at the time of the survey.

Table 2 Assessment of the depression help-seeking messages

		Message						p		
		Neutral – plain	Neutral – visual	Loss –plain	Loss –visual	Gain –plain	Gain –visual	Frame (A)	Format (B)	A × B
Comprehensibility										
	Mean	3.74	3.81	3.79	3.80	3.82	3.82	0.554	0.472	0.757
	SD	0.79	0.78	0.87	0.83	0.83	0.78			
Persuasiveness										
	Mean	3.15	3.13	3.20	3.18	3.10	3.17	0.168	0.732	0.352
	SD	0.59	0.63	0.66	0.62	0.67	0.64			
Emotional responses										
1) surprise	Mean	2.47	2.57	2.60	2.81	2.49	2.63	0.005	0.002	0.636
	SD	1.03	1.10	1.06	1.01	1.10	1.02			
2) anger	Mean	1.91	1.91	1.94	2.01	1.90	1.99	0.411	0.202	0.596
	SD	0.95	0.92	0.92	0.96	0.92	0.93			
3) fear	Mean	2.51	2.43	2.55	2.64	2.22	2.41	<0.001	0.163	0.061
	SD	1.03	1.05	1.06	1.07	1.01	0.98			
4) sadness	Mean	2.44	2.43	2.53	2.61	2.24	2.38	<0.001	0.124	0.413
	SD	1.03	1.10	1.05	1.04	1.01	0.95			
5) guilt	Mean	2.09	2.07	2.08	2.18	2.02	2.09	0.326	0.247	0.440
	SD	0.91	0.96	0.93	0.94	0.92	0.86			
6) anxiety	Mean	2.63	2.50	2.59	2.74	2.34	2.45	<0.001	0.370	0.035
	SD	1.04	1.12	1.06	1.08	1.02	1.03			
7) happy	Mean	1.93	1.83	1.99	1.98	2.17	2.35	<0.001	0.657	0.024
	SD	0.96	0.92	0.98	0.98	0.98	0.95			
Design quality										
1) organization	Mean	3.67	3.65	3.72	3.80	3.64	3.71	0.113	0.258	0.557
	SD	0.87	0.90	0.91	0.84	0.88	0.87			
2) attractiveness	Mean	3.10	3.22	3.18	3.37	3.08	3.26	0.029	<0.001	0.749
	SD	0.84	0.89	0.86	0.84	0.91	0.90			
3) size	Mean	3.38	3.38	3.37	3.52	3.32	3.41	0.177	0.037	0.296
	SD	0.81	0.88	0.91	0.86	0.79	0.86			
4) tone	Mean	3.16	3.11	3.20	3.13	3.22	3.33	0.004	0.966	0.084
	SD	0.72	0.79	0.82	0.83	0.77	0.83			
5) helpfulness	Mean	3.38	3.36	3.39	3.57	3.37	3.48	0.048	0.019	0.109
	SD	0.82	0.84	0.90	0.80	0.87	0.87			
6) spacing	Mean	3.35	3.50	3.26	3.56	3.24	3.52	0.633	<0.001	0.220
	SD	0.77	0.80	0.91	0.78	0.85	0.80			
Intended future use										
1) read	Mean	3.17	3.23	3.28	3.28	3.12	3.36	0.286	0.016	0.052
	SD	0.90	0.91	0.92	0.95	0.95	0.87			
2) use	Mean	2.77	2.71	2.87	2.83	2.72	2.86	0.063	0.666	0.065
	SD	0.84	0.86	0.84	0.85	0.82	0.79			
3) keep	Mean	2.36	2.34	2.38	2.48	2.34	2.46	0.332	0.142	0.332
	SD	0.98	0.95	0.97	0.98	0.91	0.90			

All items were scored on a 1-to-5 point scale. Two-way analysis of variance was used to assess main and interaction effects of frame and format.

Table 3 Changes in help-seeking intention for depression

Message	All					Depressed (K6 score ≥5)				
	N	Positive intention			p	N	Positive intention			p
		Before	After	Change			Before	After	Change	
Neutral	335	115	128		0.128	142	40	48		0.131
−plain		34.3%	38.2%	+11.3%			28.2%	33.8%	+20.0%	
Neutral	317	116	139		0.003	128	34	52		<0.001
−visual		36.6%	43.8%	+19.8%			26.6%	40.6%	+52.9%	
Loss	325	126	146		0.017	130	41	51		0.033
−plain		38.8%	44.9%	+15.9%			31.5%	39.2%	+24.4%	
Loss	324	117	151		<0.001	137	40	56		0.003
−visual		36.1%	46.6%	+29.1%			29.2%	40.9%	+40.0%	
Gain	323	117	144		0.001	137	36	48		0.011
−plain		36.2%	44.6%	+23.1%			26.3%	35.0%	+33.3%	
Gain	333	135	158		0.003	150	58	72		0.004
−visual		40.5%	47.4%	+17.0%			38.7%	48.0%	+24.1%	

Help-seeking intention for depression was assessed before and after exposure to the messages. McNemar test was used to assess changes in help-seeking intention.

Multiple logistic regression analysis was further conducted to compare the likelihood of having help-seeking intention for depression across the differently framed and formatted messages. The loss-visual message alone had a significantly greater odds ratio of having help-seeking intention for depression compared with the neutral-plain message as a reference group: the adjusted odds ratios (95% confidence intervals) of the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 1.31 (0.89-1.92), 1.29 (0.88-1.89), 1.57 (1.07-2.29), 1.39 (0.95-2.04) and 1.41 (0.97-2.06), respectively.

Of the 1,805 participants in the follow-up survey, 1,141 people had not possessed help-seeking intention before exposure to the messages, and 249 people (21.8%) developed their help-seeking intentions after exposure to the messages. Of these, 143 people (57.4%) maintained their help-seeking intentions up to the follow-up survey. The proportion of participants who maintain their help-seeking intentions was not significantly different across the given messages: the percentages for the neutral-visual, loss-plain, loss-visual, gain-plain, and gain-visual messages were 65.7% (23/35), 57.9% (22/38), 48.0% (25/50), 23/44 (52.3%) and 67.5% (27/40), respectively (p=0.423).

Table 4 shows the help-seeking action during the follow-up period. There were 66 people (3.7%) who had seen a doctor for their mental health problem during the follow-up period. The proportion of participants with help-seeking action was not significantly different across the given messages. Similar results were obtained when only those who were depressed (K6 score ≥5) were analyzed.

Table 4 Help-seeking action during the follow-up period

Message	All		Depressed (K6 score ≥5)	
	N	Action	N	Action
Neutral	307	12	132	8
−plain		3.9%		6.1%
Neutral	295	12	121	5
−visual		4.1%		4.1%
Loss	296	8	120	4
−plain		2.7%		3.3%
Loss	305	9	128	6
−visual		3.0%		4.7%
Gain	301	14	127	11
−plain		4.7%		8.7%
Gain	301	11	141	8
−visual		3.7%		5.7%
	p=0.815		p=0.516	

Help-seeking action for their own mental health in the previous 2 months was measured in the follow-up survey.

4. Discussion

This study examined audience's responses to differently framed and formatted persuasive messages in the context of developing depression help-seeking messages. Although depression help-seeking messages have the potential to backfire [10,11], such boomerang effect was not evident in this study. All messages except the neutral-plain message produced significant increase in help-seeking intention after exposure to the messages. This result supports the effectiveness of communicating persuasive messages for increasing people's help-seeking intentions for depression. Moreover, multiple logistic regression analysis indicated that the loss-visual message worked better than the other messages. Despite the potential limitations of this study, it would be recommendable to apply loss-framing and formatting to depression help-seeking messages.

The three message frames elicited different patterns of emotional responses. The loss-framed messages more strongly induced negative emotions (surprise, fear, sadness, and anxiety), while the gain-framed messages more strongly induced a positive emotion (happiness). Previous studies have suggested that emotional responses play a significant role in the persuasion process [18,19]. There was no significant difference in persuasiveness, however, the loss- and gain-framed messages seemed more likely to bring out the recipients' help-seeking intentions by inducing emotional responses than the neutral-framed messages.

The formatted messages were judged superior to the unformatted messages in design quality. The formatted messages consequently succeeded in increasing the likelihood that the message will be read. These results support the effectiveness of the CDC Clear Communication Index which helps provide easily understandable health messages and materials [16,17]. The significant frame×format interaction effects on 'anxiety' and 'happiness' indicated that the message formatting enhanced the recipients'emotional responses, both negative and positive. There was no significant difference in persuasiveness,

however, the formatted messages seemed more likely to be perceived as attractive and helpful by audience and more likely to increase the recipients' willingness to read than the unformatted messages.

As for the percentage changes in help-seeking intention for depression by message group (Table 3), it is hard to say that the loss-framed messages were more effective than the gain-framed messages or vice versa. The loss-plain message showed a smaller percentage increase than the gain-plain message (15.9% vs. 23.1%), and the proportions of participants who reported a positive help-seeking intention after exposure these messages were equivalent (44.9% vs. 44.6%). Meanwhile, the loss-visual message showed a greater percentage increase than the gain-visual message (29.1% vs. 17.0%), and the proportions of participants who reported a positive help-seeking intention after exposure these messages were equivalent (46.6% vs. 47.4%). The respective effects of loss-framing and formatting on help-seeking intention were not preeminent, but multiple logistic regression analysis revealed that the loss-visual message alone had a significantly greater odds ratio of having help-seeking intention for depression compared with the neutral-plain message as a reference group. Previous studies have not provided a conclusive answer as to which message frame will more satisfactorily motivate people to seek mental health care, loss frame or gain frame [13,14]. A literature review suggested that adding pictures to written text will increase the likelihood that the text will be read, however, the effects of pictures on comprehension, recall, and adherence have not yet been established [33]. The results of this study are insufficient to conclude, but it is likely that loss-framing and formatting act synergistically to increase help-seeking intention for depression. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least.

Of those who developed their help-seeking intention after exposure to the messages, 43.6% did not maintain their help-seeking intentions up to the 2-month follow-up survey. The

depression help-seeking messages succeeded in possessing help-seeking intention for a short time after exposure, but the effect could not be sustained over time. Moreover, those who had taken help-seeking action during the 2-month follow-up period accounted for 3.7% of the total and for 5.5% of those who were depressed (K6 score ≥5). Seeing a message only once may be insufficient to induce help-seeking action. Although a number of interventions have been conducted to promote access to mental health care, very little is known about what interventions increase help-seeking action [9]. To our knowledge, there is no successful precedent that proved the effect of public health messaging on help-seeking action. Further studies are needed to find out effective strategies for maintaining help-seeking intention and increasing help-seeking action.

This study provides evidence for the effectiveness of depression help-seeking messages in middle-aged Japanese people. On the contrary, it has a number of potential limitations. First, the web-based survey was self-administered, so that the accuracy of responses would depend on participants' understanding of the questions and their motivation to answer questions accurately. The understandability of the wording of items was checked prior to the survey. The use of the Internet and the provision of anonymity would be expected to elicit more truthful responses, by minimizing social desirability pressures [34]. However, it is almost impossible to eliminate the information bias completely. Second, the study participants were selected from a nationwide panel of a research company. According to the national census [35], the percentage of the Japanese population aged 35-44 years with university degrees were 22.0% in 2010, considerably lower than that of this study (45.6%). The selection bias may have influenced the results to some extent. Third, the study participants were limited to 35-45 years old. It is uncertain whether the messages will work equally well in other age groups. Moreover, because of cultural differences, the findings from this study may not be applicable to non-Japanese populations. Now we are planning to conduct a population-based

interventional study to assess the effectiveness of a public health communication program using the depression help-seeking messages. We will discuss the channels and activities that will be most likely to successfully reach target audience in the future study.

5. Conclusion

This study compared audience's responses to six depression help-seeking messages with 3 frames (neutral-, loss-, and gain-framed) × 2 formats (formatted and unformatted). The message formatting applied the CDC Clear Communication Index enhanced the recipients' emotional responses and increased the likelihood that the message will be read. Multiple logistic regression analysis indicated that the loss-framed formatted message worked better than the other messages. According to these results, message framing and formatting may influence emotional responses to the depression help-seeking message, willingness to read the message, and intention to seek help for depression. It would be recommendable to apply loss-framing and formatting to depression help-seeking messages, to say the least, but further studies are needed to find a way to sustain the effect of messaging for a long time.

Contributors

MS was responsible for the design and conduct of the study, the collection, analysis, and interpretation of data, and the writing of the article. TY and HY contributed to the data interpretation and discussion of the implications of this work. All authors read and approved the final manuscript.

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Competing interest

The authors declare that they have no competing interest.

Ethics approval

The study protocol was approved by the ethics committees of the Jikei University School of Medicine and has been conducted in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects by the Japanese Government.

Data sharing statement

No additional data are available.

Figure legend

Figure 1 Flow of participants through the study

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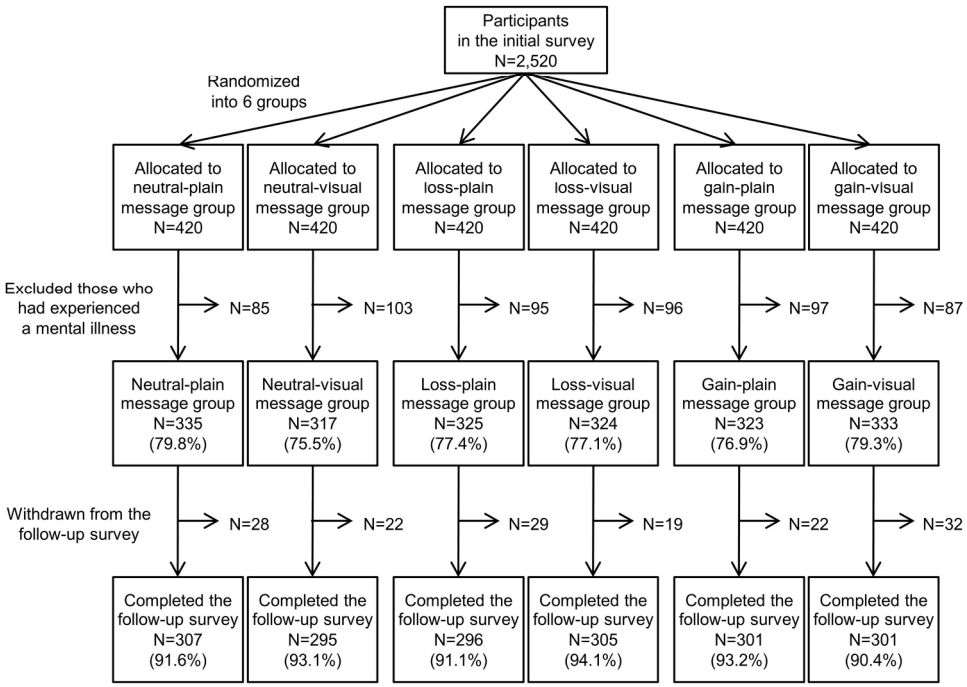
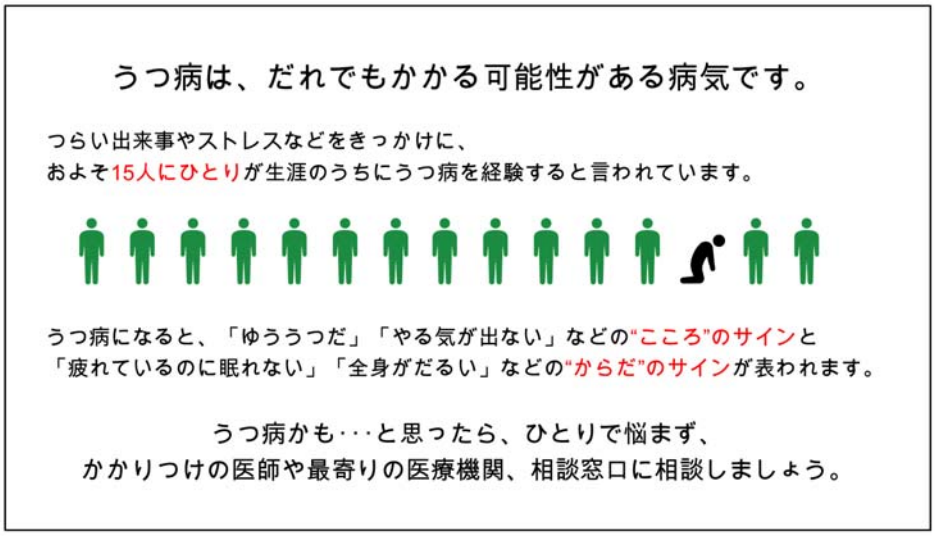


Figure 1 Flow of participants through the study

190x142mm (300 x 300 DPI)

Appendix A. Depression help-seeking messages (formatted versions)

Neutral-framed message - “Depression can happen to anyone”



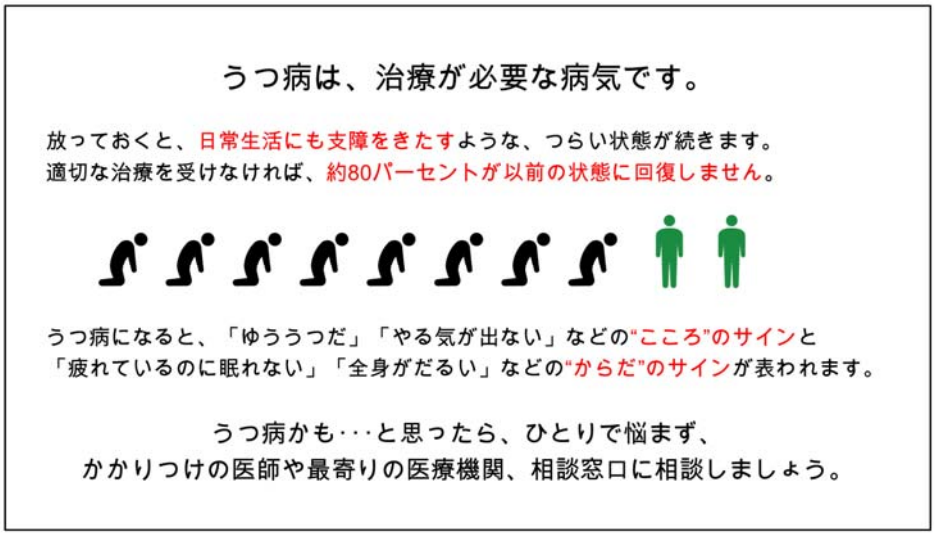
Main message

- Depression happens to one out of 15 people.

Information on early signs of depression

Call to action

Loss-framed message - “Depression needs treatment”



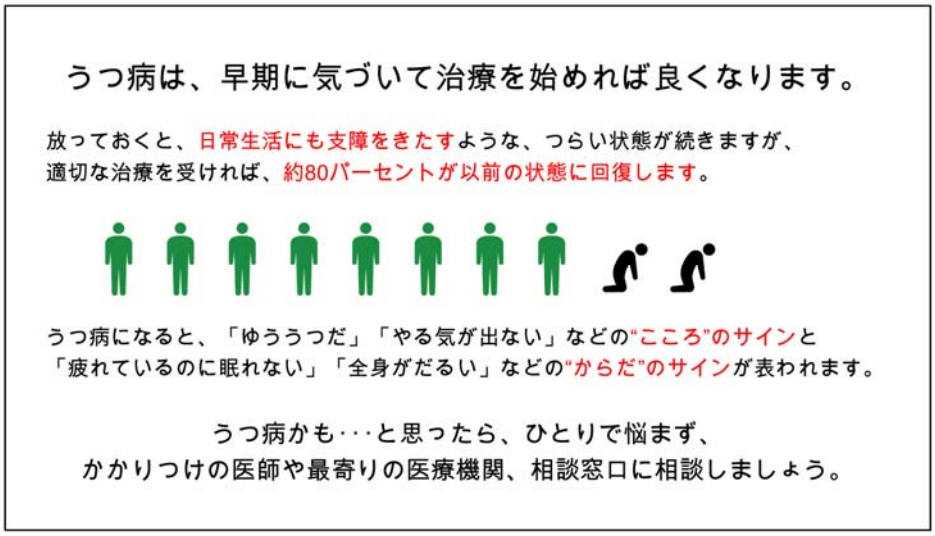
Main message

- If not treated, 80% cannot recover from depression.

Information on early signs of depression

Call to action

Gain-framed message - “Depression improves with treatment”



Main message

- If treated, 80% can recover from depression.

Information on early signs of depression

Call to action

STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5-6
Objectives	3	State specific objectives, including any pre-specified hypotheses	7
Methods			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	9-10
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	9-10
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	NA
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	10-12
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	10-12
Bias	9	Describe any efforts to address potential sources of bias	10
Study size	10	Explain how the study size was arrived at	13
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	13
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	13
		(*b*) Describe any methods used to examine subgroups and interactions	13
		(*c*) Explain how missing data were addressed	NA
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	NA

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	13
		(b) Give reasons for non-participation at each stage	13
		(c) Consider use of a flow diagram	Fig.1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	13-14, Table1
		(b) Indicate number of participants with missing data for each variable of interest	NA
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	NA
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time *Case-control study*—Report numbers in each exposure category, or summary measures of exposure *Cross-sectional study*—Report numbers of outcome events or summary measures	14, Table2
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	14, Table3
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	NA
Discussion			
Key results	18	Summarise key results with reference to study objectives	20
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	22
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	22
Generalisability	21	Discuss the generalisability (external validity) of the study results	22
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	23

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.