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Identifying persuasive public health messages to change community knowledge and attitudes  
about bulimia nervosa

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### **Abstract**

Addressing stigma through social marketing campaigns has the potential to enhance currently low rates of treatment seeking and improve well-being of individuals with the eating disorder bulimia nervosa. This study aimed to evaluate the persuasiveness of health messages designed to reduce stigma and improve mental health literacy about this disorder. A community sample of 1,936 adults (48.2% male; 51.8% female) from Victoria, Australia, provided self-report information on knowledge and stigma about bulimia nervosa, and ratings of persuasiveness of nine brief health messages on dimensions of convincingness and likelihood of changing attitudes. Messages were rated as moderately-to-very convincing and a little-to-moderately likely to change attitudes towards bulimia nervosa. The most persuasive messages were those that emphasised that bulimia nervosa is a serious mental illness and is not attributable to personal failings. Higher ratings of convincingness were associated with being female, having more knowledge about bulimia nervosa, and lower levels of stigma about bulimia nervosa. Higher ratings for likelihood of changing attitudes were associated with being female and with ratings of convincingness of the corresponding message. This study provides direction for persuasive content to be included in social marketing campaigns to reduce stigma towards bulimia nervosa.

**Keywords:** stigma; bulimia nervosa; persuasiveness; health messages

The negative impact of poor community knowledge and stigmatizing attitudes about mental illness on treatment seeking and well-being in individuals suffering from mental health problems has been well documented (Clement et al., 2015; Evans-Lacko, Brohan, Mojtabai, & Thornicroft, 2012; Mackenzie, Erickson, Deane, & Wright, 2014). Individuals affected by bulimia nervosa (BN) are no exception (Hepworth & Paxton, 2007). Bulimia nervosa, an eating disorder characterised by regular episodes of binge eating and the regular use of extreme weight-control behaviours, is associated with severe psychological and physical consequences and poor quality of life (DeJong et al., 2013; Stice, Marti, & Rohde, 2013). It affects about 1.5% and 0.5% of women and men respectively and its prevalence may be increasing (Hay, Mond, Buttner, & Darby, 2008; Hudson, Hiripi, Pope, & Kessler, 2007). Although treatments for BN have been shown to be beneficial (Hay, Bacaltchuk, Stefano, & Kashyap, 2009), appropriate treatment seeking is low (Fursland & Watson, 2014; Hart, Granillo, Jorm, & Paxton, 2011). Barriers to seeking help for BN include lack of knowledge about treatment options, attitudinal barriers related to fear of stigmatisation and shame, and structural barriers such as cost (Hepworth & Paxton, 2007). Improving community knowledge and attitudes about BN may therefore be valuable in increasing help-seeking.

Community samples have moderate levels of knowledge about symptoms of BN but recognition is lower if the symptoms described do not include self-induced vomiting (Gratwick-Sarll, Mond, & Hay, 2013; Rousseau, Callahan, & Chabrol, 2012). Adults frequently describe the symptoms of bulimia as problems of 'low self-esteem' and not accurately as BN (Mond & Arrighi, 2011; Mond et al., 2010), and knowledge about effective treatment is mixed. Although cognitive behavioural therapy was appropriately endorsed as a helpful intervention for BN by over 90% of a community sample (Mond, Hay, Rodgers, Owen, & Beumont, 2004), many treatments for which there is no evidence are endorsed by a sizable proportion of the population as helpful, including: getting out and about more/finding

new hobbies, taking vitamins and minerals, and alternative therapies (Mond, Hay, et al., 2004). Further, antidepressant medication which has been shown to improve bulimic symptoms (Bacaltchuk & Hay, 2003) was endorsed as helpful by only 35.7% of a community sample (Mond, Hay, et al., 2004).

Stigmatizing attitudes regarding individuals with BN are widespread and include beliefs that BN is not serious, that individuals with BN cannot be trusted and ideally would be kept at a social distance (McLean et al., 2014; Mond & Arrighi, 2011). The most widely held stigmatizing attitude is that people with BN are personally responsible for their disorder (Ebner & Latner, 2013; McLean et al., 2014; Roehrig & McLean, 2010; Wingfield, Kelly, Serdar, Shivy, & Mazzeo, 2011). This attitude is reflected in beliefs that individuals with BN should stop obsessing about their appearance; work on their self-control; “get over it”; and that BN is a form of attention seeking (McLean et al., 2014). These views have been endorsed by about 30% of an adult sample (McLean et al., 2014). However, greater knowledge about BN has been shown to be associated with lower stigmatising beliefs, suggesting that improving understanding about BN in the community may reduce stigma (Rodgers et al.). Gender differences have also been observed such that males hold more stigmatizing beliefs about mental illness in general (Corrigan & Watson, 2007) and eating disorders and BN in particular (McLean et al., 2014; Mond & Arrighi, 2011).

In light of poor knowledge about treatment options for BN and the concerning levels of stigmatizing attitudes about individuals with BN, authors have concluded that community interventions could reduce stigma and increase treatment seeking (Ebner, Latner, & O'Brien, 2011). Three broad approaches have been identified; education, contact, and protest (Corrigan et al., 2001) that may be used separately or in combination (Knaak, Modgill, & Patten, 2014). Direct contact as well as indirect or virtual contact such as a filmed conversation with people with the stigmatized condition can be powerful approaches

(Clement et al., 2012). In addition, protest against stigmatization of people with mental illness can be highly visible (Corrigan, 2011). However, education through social marketing, with or without virtual social contact, is a practical way to reach a large number of people (Corrigan, 2011; Knaak et al., 2014). Education has been found to be helpful in improving knowledge and stigma related to depression (beyondblue, 2012) and mental health problems generally (Henderson et al., 2012; Thornicroft, Wyllie, Thornicroft, & Mehta, 2014). However, little is known about how to reduce stigmatizing attitudes (Jorm et al., 2006).

With these observations in mind, prior to developing a community intervention to improve knowledge and reduce stigma about BN, we wished to identify social marketing messages that were likely to address poor knowledge about aetiology, treatment, and negative consequences of BN and to counter stigmatizing beliefs about BN. Different approaches to identifying effective messages have previously been used. Focus groups have been used which have the advantage of gaining in-depth information, a range of perspectives, and capacity to follow-up ideas. However, disadvantages include that findings cannot necessarily be generalised and individual attitudes cannot be linked to specific personal qualities (e.g., Cataldo, Hunter, Petersen, & Sheon, 2015). A consensus of experts in mental health-related stigma has also been used to identify potentially effective types of messages to address stigma (Clement, Jarrett, Henderson, & Thornicroft, 2010). This approach draws on a wide range of knowledge but may not reflect views of specific communities and relationships between individual responses to messages and personal qualities cannot be explored. Our central interest was to understand messages that the Australian community believed were likely to effectively change stigma about BN and also to identify how views about messages were related to pre-existing stigmatising attitudes. Consequently, we selected a representative survey approach to gain information about individual views about message content as well as pre-existing attitudes, although this approach did not allow us to gather in-depth information.

We developed nine brief social marketing messages to counter the gaps in knowledge and stigmatizing attitudes about people with BN described above. Guided by the Elaboration Likelihood Model (Petty & Cacioppo, 1986) of persuasive communication that highlights the importance of believability of messages, we evaluated each message with items assessing the extent to which participants believed a message was both convincing and likely to change community attitudes. Thus, the overall aims of the study were to evaluate ratings of brief messages to increase knowledge about and counteract stigma towards BN and to identify predictors of highly rated messages in a large adult, Australian, community sample. We hypothesized that, as all messages were designed to counteract specific stigmatizing attitudes about BN or gaps in knowledge that had been identified in the literature, all messages would be rated at least moderately convincing and moderately likely to change community attitudes. However, given widespread community beliefs that people with BN are personally responsible for their illness, we hypothesized that messages rated the most convincing and most likely to change attitudes would be those that increased appreciation of BN as a serious mental illness that is not attributable to personal failings. We hypothesized that after controlling for age and gender effects, participants with lower knowledge and higher stigmatising attitudes towards BN would be less responsive to persuasive messages as the messages were more likely to be at odds with their existing attitudes. Finally, in light of the importance of believability of communication for changing attitudes, we hypothesised that ratings of message convincingness would be positively related to ratings of likelihood of changing attitudes.

## **Method**

### **Participants**

Participants were 2,095 community adults residing in Victoria, Australia, who responded to an invitation to take part in the study (response rate 22.4%) and provided data.

Although the response rate was low, it was commensurate with rates achieved for mail surveys for eating disorders in previous research (Mond, Rodgers, Hay, Owen, & Beumont, 2004; Striegel-Moore et al., 2009). Following exclusion for incomplete data ( $n = 42$ ) and repetitive responses ( $n = 126$ ) indicative of systematic response styles (see Data analysis), the final sample for analyses was 1,936 (48.2% male; 51.8% female). Participants were 18-67 years ( $M_{\text{age}} = 44.4$ ,  $SD = 13.1$ ). They were recruited from a random sample obtained from the Australian Electoral Roll. Detailed sample characteristics have been described previously (██████████). Briefly, distributions of age, gender, and socio-economic status were consistent with the population from which they were sampled.

## Measures

Participants provided information on their age, gender, marital status, racial group, educational attainment, employment status, and household income bracket.

### Ratings of persuasiveness of health messages

Nine commonly held misconceptions or stigmatizing attitudes about BN were identified from previous research (McLean et al., 2014; Mond et al., 2010) and paired with nine counter health messages developed by the authors which aimed to increase knowledge especially in relation to effective treatment and to challenge stigmatizing attitudes in relation to BN including beliefs about personal responsibility and blame (see Table A1 in Appendix). Pilot testing indicated that messages were easily understood and ratings of clarity were high (unpublished data).

Following presentation of each health message, participants were asked to respond to 13 items (see Table 1) to indicate the persuasiveness of the message. Items were adapted from research evaluating dieting and body dissatisfaction prevention messages (Durkin, Paxton, & Wertheim, 2005; Paxton, Wertheim, Pilawski, Durkin, & Holt, 2002). Responses were rated on a 5-point scale (1 = *not at all*, 2 = *a little*, 3 = *moderately*, 4 = *very*, 5 =



*extremely*). To reduce the 13 individual items into scales to be used to compare levels of persuasiveness across messages, separate principal components analyses (PCA) with orthogonal rotation were conducted on the persuasiveness items for each health message. For each health message two components were retained to be used as subscales to assess persuasiveness. Consistent patterns of results were found for PCAs across the nine health messages whereby for each message two components had eigenvalues greater than one and breaks between the second and third components were visible on the scree plots. One component contained four items that assessed the convincingness and believability of the message that we named “Convincingness”, and the other contained six items that assessed perceived likelihood that the message would change one’s own or others’ attitudes that we named “Likelihood of Changing Attitudes” (see Table 1). For items 5 and 13, which loaded on both components, consideration of the Elaboration Likelihood Model (Petty & Cacioppo, 1986) indicated that the items be retained on the likelihood of changing attitudes component as these items both assessed the likelihood that the information would change others’ attitudes toward people with BN. Three items (see Table 1) were omitted from the PCA analyses as they did not meet assumptions. These were items one and eight which had low communality values for all health messages and item 11 which had no correlation greater than .3 with any other item across all messages. Subscale scores were calculated from the mean score for items on each component. Internal consistency for Convincingness ranged from  $\alpha = .81$  to  $\alpha = .86$ , and for Likelihood of Changing Attitudes ranged from  $\alpha = .85$  to  $\alpha = .89$ .

### **Knowledge about bulimia**

Participants’ knowledge about treatment, causes and outcomes for BN was assessed with the ten-item knowledge about bulimia scale (Rodgers et al.). Participants responded to questions including “Lifestyle changes, such as “getting out and about more” or “finding new

hobbies” are helpful for treating bulimia” on a scale from 1 (*completely disagree*) to 6 (*completely agree*). Responses were dichotomized so that completely disagree, mostly disagree and slightly disagree were coded as disagree responses, and completely agree, mostly agree and slightly agree were coded as agree responses. Correct responses were summed to form a total score. Higher scores reflect greater levels of knowledge about BN.

### **Stigmatising attitudes and beliefs about bulimia nervosa**

Four of the five subscales of the stigmatising attitudes and beliefs about bulimia nervosa (SAB-BN) scale were used to assess stigma (McLean et al., 2014). The Social Distance subscale was not included in the current study due to low internal reliability. The four subscales used were Advantages of Bulimia (7 items), Minimisation/Low Seriousness, (6 items), Unreliability (5 items), and Personal Responsibility (5 items). Items from each subscale respectively included “There are good things about having bulimia”, “Bulimia is a serious eating disorder”, “I’d find it difficult to trust someone with bulimia”, and “People with bulimia should just “pull themselves together” and “get over it”. Each item was rated on a 6-point scale (1= *completely disagree*, 2 = *mostly disagree*, 3 = *slightly disagree*, 4 = *slightly agree*, 5 = *mostly agree*, 6 = *completely agree*). Items were reverse scored where appropriate and total subscale scores calculated from the mean of the items for each subscale. Higher scores reflect higher stigma. In the current sample internal consistency for each subscale was  $\alpha = .73$ ,  $\alpha = .70$ ,  $\alpha = .84$ , and  $\alpha = .76$  respectively.

### **Procedure**

The study was approved by the Institutional Human Ethics Committee and all participants provided informed consent. Participants received a mailed questionnaire package with an information statement, consent form, paper survey and reply paid envelope for survey return. The measures were presented in the following order, demographic questions, knowledge about BN, SAB-BN, and ratings of persuasiveness of health messages. The latter

measure was presented last to ensure that information provided in the messages did not influence participant's responses to items assessing knowledge about and stigma towards BN. Non-respondents were sent a second package after one month.

### **Data analysis**

Data were excluded from analyses when responses to nine or more of the 13 persuasiveness items were missing for three or more health messages. Data from participants with highly repetitive responses on the persuasiveness items, indicative of systematic response styles, were excluded from analyses. Three subscales from the SAB-BN, Advantages, Minimisation/Low Seriousness and Unreliability were positively skewed but logarithmic transformations substantially reduced skewness.

Repeated measures analyses of variance (ANOVA) with pairwise comparisons examined differences in scores across the nine health messages on convincingness and likelihood of changing attitudes. Due to the large sample size, rather than examining the statistical significance of post hoc pairwise comparisons of differences between messages on mean persuasiveness ratings, effect sizes of differences were examined and only values above  $d = .20$  were considered to be worthy of interpretation.

To explore sample characteristics related to ratings, the top four messages in each persuasiveness dimension were selected as they were most likely to be used in public health settings. Separate hierarchical linear regression analyses were conducted in which ratings of convincingness or likelihood of changing attitudes of the health messages were dependent variables. To adjust for demographic variables, gender and age were entered in step one, followed by knowledge in step two, and SAB-BN subscales in the step three. In addition, for the prediction of the likelihood of the message changing attitudes, convincingness of the corresponding message was entered in a fourth step. Independent variables were included as predictors in regression analyses only if they were significantly related to the dependent

measure in zero order correlations at  $\alpha = .01$ , adjusted from the conventional level of .05 due to the large sample size.

## Results

### Ratings of convincingness and likelihood of changing attitudes

Mean scores and 95% confidence interval error bars for ratings of convincingness and likelihood of changing attitudes of health messages are shown in Figures 1 and 2 respectively. The highest mean ratings for convincingness correspond to *very convincing*, whereas for likelihood of changing attitudes, the means for the highest rated messages correspond to between *somewhat* and *moderately* likely to change attitudes. Repeated measures ANOVA revealed that ratings of convincingness were significantly different across health messages,  $F(6.5, 11964.7) = 179.6, p < .001$ . Examination of effect sizes of the differences between means on convincingness showed that message one (BN is a serious and distressing mental illness) and message five (BN is not appropriate for weight control and is physically and mentally damaging) both had higher scores than messages two (Treatment for BN helps stabilize eating and weight) ( $d = .25; d = .28$ ), four (Psychological treatment and prescription medication can help treat BN) ( $d = .33; d = .37$ ), six (There is no evidence for alternative or lifestyle therapies) ( $d = .56; d = .63$ ), eight (BN is different from depression, anxiety or low self-esteem and requires BN specific treatment) ( $d = .33; d = .35$ ), and nine (BN is a mental illness that is not caused by vanity) ( $d = .28; d = .30$ ). Health message three (BN has nothing to do with attention seeking) also had higher convincingness ratings than messages four ( $d = .22$ ), six ( $d = .48$ ), and eight ( $d = .21$ ). In addition, message six had lower convincingness ratings than messages two ( $d = .41$ ), four ( $d = .35$ ), seven ( $d = .46$ ), and nine ( $d = .37$ ).

For likelihood of changing attitudes, a repeated measures ANOVA revealed a significant difference in the mean ratings across health messages,  $F(6.8, 12577.5) = 84.3, p <$

.001. Calculation of effect sizes for the differences in mean ratings for the nine messages revealed that message eight (BN is different from depression, anxiety or low self-esteem and requires BN specific treatment) had higher scores for likelihood of changing attitudes than all other health messages, with the exception of message one (two  $d = .29$ ; three  $d = .21$ ; four  $d = .33$ ; five  $d = .24$ ; six  $d = .49$ ; seven  $d = .26$ ; and nine  $d = .28$ ). Conversely, message six (There is no evidence for alternative or lifestyle therapies) was rated lower than each of the other messages in relation to likelihood of changing attitudes (one  $d = .34$ ; two  $d = .24$ ; three  $d = .30$ ; four  $d = .21$ ; five  $d = .29$ ; seven  $d = .26$ ; and nine  $d = .28$ ). In addition, message one (BN is a serious and distressing mental illness) was rated more likely to change attitudes than message four (Psychological treatment and prescription medication can help treat BN) ( $d = .20$ ). Significance values for all pairwise comparisons for which effect sizes of the differences were greater than  $d = .20$  were  $p < .001$ .

### **Relationships between ratings of convincingness and knowledge and stigma**

Descriptive statistics for knowledge and stigma variables are shown in Table 2. As hypothesized, higher ratings of convincingness on the four highest rated messages (one, three, five, and seven) were consistently significantly correlated with higher levels of knowledge (ranging from  $r = .14$  to  $r = .16$  for the four messages) and lower scores on advantages of BN ( $r = -.40$  to  $r = -.45$ ) minimisation ( $r = -.30$  to  $r = -.33$ ), unreliability ( $r = -.26$  to  $r = -.30$ ), and personal responsibility ( $r = -.23$  to  $r = -.30$ ). Each correlation was significant at  $p < .001$ . Results of the hierarchical linear regression analyses revealed that demographic variables accounted for significant variance for convincingness of each health message, with gender emerging as the only unique predictor variable, whereby being female predicted higher ratings of convincingness. The addition of knowledge at step 2 also accounted for a significant increase in variance for each health message, as did the addition of stigma subscales at step 3. Knowledge, advantages of bulimia, minimisation, and unreliability

consistently accounted for unique variance in convincingness for each health message, as did personal responsibility with the exception of health message five. The final models accounted for between 22% and 26% of variance in convincingness of the health messages (see Table 3).

### **Relationships between ratings of likelihood of changing attitudes and knowledge and stigma**

Only a few predictor variables correlated significantly with ratings of likelihood of changing attitudes for the top-rated health messages (one, three, eight, and nine). Lower ratings of likelihood of changing attitudes were significantly associated with higher scores on advantages of bulimia ( $r = -.06$  to  $r = -.12$ ;  $p < .01$ ) and higher scores on personal responsibility ( $r = -.07$  to  $r = -.11$ ;  $p < .01$ ) for the top rated health messages. Minimisation was inversely correlated with health message eight ( $r = -.07$ ,  $p < .01$ ). Neither knowledge nor unreliability was significantly correlated with likelihood of changing attitudes for any of the top rated messages. Ratings of convincingness of messages were positively correlated with ratings of likelihood of changing attitudes for corresponding health messages (ranging from  $r = .27$  to  $r = .43$  for the four messages;  $p < .001$  for each correlation). As shown in Table 4, gender was the only unique demographic predictor of likelihood of changing attitudes, with being female predicting higher ratings. At step 2 the inclusion of the stigma subscales significantly increased the explained variance for health messages eight, and nine, although the increase in variance was small (0.4% to 1.0%) with advantages of bulimia emerging as the only unique predictor for health messages eight and nine. At step 3, the inclusion of ratings of convincingness of the corresponding message accounted for significant variance and convincingness was a unique positive predictor of likelihood of changing attitudes for each health message. The final models accounted for between 9% and 18% of variance in ratings of likelihood of changing attitudes for the health messages examined.

## Discussion

In this research we endeavoured to identify potentially persuasive messages that could be used as the foundation for a public health campaign to reduce stigma and improve knowledge about BN. Our hypotheses were partially supported. In relation to our first hypothesis, we anticipated that all messages would be rated as at least moderately convincing and moderately likely to change attitudes. This was the case for convincingness. All messages were rated as at least moderately convincing (a rating of 3) with four messages rated as at least very convincing (a rating of 4). However, this was not the case for likelihood of messages to change attitudes. The message with the highest mean rating, message 8, (BN is different from depression, anxiety, or low self-esteem and requires BN specific treatment), received a rating of 2.8. Seven messages received mean ratings of at least 2.60, a little over half way between “a little” and “moderately” likely to change attitudes about BN.

Consistent with our second hypothesis, the messages that emerged as most convincing describe different aspects of the seriousness of BN and that BN is not attributable to personal failings: messages one (BN is a serious and distressing mental illness), three (BN has nothing to do with attention seeking), five (BN is not appropriate for weight control and is physically and mentally damaging), and seven (People with BN are not to blame for their illness). Two messages emerged as most likely to change attitudes, messages one and eight (BN is different from depression, anxiety or self-esteem and requires BN specific treatment). Interestingly, although message one is consistent with our hypothesis in relation to drawing attention to the seriousness of BN, message eight is not, as this message differentiates BN from other mental illnesses and emphasizes specific treatment needs. Message six (There is no evidence for alternative or lifestyle therapies) was rated relatively poorly on both persuasiveness scales. Consistent with our third hypothesis, message ratings for convincingness were positively predicted by knowledge about BN and negatively predicted by stigmatising attitudes after

controlling for age (which was unrelated to ratings) and gender (female ratings were higher than male ratings). However, message ratings for likelihood of changing attitudes were only uniquely predicted by being female, to a small degree by the stigma attitude advantages of bulimia, and in line with our fourth hypothesis, by message convincingness.

There is growing support for social marketing campaigns to improve mental health literacy and reduce stigma in relation to mental illness (e.g., Thornicroft et al., 2014), and to reduce the public health burden of mental health problems by promoting appropriate treatment seeking (Kazdin & Rabbitt, 2013; Mond, 2014). However, we are unaware of attempts to evaluate the possible persuasive power of specific social marketing messages. In this research we identified messages about BN that were rated as convincing and believable which is a positive step. This is especially relevant in that being believable appeared to be a prerequisite for a message being regarded as likely to change attitudes. The finding that the most convincing messages targeted blame and increased understanding about the seriousness of BN suggests that these are likely to be productive directions for further development and dissemination for social marketing campaigns. Although we have explored messages individually, in practice, different messages may be combined and to produce additional impact. Interestingly, the two poorly rated messages on convincingness (messages four and six) were both about specific treatment approaches, medication and alternative therapies. It may be that these messages ran so much against prevailing beliefs about helpful treatment (Mond et al., 2010; Mond, Hay, et al., 2004) that they were less believable.

As one of the goals of social marketing campaigns is to increase treatment seeking, it is particularly interesting that the two messages rated most likely to change attitudes included information that BN is a mental health problem that requires treatment specific to BN (message eight) or treatment from a mental health professional (message one). The reason for these messages being most positively rated is not clear, but it may be that the content



regarding specific treatment for BN was sufficiently engaging to capture the attention of our sample, producing higher ratings for likelihood of changing attitudes (Petty, Briñol, & Priester, 2009). Although further research is needed, the findings suggest that these themes would be valuable to develop and explore further.

It is notable that overall ratings of likelihood to change attitudes were not high. There are a range of possible reasons for this. It may be that the messages did not contain content that will change community attitudes and further consideration of content needs to be considered. However, in line with attribution theory, that stigmatising attitudes are formed when attributions of blame, or personal responsibility for the illness are made (Corrigan, 2000), it is encouraging that messages three (BN has nothing to do with attention seeking) and nine (BN is a mental illness that is not caused by vanity) were among the highest rated messages for this persuasiveness dimension. These messages contained content to address erroneous attributions about personal responsibility for BN, indicating the potential for such messages to reduce stigma. Another consideration is that two of the interventions that appear to have reduced stigmatizing attitudes about mental illness in general, “Like Minds, Like Mine” (Thorncroft et al., 2014) and “Time to Change” (Henderson et al., 2012), focus on messages that directly raise awareness of discrimination and highlight the value of providing social support to and staying involved with people with mental illness. This was not the approach used in our research and may need to be considered to improve likelihood of attitude change towards BN. Our modest ratings of likelihood to change attitudes may also have related to the brief nature of the messages and thus intensity may not have been adequate. It is also known that format of social marketing messages, such as delivery by experts or non-experts, or written versus audio visual format, can influence persuasiveness (e.g., Carnaghi, Cadinu, Castelli, Kiesner, & Bragantini, 2007; Clark, Wegener, Habashi, & Evans, 2012). The presentation of our messages was in written form and so may have lacked

the impact they may have had when delivered by a persuasive communicator, or in a more engaging format that would typically be used in a social marketing campaign. In particular, social marketing campaigns can not only present a specific message but can also provide a call for action that could enhance the likelihood of attitude and behaviour change.

A number of participant characteristics played a role in predicting convincingness and likelihood to change attitudes. In both cases, being female was associated with more positive ratings. It is crucial that social marketing messages are effective amongst females in light of the higher prevalence of eating disorders in females, but as males also make up an important part of the social environment of females, a relevant factor in the development of BN, and increases in eating disorder behaviour and impact on quality of life has been observed in males (Hay et al., 2008; Mitchison, Hay, Slewa-Younan, & Mond, 2014), more attention may need to be paid to identifying messages that males respond to strongly. Knowledge about BN only accounted for a small amount of variance in ratings of convincingness and none for likelihood of changing attitudes, suggesting that the most persuasive messages could be used to reach members of the community across the knowledge spectrum. Unexpectedly, although more stigmatizing attitudes predicted perceiving messages as less convincing, these attitudes were largely not associated with likelihood of changing attitudes, however, convincingness of messages was a significant contributor to variance in likelihood of changing attitudes. These relationships are complex, multi-directional and need further clarification.

The interpretation of findings from this research is limited by methodological factors. These include the fact that although a large random sample was used, response rates were low. The socio-demographic distribution of participants was, however, similar to that of the general population. The messages were developed to counteract specific stigmatizing attitudes or knowledge deficits about BN that have been previously identified. However, there is some overlap in message content, for example that BN is a serious mental illness.

Future research could use an experimental design with independent presentation of messages to further explore the impact of particular message content. In addition, future research could examine additional participant predictor characteristics such as eating disorder symptomatology, or engagement with mental health issues, that could provide information about indicators of message salience (Petty et al., 2009). Finally, participants were asked to rate convincingness and likelihood of changing attitudes but the present study does not reveal whether the messages do in fact have the impact predicted in relation to improving mental health literacy and promoting early, appropriate help seeking (Mond, 2014). Future research is required to explore actual rather than anticipated message outcomes using engaging social marketing approaches.

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Table 1

*Pattern coefficients from rotated solution of Principal Components Analyses of items assessing persuasiveness of health messages*

Item	Range of pattern coefficients across messages 1-9	
	Component 1	Component 2
2. How easy is it to understand this information?	-.08 to -.12	<b>.74 to .82</b>
3. How believable is this information?	-.02 to .09	<b>.87 to .89</b>
4. How likely is it that this information will change the way you think about bulimia?	<b>.87 to .92</b>	-.02 to .15
5. How likely is it that this information will change the way other people think about people who have bulimia?	<b>.52 to .68</b>	.38 to .58
6. How likely is it that this information will change the way you feel about people who have bulimia?	<b>.89 to .93</b>	-.05 to .03
7. How important do you think it is for the community to know this information?	.17 to .30	<b>.65 to .74</b>
9. How convincing do you find this information?	.06 to .18	<b>.84 to .88</b>

Range of pattern coefficients across messages 1-9		
Item	Component 1	Component 2
10. Does this information make you feel more sympathetic towards people with bulimia?	<b>.64 to .74</b>	.23 to .37
12. How likely is it that this information will change your attitudes toward people with bulimia?	<b>.86 to .90</b>	.01 to .05
13. How likely is it that this information will change the attitudes of others toward people with bulimia?	<b>.41 to .67</b>	.39 to .61

Items 1 “*How new is this information to you?*”, 8 “*How important is it for you to know this information?*”, and 11 “*Does this information make you feel more negative about people with bulimia?*” did not meet assumptions and were omitted from the analyses.

Major loadings on components for the pattern coefficients for each item are bolded.

Component 1: Likelihood that message will change beliefs; Component 2: Convincingness of message

Table 2

Means and standard deviations for knowledge and stigma subscales <sup>a</sup>

	<i>Scale range</i>	<i>N</i>	<i>M (SD)</i>	<i>95% CI</i>
Knowledge	1-10	1884	6.45 (1.37)	6.38, 6.51
Stigma subscales				
Advantages of BN	1-6	1875	1.64 (0.65)	1.61, 1.67
Minimisation	1-6	1891	1.83 (0.88)	1.79, 1.87
Unreliability	1-6	1847	2.29 (1.00)	2.24, 2.33
Personal Responsibility	1-6	1855	2.92 (1.07)	2.87, 2.96

<sup>a</sup> Statistics presented for untransformed variables

Table 3

*Summary statistics for hierarchical linear regression analyses predicting convincingness of the top four rated health messages*

	<i>Health message one</i>		<i>Health message three</i>		<i>Health message five</i>		<i>Health message seven</i>	
	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$
<i>DV: Convincingness</i>								
Step 1	.05***		.05***		.03***		.04***	
Gender <sup>a</sup>		.23***		.22***		.17***		.19***
Age		-.04		.01		-.04		.02
Step 2	.02***		.01***		.02***		.02***	
Knowledge		.13***		.12***		.15***		.13***
Step 3	.20***		.18***		.17***		.18***	
Advantages of BN		-.30***		-.26***		-.27***		-.26***
Minimisation		-.14**		-.15***		-.18***		-.14***
Unreliability		-.15***		-.16***		-.13***		-.14***
Personal Responsibility		-.05		-.07*		.00		-.08**

Total $R^2$	.26***	.24***	.22***	.23***
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<sup>a</sup>male coded 1, females coded 2

$N = 1847$

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Table 4

*Summary statistics for hierarchical linear regression analyses predicting likelihood of changing attitudes of the top four rated health messages*

	<i>Health message one</i>		<i>Health message three</i>		<i>Health message eight</i>		<i>Health message nine</i>	
	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$
<i>DV: Change attitudes</i>								
Step 1	.02***		.01***		.01***		.02***	
Gender <sup>a</sup>		.13***		.11***		.10***		.12***
Age		.03		.01		.02		.02
Step 2	.00		.00		.01***		.004*	
Advantages of BN		-.01		-.03		-.07*		-.06*
Minimisation		-		-		-.02		-
Unreliability		-		-		-		-
Personal Responsibility		-.05		.04		-.05		-.02
Step 3	.07***		.10***		.16***		.11***	
Convincingness <sup>b</sup>		.29***		.36***		.43***		.37***



Total $R^2$	.09***	.12***	.18***	.13***
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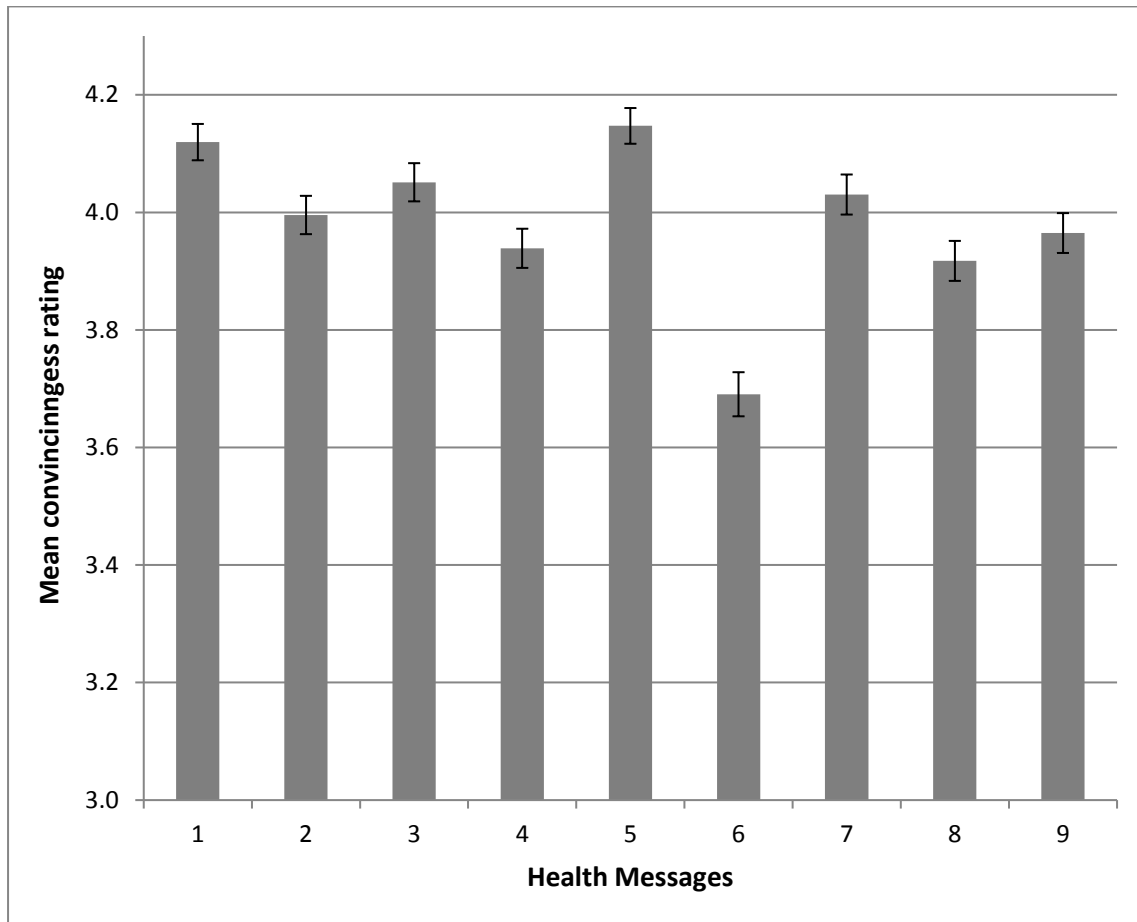
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$N = 1855$

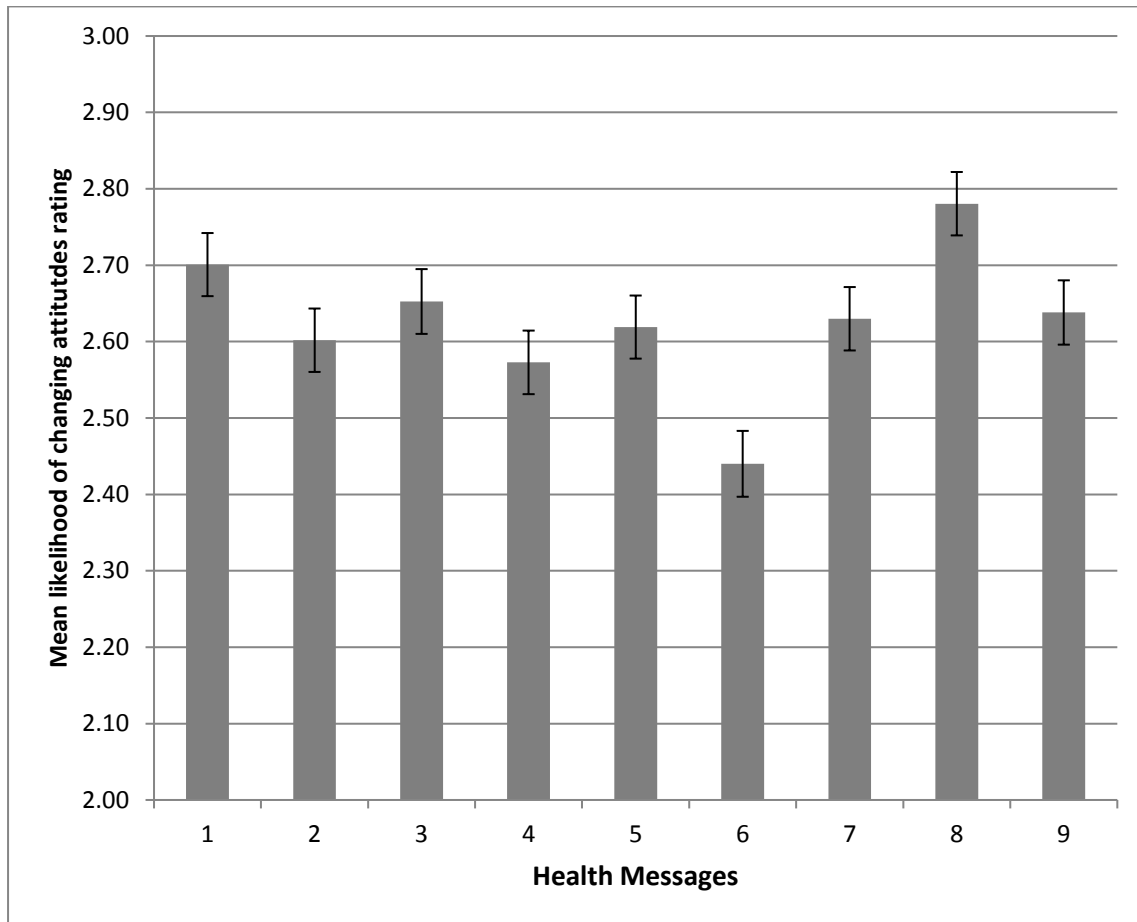
\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ,

<sup>a</sup> male coded 1, females coded 2

<sup>b</sup> Convincingness predictor variable is the variable corresponding to the dependent variable, e.g., for dependent variable likelihood of changing attitudes health message one, the predictor variable is convincingness rating for health message one.



*Figure 1.* Mean ratings with 95% confidence interval error bars for convincingness of health messages.



*Figure 2.* Mean ratings with 95% confidence interval error bars for likelihood of changing beliefs of health messages.

## Appendix

Table A1

*Community Belief, Paired Counter Health Message and a Summary Description<sup>a</sup> (in brackets).*

Community Belief	Counter Health Message
1. Some people do not believe that bulimia is a serious problem.	1. Bulimia is a serious mental illness. It causes a great deal of distress, poor quality of life, poor physical health and requires treatment from a mental health professional. <i>(BN is a serious and distressing mental illness).</i>
2. Some people think that treatment for bulimia causes weight gain.	2. Treatment for bulimia does not cause weight gain. Rather, stopping the cycle of binge eating and extreme weight-control methods helps to stabilise eating patterns, and in turn, body weight. <i>(Treatment for BN helps stabilize eating and weight)</i>
3. Some people think that people with bulimia are just trying to get attention.	3. Bulimia is a serious mental illness that has nothing to do with attention seeking. People with bulimia try to hide their illness, rather than bring attention to it. <i>(BN has nothing to do with attention seeking).</i>
4. Some people are unsure whether medication prescribed by a doctor, such as Prozac or Zoloft, is helpful for treating bulimia.	4. When combined with psychological treatment, medication prescribed by a doctor can be helpful for treating bulimia, although medication on its own is not likely to be helpful in the long term. <i>(Psychological treatment and prescription medication can help treat BN).</i>

5. Some people think that bulimia is an okay way to control weight.

5. Using bulimia to try to control weight is not appropriate. In fact, bulimia causes difficulty in controlling weight and it does not lead to weight loss. Bulimia is also very damaging to physical and mental health. *(BN is not appropriate for weight control and is physically and mentally damaging).*

6. Some people think that “alternative therapies”, such as herbal medicine, or “lifestyle changes”, such as finding some new hobbies, can help treat bulimia.

6. These approaches may be beneficial in other areas of life, but there is no evidence that “alternative” therapies of “lifestyle changes” are helpful for treating bulimia. *(There is no evidence for alternative or lifestyle therapies).*

7. Some people think that people with bulimia “bring it on themselves” or “have only themselves to blame”.

7. Like people with other mental illnesses, people with bulimia do not choose to be ill and they are not to blame for their illness. Rather, social pressures cause people to believe they are not worthwhile unless they look a particular way and then go to extreme lengths to meet these expectations. *(People with BN are not to blame for their illness).*

8. Some people think that bulimia is caused by depression, anxiety or self-esteem problems and that fixing these problems will therefore cure bulimia.

8. Bulimia is a mental health problem in its own right, different from depression, anxiety or low self-esteem. Treating depression, anxiety, or low self-esteem will not cure bulimia. Rather, treatment needs to focus on the thoughts and behaviours related to weight, shape and eating that underlie bulimia. *(BN is different from*

*depression, anxiety, or low self-esteem and requires BN specific treatment).*

9. Some people believe that bulimia is only a problem because people with bulimia are obsessed with their looks and weight, to the point of being vain.	9. Bulimia is a mental illness; it is not caused by vanity. Some people are personally vulnerable to the very strong social pressures (i.e. from media, friends) about the way they should look. They are then driven to use extreme ways of controlling weight, which is how bulimia starts. ( <i>BN is a mental illness that is not caused by vanity</i> ).
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<sup>a</sup>The summary description was not provided to participants but is included in this table for illustrative purposes.