

A systematic review of humour-based strategies for addressing public health priorities

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The research evidence-dissemination gap continues to be a major public health challenge.¹ It has been estimated that there is a 17-year lag between evidence and practice,¹ while a second dissemination gap exists between knowledge and treatment, as exemplified by unmet mental health and substance use needs.² Two of the reasons people have reported having unmet health needs are due to a lack of awareness of treatment options or help-seeking knowledge.² In this paper we are primarily concerned with addressing this knowledge to treatment change gap with effective health promotion.

Issues around the lack of awareness relating to health prevention and treatment options may be more pronounced in areas of public health that are considered taboo or embarrassing.³ Tradition-bound practices have been blamed for the disconnect between the way that scientists and the users of research, including clinicians and the public, access and implement knowledge.⁴ Health promotion strategies can help to fill this knowledge-dissemination gap, but careful consideration is needed for engaging audiences with public health activities that could inadvertently have the opposite effect by evoking anxiety⁵ or defensiveness,⁶ or perpetuating feelings of shame and embarrassment.^{7,8} There is evidence to suggest that humour-based health promotion strategies may help to mitigate potential negative reactions⁸ and increase pro-health attitudes, behaviour intentions and behaviours.^{5,9}

Abstract

Objective: To systematically review research into the use of humour-based health promotion strategies for addressing public health issues during the past 10 years.

Method: The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Results: Thirteen studies were included in the review. Mental health, breast and testicular cancer self-examination, safe sex, skin cancer and binge drinking public health issues were targeted. Humour-based strategies were used to influence health attitudes and behaviours, encourage interpersonal sharing to indirectly affect health behaviour, and investigate the level of threat and humour associated with positive outcomes. Findings provided some evidence to support the use of humour-based strategies as determined by the right combination of audience characteristics, level of humour and amusement evoked, and message persuasion and behaviour change methods underpinning strategies.

Conclusion: Methodologies varied limiting comparability, although overall results indicate that humour-based health promotion strategies may be a useful tool for increasing awareness and help-seeking behaviour for public health priorities, particularly those associated with stigma.

Implications for public health: Humour interventions vary widely because there can never be a standardised approach to evoking humour. Further research examining humour and public health promotion is needed.

Key words: humour, health promotion, stigma, research translation, behaviour change

Humour and health promotion

Health promotion is the process of enabling people to increase control over, and improve, their health and wellbeing by emphasising social and personal resources, as well as physical capacities.¹⁰ Health promotion programs often take a deficit or pathogenic approach. Focusing on risk can lead to defensive or avoidant behaviour.¹¹ In contrast, a salutogenic approach focuses on protective mechanisms, identifying the general resources that individuals use to manage tension associated with stressors,

giving prominence to individuals' health needs and potential to create and sustain health, and offering a different paradigm for health research.^{2,12,13} Cernerud and Olsson¹⁴ proposed humour as a salutogenic factor.

The humour-health hypothesis describes the concept that humour has a positive direct or indirect impact on health.¹⁵ There is evidence that humour is associated with pain tolerance, although empirical support for effects on health markers such as immunity, blood pressure, stress hormones and muscle relaxation are limited and inconsistent.

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Studies suggest stronger associations with psychological health indicators such as coping, interpersonal relationships and overall wellbeing,¹⁶⁻¹⁸ although these broad applications of humour (i.e. laughter and clown therapy) are not designed to target specific public health issues. In contrast, health promotion activities underpinned by message persuasion models largely focus on the influence that humour-based messages have on the audience's cognitive and affective processes involved in evoking favourable responses (i.e. message acceptance; behaviour change intentions).

Humour may counteract risk factors in health promotion programs by acting as a vehicle for the message and an emotional or cognitive buffer for individuals who are confronted with threatening or negative stimuli.¹⁹ It may also increase attention towards and improve retention of health messages, and encourage new knowledge and skills, and attitude and behaviour change.²⁰ For example, the use of humorous health promotion strategies have been associated with reduced cancer self-examination anxiety⁵ and intentions to engage in unprotected sex,²¹ and increased mental health help-seeking intentions.²²

Notwithstanding these research findings, systematic reviews exploring the relationship between humour and message persuasion, audience attention and attitudes have predominately emerged from non-health-related fields.²³ In commercial advertising, humour has been shown to attract attention, promote the memory of and positive attitudes towards an advertisement or brand, and encourage positive affect and purchase intent, while cognitive effects appear to be weaker.^{24,25} Humour has also been used by social marketers to tackle public safety issues such as road²⁶ and rail safety.²⁷ Appeals based on positive emotions, including humour, might be equally effective as communication campaigns based on serious, threat-based messaging to generate strong negative emotions such as fear.^{28,29} Guttman reviewed persuasive appeals in road safety communication campaigns, finding humour elicited positive or negative emotions that could help overcome an individual's resistance to safety messages and encourage sharing. It could also, however, encourage an individual to enjoy the communication without accepting, or even trivialising, the safety message.³⁰

Health-related literature has focused on the links between humour and health benefits.

Gonot-Schoupinsky and Garip,³¹ for example, examined the potential of laughter and humour programs to increase wellbeing in adults aged 60 years and over, concluding that laughter and humour interventions appeared to enhance wellbeing, while clown therapy in paediatric settings has been associated with reduced hospital and pre-operative anxiety, distress and fear in both children and parents.^{32,33} In contrast, Martin¹⁶ reported limited evidence for unique positive effects of humour and laughter on five broad areas of health: immunity, pain tolerance, blood pressure, longevity and self-reported illness.

Increasingly, public health professionals are using humour to enhance health communication and community engagement with health promotion campaigns. However, to our knowledge, a synthesis of research on the extent to which humour can improve health promotion strategy outcomes in non-clinical settings (i.e. settings that are not focused on the diagnosis and treatment of medical conditions) is lacking. Given the complex and dynamic nature of humour as a construct,³⁴ it is important to more fully understand the mechanisms that underpin links between health promotion strategies and health and behavioural outcomes. Further knowledge about the extent to which humour has been used in health promotion strategies and the outcome of those strategies is needed; this was the overall aim of this systematic review study.

The current study

To address the overall aim of this systematic review, three research questions were examined: i) To what extent has humour been used in health promotion strategies, including the type of programs, settings, populations and theories that have been examined in the literature?; ii) What does the literature reveal about the use of humour in improving health promotion strategy outcomes, including cognitions, perceptions and behaviours?; and iii) What are the methodological limitations of research investigating humour within health promotion, and what recommendations can be made for future research?

Methods

Search strategy and study selection

This systematic review was conducted in accordance with the Preferred Reporting

Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.³⁵ Five electronic databases, PsychInfo, Informit: Health Collection, Families & Society Collection, Cochrane and Medline were searched using combinations of the following key terms: humour*, comedy, jok*, jest*, funn*, satir*, laugh*; "behaviour change", action*, "persuasive message*"; health, wellbeing; prevention, intervention, promotion, treatment, program*, public service announcement, appeal, campaign. (The terms "humor" and "behavior" with American spelling were included when searching databases.) Additional articles were identified by scanning reference lists of included studies and relevant systematic reviews. The search aimed to identify peer-reviewed studies that evaluated the effect of humour-based health promotion strategies on cognition, behaviour and/or health outcomes of people aged 18 years and over, published in English between 2010 and 2020, to capture the latest approaches for addressing contemporary public health issues. Given that our aim was to explore the extent to which humour has been used in health promotion, we did not place any limits on how researchers conceptualised humour or strategy level (e.g. message persuasion level; campaign level), providing the humour-based strategy incorporated a focus on the health issue that was being addressed. As such, humour approaches, such as laughter and clown therapy, for enhancing positive emotions and decreasing anxiety but not directly targeting a particular health issue were excluded. All database searches were carried out between April and September 2020.

Inclusion and exclusion criteria

Studies were assessed against the inclusion and exclusion criteria presented in Table 1.

Review procedures and data abstraction

The systematic search identified 5,894 articles after the removal of duplicates (Figure 1); of these, 10% of the articles' titles and abstracts were independently screened by two authors (AO, CB); agreement for articles to be read in full was 100%. The titles and abstracts of all papers were then screened by one author (AO). Ninety-seven papers were read in full (AO, HB, CB), with 13 included in this review. Relevant data were extracted from each study and tabulated. Due to heterogeneity in study design and outcome measures, a meta-

analysis was not appropriate for this research topic and the literature was narratively reviewed.

Quality of evidence

Study quality was assessed against the Standard Quality Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields with respect to: research question, study design, selection bias, subject characteristics, randomisation, blinding, outcome measures, sample size, analytical methods, reporting of variance, confounding, reporting of results, and conclusions. Each item was scored depending on the degree to which the criteria was met (“yes” = 2, “partial” = 1, “no” = 0). Any items that were not applicable were marked “n/a” and excluded from the total score. A total score for each paper was calculated by summing the total scores across all relevant items (excluding items marked “n/a”), divided by the total possible score.³⁶

Results

Summary of included studies

Characteristics of the 13 studies included in this review are summarised in Table 2, and key findings are described in Table 3. All studies reported quantitative data, using randomised controlled trials and randomised controlled pilot trials [please see Table 2 for study numbers: 3, 9], cohort [1, 10], comparison [2, 4], between subjects [5–7, 11] and experimental [8, 12, 13] designs. Settings included universities [1–8, 12], community [9], online [11, 13] and prison [10]. Most studies were conducted in the US [2, 3, 5, 6, 8, 9, 11, 12, 13], and one each in France [1], the Netherlands [4], Canada [7] and the United Kingdom [10]. A total of 3,717 individuals were captured by the studies in this review.

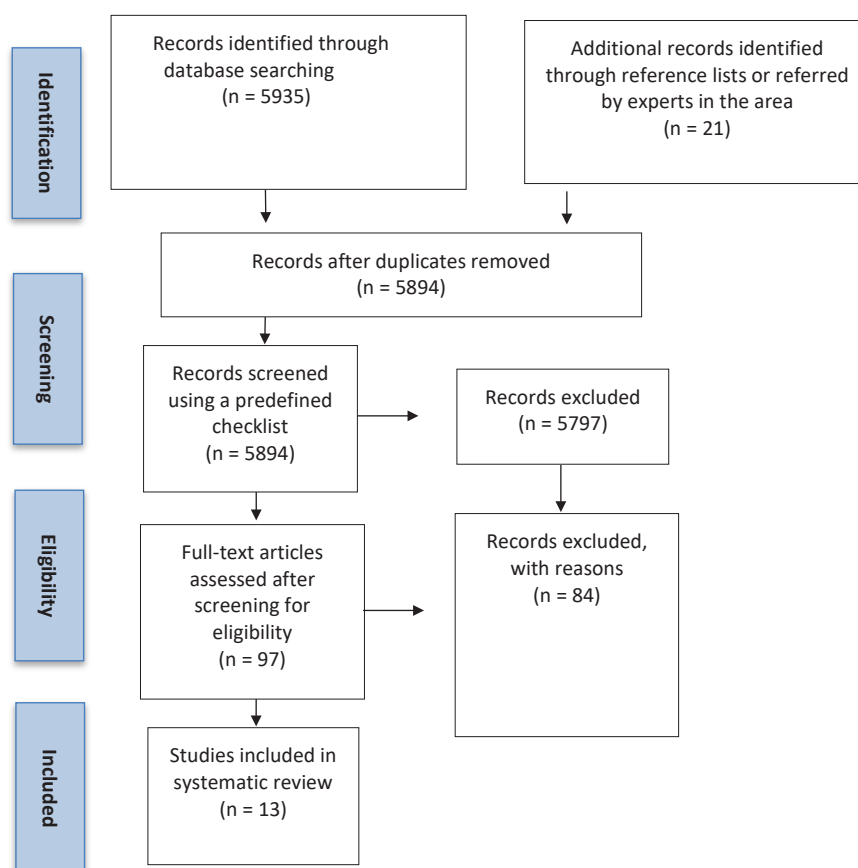
Summary of quality of evidence

The quality of evidence of studies included in this review is shown in Table 4. Only three studies controlled for confounding factors, including sex, relationship status and the use of birth control [2], gender [11] and current health, general health concern, age, gender, ethnicity, education, marital status and income [13]. Studies did not blind investigators and participants where possible, and few (5/13) studies reported estimates of variance [1, 3, 5, 6, 11].

Table 1: Inclusion and exclusion criteria.

Category	Included	Excluded
Research Design	Quantitative and qualitative methods including randomised controlled trial, quasi-experimental, or single-group pre-post design	Systematic literature review
Research Setting	All settings except clinical health settings were included (e.g. school, university, community, aged care or online)	Programs that were delivered in clinical settings (e.g., hospital) to individuals experiencing ill-health
Program Type	Program, intervention, approach or strategy that explicitly used humour-based health promotion strategies, behaviour and/or health outcomes Program may include other components in combination with the humour component	Studies that examined associations between humour and health outcomes only, without applying a humour-based health promotion intervention, strategy or approach
Dependent Variable	At least one behavioural or health outcome was assessed following the intervention	Did not report a behavioral or health outcome post intervention
Publication Status	Published in English between January 2010 and September 2020 and peer-reviewed	Unpublished reports and dissertations Articles published in languages other than English Articles published prior to January 2010

Figure 1: PRISMA 2009 flow diagram of search strategy.



Description of humour-based health promotion strategies

The review revealed a diverse range of strategies, strategy components, outcome measures and methodological approaches, which impaired meaningful comparison between studies. Humour messages were delivered through a wide variety of mediums, including written or printed messages and

advertisements [1, 4, 5, 7, 11, 12], surround campaigns with multiple media channels [2], video or entertainment narratives [3, 6], public service announcements [8, 9, 13] and a comedy performance [10]. Strategies were facilitated by a stand-up comedian [10], media channels [2] or research team members [1, 3, 4, 5, 12]. Facilitators were not applicable in three studies [6, 7, 11] or

Table 2: Characteristics of included studies.

Study #	First Author (Year) Country	Study Aim	Design	Intervention	Setting	n	Program Length	Program Facilitator	Theoretical Foundation	Components
1	Blanc (2014) France	To test the effect of humour in print advertisement.	Cohort	Print health campaigns	University	E1: 32 Males E2: 168	1 session	Researcher	NS	Alcohol, tobacco and obesity health ads on computer screen
2	Campo (2013) USA	To examine whether exposure to a humorous surround campaign could produce a multiplicative effect.	Comparison study	Until You're Ready, Avoid the Stork.com	University	594 College students	NS	Media channels	Intermedia theory	Surround campaign (i.e., a broad mix of campaign tactics and channels)
3	Futerfas (2017) USA	To focus on humorous narratives related to unprotected sex.	RCT	Humorous narratives	University	161 Females	1 session	Researcher	NS	Video (humour, non-humour and control)
4	Hendriks (2018) Netherlands	Investigated gender differences in responses to threatening health-promoting information communicated with humour.	Comparison study	Health communication	University	143 Females 66 Males	1 session	Researcher	NS	Campaign posters and leaflets, stressing the negative consequences of excessive alcohol consumption or caffeine consumption
5	Lee (2015) USA	To cross humorous vs. non-humorous and self- vs other-deprecating messages about binge drinking, and test how differences in personal investment in alcohol use moderates the effects of such messages on college binge drinkers.	Between subject factorial design	Written health message about binge drinking	University	199 Females	1 session	Researcher	Social Identity Theory	Four versions of the same message: humorous self-deprecating, humorous other-deprecating, non-humorous self-deprecating, non-humorous other-deprecating
6	Moyer-Gusé (2011) USA	To examine how the presence or absence of pregnancy-related humour influences viewers' counterarguing, perceived severity, and intentions to engage in unprotected sexual behaviour.	Between-subjects experiment	15-minute video	University	237 University students	1 session	NA	Extended elaboration likelihood model	Videos from Scrubs, portraying either an unplanned pregnancy storyline presented in a humorous way, the same unplanned pregnancy with the pregnancy-related humour edited out, or a control episode
7	Mukherjee (2011) Canada	To explore whether humour can reduce defensive responses and hence increase the persuasiveness of fear advertising.	Between-subjects experiment	Advertisement for sunscreen lotion	University	Study 1: 124 University Students Study 2: 132 University Students	1 session	NA	Fear theories	Advertisement
8	Nabi (2016) USA	To examine the possible benefit of using humour to reduce anxiety associated with performing cancer self-examination behaviours.	Experimental	Humorous public service announcement	University	187 students	1 session	NS		Respondents read the script of a humorous public service announcement encouraging either BSE or TSE behaviour.
9	Paniera (2016) USA	To examine the impact of a humorous intervention designed to increase mothers' intentions to talk to their child about sex.	RCT	Humour intervention	Community	442 mothers	1 session	NS	Theory of Planned Behaviour	Public service announcement
10	Wright (2014) UK	To evaluate the effectiveness of a comedy show in a women's prison to reduce mental health stigma and improve coping and help-seeking for mental health problems.	Cohort	Cracking Up - comedy performance	Women's prison	70 Females	Not specified	Stand-up comedian	NS	Mental health and race-related issues, and encouraged seeking and accessing well-being and support services
11	Yoon (2013) USA	To explore the interaction between threat intensity and humour on ad effectiveness for low- and high-past-threat individuals.	Between subjects factorial design	Sunscreen advertisement	Online	290 undergraduate students	1 session	NA	Protection motivation theory	Low/medium/high threat and humour/non-humour advertisement
12	Yoon (2014) USA	The interaction of humour, threat level and need for cognition (NFC) was tested on the processing measures (i.e. processing motivation and processing depth), to explain the basis of the hypothesised effects, and on the persuasion measures (i.e. ad attitude and behavioural intention).	Experimental	Humour - fictitious ads	University	343 students	1 session	Researcher	NS	Humour was manipulated by a combination of imagery and words
13	Yoon (2015) USA	To test humour as an advertising strategy that might attenuate the negative effects of shame and increase message persuasion.	Experimental	Public service announcements	Online	Study 1: 165 Study 2: 162 Study 3: 158	1 session	NS	Security Theory	Manipulated shame levels by: (i) using PSAs featuring a real disease, (ii) using PSAs featuring a fictional disease, and (iii) using a scenario primer followed by exposure to PSAs featuring two different real diseases

Table 3: Key findings from included studies.

Study #	First Author (Year)	Intervention	Outcomes	Key Findings
1	Blanc (2013)	Print health campaigns	Viewing time Convincing judgement Recognition	Compared to non-humorous health ads, those using humour received prolonged attention, were judged more convincing, and their messages were better recognised.
2	Campo (2013)	Until You're Ready, Avoid theStork.com	Number of channels seen Sharing Unprompted recall Campaign impressions Humour response Self-efficacy Response efficacy Perceived susceptibility Perceived severity	Campaign exposure and humour were significant predictors of talking with and/or showing the campaign to others.
3	Futerfas (2017)	Humorous narratives	Counterarguing Perceived severity Attitudes toward unprotected sex Intentions to engage in unprotected sex Prior viewing experience	Humour increased perceived severity of unintended pregnancy, with no effect on counterarguing. The presence of humour reduced behavioural intentions to engage in unprotected sex.
4	Hendriks (2018)	Health communication	Message evaluation Message attention Attitudes and intentions towards the behaviour	Health messages were more persuasive when communicated with humour, although humour played a different role for men and women. Men responded more in line with message goals when the message combined high threat with humour, women preferred the low threat humour messages.
5	Lee (2015)	Written health message about binge drinking	Personal investment in alcohol Behavioural intentions Subjective norms Attitudes towards health behaviour	Significant three-way interaction effects on subjective norms and behavioural intentions: for binge drinkers who weren't high in personal investment in alcohol use, other-deprecating humour reduced their perceived subjective norms about the acceptability of binge drinking behaviour and their behavioural intentions. Effect of the experimental manipulation on subjective norms among these binge drinkers was shown to mediate the effect on intentions to binge drink in the future.
6	Moyer-Gusé (2011)	15-minute video	Perceived severity of the consequences of unintended pregnancy Behavioural intentions Counterarguing	Humour reduced counterarguing while also trivialising the severity of the consequences of sexual behaviour. When the pregnancy storyline was presented in its original humorous context, viewers reported greater intentions to engage in unprotected sex than when pregnancy was presented in a more serious tone.
7	Mulkerjee (2013)	Advertisement	Attitude toward the brand Usage intent for sunscreen Positive brand thoughts Perceived vulnerability Fear tension arousal Humour	Increasing fear tension arousal from moderate to high increased persuasion when humour was included in the ad but decreased persuasion when there was no humour in the ad. The interaction of humour and fear tension was mediated by reduction in defensive responses to the ad, measured by positive thoughts about the brand and perceived vulnerability to the threat.
8	Nabi (2016)	Humorous public service announcement	Breast or testicular cancer severity and susceptibility as well as BSE or TSE self-efficacy Level of emotions when thinking of performing a self-exam Issue relevance Perceived knowledge Attitude towards performing a self-exam Message humorousness Anxiety during message exposure Message processing motivation Intention to perform a self-exam Past self-exam behaviour	Perception of humour reduced anxiety about self-exams, which was related to more positive self-exam attitudes. Humour perception was associated with greater message processing motivation, which, in turn, was associated with more supportive self-exam attitudes. Self-exam attitudes positively associated with self-exam intentions. The humorous and serious messages did not generate differences in subsequent self-exam behaviour, although the intention-behaviour relationship was stronger and significant for those exposed to the humorous versus the serious message.

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Table 3 cont.: Key findings from included studies.

Study #	First Author (Year)	Intervention	Outcomes	Key Findings
9	Pariera (2016)	Humour intervention	Level of humour Subjective norms Self-efficacy Attitudes Communication	Exposure to humour can have a negative effect on participants unless they report being highly amused, in which case their communication attitudes, norms, and intentions are increased.
10	Wright (2014)	Cracking Up - comedy performance	Attitude and knowledge Willingness to associate and comfort in disclosing and discussing mental health problems with others	Intervention improved some aspects of prisoners' knowledge about the effectiveness of psychotherapy and likelihood of recovery from mental health problems. Significant post-intervention increases in the proportion of prisoners who stated they would discuss or disclose mental health problems. This was consistent with the increases in the number of prisoners who rated themselves as likely to start using different sources of help or prison activities. No improvement in intentions to associate with people with a mental health problem.
11	Yoon (2013)	Sunscreen advertisement	Past threat Ad attitude Purchase intention	Differential humour effects among individuals with different levels of past threat experience. For the low-past-threat group, when threat intensity is low, the non-humour ad was more persuasive than the humour ad. In contrast, given high threat intensity, the use of humour made the persuasion more effective. The opposite was reported for the high-past-threat group. With low threat intensity, the presence of humour increased effectiveness, with high threat intensity, the non-humour ad was more effective.
12	Yoon (2014)	Humour - fictitious ads	Need for cognition Processing motivation Prior attitude and awareness Prior perceived threat Past threat experience Perceived humour	Significant three-way interaction between humour, threat level and NFC emerged where low-NFC participants responded more positively to the no-humour condition than the humour condition with low threat, and more positively to the humour condition than the no-humour condition in the high-threat advertisement. Opposite was observed for high-NFC participants.
13	Yoon (2015)	Public service announcements	Attention Behavioural intention Ad attitude Behaviour attitude	Individuals with low fear of negative evaluation (FNE) were more attentive to and favoured humour over no humour when shame was low but were more attentive to and favoured no humour over humour when shame was high. With low shame, high FNEs favoured no humour over humour; however, with high shame, the humour condition produced significantly higher ratings for behavioural intention.

not described in another three [8, 9, 13]. Nine studies described a theoretical rationale, including Intermedia Theory [2], Social Identity Theory [5], Extended Elaboration Likelihood Model [6], fear theories [7], including Protection Motivation Theory [11], Theory of Planned Behaviour [9], Protection Motivation Theory [11] and Security Theory [13]. A broad range of outcomes were evaluated across studies (Table 3). These included behaviour change [8], attention, attitudes and behavioural intention [1–8, 10–13], and psychological outcomes such as self-efficacy and anxiety [8, 9]. Humour-based strategies were used to: i) influence health attitudes and behaviours; ii) encourage interpersonal sharing to indirectly affect health outcomes; and iii) investigate the level of threat and humour associated with positive outcomes.

Health attitudes and behaviour

Humour has been integrated into written health messages,³⁷ advertisements,⁹ entertainment narratives,^{21,38} public service announcements^{5,8} and psychoeducational intervention²² to attract attention and encourage health-promoting attitudes and behaviour. Humour in preventative print advertisements targeting alcohol, tobacco and obesity was examined in one study.⁹ Participants who watched humorous ads exhibited prolonged attention, judged the ad as more convincing and the message was better recognised compared to non-humorous ads, supporting the hypothesis that attention is attracted by humour.⁹

Two studies reported that the impact of humour-based strategies on attitudes, norms and behavioural intentions was dependant on the type of humour used and characteristics of the target audience. Lee, Slater and Tchernev³⁷ exposed female university students to both humorous and non-humorous and self- and other-deprecating written messages about binge drinking. For women classified as binge drinkers, who weren't high in personal investment in alcohol use, other-deprecating humour tended to reduce their perceived subjective norms about the acceptability of binge drinking and their subsequent behavioural intentions. Yoon⁸ tested humour as an advertising strategy to attenuate the negative effects of shame, measured as fear of negative evaluation, and increase message persuasion across three studies featuring a real disease (study 1); a fictional disease (study 2) and a scenario primer and two different real diseases. Their studies showed the strongest humour benefits on high shame-inducing health issues for individuals with high fear of negative evaluation. The authors concluded that exposure to humour

alone can have a negative effect on participants unless they are highly amused, when their communication attitudes, norms, and intentions are increased. Here, humour and amusement emerged as distinct concepts with different persuasive influence.

The persuasive impact of humorous entertainment narratives related to unprotected sex was explored in two studies. In Futerfas and Nan,²¹ 161 female participants watched either a video with a humorous storyline about unprotected sex, an identical storyline with humour edited out, or an unrelated storyline. Humour increased the perceived severity of unintended pregnancy, while having no effect on counterarguing. Also, the presence of humour reduced behavioural intentions to engage in unprotected sex. In contrast, Moyer-Gusé et al.³⁸ explored whether the presence or absence of pregnancy-related humour influenced counterarguing, perceived severity and intentions to engage in unprotected sexual behaviour. University students were randomly assigned to view one of three videos from the situation comedy *Scrubs*, portraying either an unplanned pregnancy storyline presented in a humorous way, the same unplanned pregnancy with the pregnancy-related humour removed, or a control episode unrelated to pregnancy. While humour also reduced counterarguing, participants reported that it trivialised the severity of consequences related to sexual behaviour. After viewing the pregnancy storyline in a humorous context, viewers reported greater intention to engage in unprotected sex than when pregnancy-related jokes were edited out.

The role of humour to promote help-seeking behaviour was also examined in two studies. In one,⁵ undergraduate students read either a humorous or serious public service announcement promoting breast or testicular self-exams. Perception of humour was related to reduced anxiety about self-exams, which, in turn, was associated with more positive self-exam attitudes. Humour perception also predicted message processing motivation, associated with more supportive self-exam attitudes. Self-exam intentions predicted self-exam behaviour one week later; however, there were no differences between groups on subsequent self-exam behaviour. In another study, the effectiveness of a comedy show to reduce mental health stigma and improve coping and help-seeking for mental health problems in a women's prison

Table 4: Quality indicators for quantitative studies.

Study #	First Author (Year)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
1	Blanc (2014)	2	2	2	2	NA	0	0	2	2	2	2	0	2	2	77%
2	Campo (2013)	2	2	2	1	NA	0	NA	1	2	2	0	2	2	2	75%
3	Futerfas (2017)	2	2	2	2	2	0	0	2	2	2	2	0	2	2	79%
4	Hendriks (2018)	2	2	2	2	0	0	0	2	2	2	0	0	2	2	64%
5	Lee (2015)	2	2	1	1	0	0	0	2	2	2	2	0	2	2	64%
6	Moyer-Gusé (2011)	2	2	2	1	NA	0	0	2	2	1	2	0	2	2	69%
7	Mukherjee	1	2	2	1	NA	0	0	2	2	2	0	0	2	2	62%
8	Nabi (2016)	2	2	2	2	0	0	0	2	2	2	0	0	2	2	64%
9	Pariera (2017)	2	2	2	2	2	0	0	2	2	2	0	0	2	2	71%
10	Wright (2014)	2	2	2	2	NA	0	NA	2	2	2	0	0	2	2	75%
11	Yoon (2013)	2	2	2	1	NA	0	0	2	2	1	2	2	2	2	77%
12	Yoon (2014)	2	2	2	2	2	0	0	2	2	2	0	0	2	2	71%
13	Yoon (2015)	2	2	2	2	2	0	0	2	2	1	0	2	2	2	75%

Notes:

1 Question / objective sufficiently described, 2 Study design evident and appropriate, 3 Method of subject/comparison group selection or source of information/input variables described and appropriate, 4 Subject (and comparison group, if applicable) characteristics sufficiently described, 5 If interventional and random allocation was possible, was it described, 6 If interventional and blinding of investigators was possible, was it reported, 7 If interventional and blinding of subjects was possible, was it reported, 8 Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported, 9 Sample size appropriate, 10 Analytic methods described/justified and appropriate, 11 Some estimate of variance is reported for the main results, 12 Controlled for confounding, 13 Results reported in sufficient detail, 14 Conclusions supported by the results, NA Not Applicable; Ratings: Yes = 2, Partial = 1, No = 0.

was evaluated. Self-report questionnaires indicated a significant increase in the number of participants who would discuss or disclose mental health problems and use different sources of help or prison activities following the intervention, suggesting the approach might increase help-seeking behaviour.²²

Interpersonal sharing to indirectly affect health behaviour

Two papers explored whether humour-based strategies could indirectly impact public health outcomes by encouraging interpersonal communication and sharing. Campo and colleagues³⁹ investigated whether exposure to a humorous surround campaign could prevent unintended pregnancy in women through the promotion of interpersonal sharing. Recognising contraceptive decisions are influenced by what others, especially friends, think about the issue, a cross-sectional survey of 594 college students found campaign exposure (the number of different channels through which students reported seeing or hearing the ads) and the extent to which the participant found the ads humorous were significant predictors of whether they talked about it with and/or showed the campaign to others, after adjusting for self-efficacy, response-efficacy, perceived susceptibility and perceived severity of unintended pregnancy. Participants who found the campaign funnier were more likely to share it with others than those who did

not. Pariera⁷ similarly used a humorous public service announcement to increase mothers' intentions to talk to their child about sex. The study found exposure to humour did not directly affect mothers' beliefs and intentions about talking with their child about sexual health unless they were highly amused, when communication attitudes, norms, and intentions were increased.

Interaction between threat level and humour

Studies in this review suggest some individuals may respond more positively to threatening information when it is communicated with humour. Four studies investigated the interaction between the level of threatening information and humour to explore whether certain levels of threat humour are more or less likely to reduce defensive responses and be persuasive. Hendriks and Janssen⁴⁰ exposed university students to campaign posters stressing the negative consequences of binge drinking or caffeine consumption that did or did not contain a funny visual metaphor or a slapstick cartoon. Health messages were perceived as more persuasive when communicated with humour, albeit humour played a different role for men and women: men appeared to respond to message goals when the message combined high threat with humour; women appeared to prefer the low-threat humour messages. The opposite was observed for participants with a high need for cognition

(need for cognition refers to the extent to which individuals are inclined towards effortful cognitive activities).

Using a similar approach, another study manipulated levels of humour and threat in fictitious print ads targeting dental care. Low need for cognition participants responded more positively to the no-humour condition than the humour condition with low threat, and more positively to the humour condition than the no-humour condition in the high-threat advertisement. The opposite was observed for high need for cognition participants.⁴¹ These authors tested the three-way interaction effects of humour, threat level and need for cognition on message processing motivation and depth and on persuasion measures ad attitude and behaviour intention. Their study showed that participants with a low need for cognition responded more positively to the no-humour condition than the humour condition with low threat, and more positively to the humour condition than the no-humour condition in the high-threat advertisement.

Mukherjee and Dubé⁶ conducted two studies with undergraduate university students to explore whether humour could reduce defensive responses to sunscreen ads. They found increasing fear tension arousal from moderate to high increased persuasion when humour was included in the ad but decreased persuasion in the ads that did not use humour. Finally, Yoon and Tinkham⁴² conducted two studies to test the interaction between threat intensity and humour on sunscreen ad effectiveness for individuals with low and high past threats (experiences of sunburn). Results showed differential humour effects among individuals based on different levels of past-threat experience. For the low past-threat group, the use of humour made the persuasion more effective when threat intensity was high; whereas non-humour ads were more effective when intensity was low. Opposite findings were observed in the high past-threat group. Hence the effectiveness of combinations of threat and humour appear to differ according to whether an individual considers the issue as personally relevant.

Discussion

Extent to which humour has been used in health promotion strategies

The overall aim of this systematic literature review was to explore the use of humour-based health promotion strategies in

non-clinical settings. This knowledge is critical to better understand what types of humour-based strategies work for who, where and in what context. Our first aim was to examine the extent to which humour-based health promotion strategies have been implemented to improve cognitions, perceptions and behaviours relating to a range of health topics. We examined program components and underlying theories, who programs have been delivered to, and the settings in which they have been offered. While the studies included in this review were relatively homogenous with regards to setting and population, with most using university students as participants, they implemented a diverse range of strategies, strategy components, outcome measures and methodological approaches, which impaired meaningful comparison between studies. Nevertheless, the findings have allowed us to map out a range of humour-based health promotion strategies for increasing public engagement with knowledge dissemination, and in turn, influence health behaviour change.

Humour-based strategies were delivered through various mediums including written, print and online advertisements, video or entertainment narratives, public service announcements, and a comedy performance. They focused on optimising behavioural health intentions, by targeting individuals' knowledge, attitudes and psychological outcomes such as self-efficacy and anxiety. Examples include reducing anxiety associated with performing cancer self-examinations⁵ and reducing mental health stigma and improve coping and health-seeking for mental health issues.²² One of the studies³⁷ aimed to reduce binge drinking and was underpinned by Social Identity Theory. The two studies implementing humour-based entertainment narratives addressed the health topic of unprotected sex among university students, yielding mixed findings relating to its effect on counter-arguing and behaviour intention.^{21,38}

Humour-based strategies also indirectly targeted health outcomes by encouraging recipients to discuss health-related issues with peers or family members, such as increasing mothers' intentions to talk with their child about sex.⁷ Foci of studies incorporating humour and threat-based health communication approaches explored elements of message persuasion models, including fear theories.^{6,42}

Use of humour to improve health promotion strategy outcomes

Our second aim was to explore humour-based health promotion strategies on audience outcomes, including cognition, perceptions and health behaviour. Overall, the findings of studies included in this review suggest that humour-based interventions are a novel approach for eliciting favourable audience responses, such as attracting more sustained attention, influencing health attitudes, behaviour intentions and adoption of health behaviours, and promoting discussion about health issues among peers and family members. Humour-based health promotion strategies were also used to explore the interactions between the level of threat and humour, and health outcomes.

However, there are some exceptions (e.g. Moyer-Guse³⁸), suggesting that these findings come with a 'know your audience' caveat. Indeed, as has been highlighted in other research (e.g. Conway⁴³), our study showed that humour plays a different role for men and women.⁴⁰ For example, in Hendriks and Janssen's study,⁴⁰ men responded more in line with message goals when the message combined high threat with humour and women preferred the low-threat humour messages. Furthermore, getting the right balance between levels of fear/threat and humour evoked may also need to vary according to the depth of cognitive effort required to process and appraise the message⁴² as part of forming behaviour intentions. We also noted that while two separate studies both compared humour and non-humour messaging to address risks associated with unprotected sex among university students, participants who had been exposed to the humour context reported reduced intention to engage in unprotected sex in only one of the studies,²¹ while the opposite effect was observed in the other.³⁸ Given the potential adverse health and lifestyle risks associated with certain health topics such as unprotected sex, implications of potential unintended effects need to be carefully measured when designing humour-based interventions.

There was also some evidence showing that the amusement quality of humour is important for increasing communication attitudes, norms and intentions,⁷ with humour and amusement emerging as distinct concepts relating to persuasive influence. A challenge to understanding

what works for who, when and in what context is the fact that humour is a subjective construct.^{44,45} Moreover, not all types of humour are received equally.³⁹ Humour typologies include: slapstick, clownish, surprise, misunderstanding, irony, satire and parody.⁴⁶ Humour approaches that sit within the slapstick, satire, and irony categories have been shown to be undesirable and thus potentially less likely to evoke amusement.⁴⁶

With regards to using humour-based approaches to address stigmatised or "sensitive" public health issues, Wright et al.⁵² prison-based mental health intervention showed significant post-intervention increases in women reporting that they would discuss or disclose mental health issues, but there were no improvements in their intentions to associate with other people with mental health issues. This was surprising, although the authors have suggested that the population met many criteria associated with having less negative perceptions about compromised mental health, such as having previous experience of mental health issues and being female; hence the lack of significant changes between pre- and post-intervention measures may have instead revealed a ceiling effect.²² Other such topics addressed in the studies included sexual behaviour^{21,38,39} and binge drinking;³⁷ whereas other studies focused on investigating message persuasion components associated with discomfort (e.g. fear/threat⁴² and shame⁸). Understanding all of the components needed for effective dissemination is needed to bridge the knowledge to treatment gap, particularly around unmet health issues that may be considered 'uncomfortable' topics.

Methodological limitations and recommendations for future research

Our third and final aim was to examine the methodological limitations of research investigating humour-based health promotion strategies and to suggest recommendations for future research. The quality of evidence of included studies was varied, and most did not account for confounding variables. All but two of the studies^{7,22} were conducted among university students. Hence findings may not be generalisable to populations in other age or education level brackets. A large proportion of studies were based in English-speaking countries. While humour is a universal construct that occurs within all groups, an

individual's sense of humour is subjective and shaped by life experiences, culture and social norms.⁴⁴ Therefore, careful consideration ought to be made regarding culture-relevance of approaches described when aiming to reach culturally and linguistically diverse members of the public.

High-quality research is needed to better understand the conditions under which different types of humour may or may not influence public health outcomes. While there are different types of humour (e.g. self-deprecating, other-deprecating, satire, parody, wit, etc), most health communication research considered whether the content is humorous or not humorous; the effect of different forms of humour on an individual's perceptions and attitudes relating to health messaging, and how these may vary based on audience characteristics requires greater consideration.³⁷ This could empower health communicators with empirical and theoretical knowledge relating to how humour may be received by diverse audiences. There also appears to be limited understanding of the degree to which exposure to humour-based strategies is associated with not only behavioural intentions, but health-related behaviour change. Designing studies to assess health-related behaviour before and after exposure to the humour-based strategy could strengthen understanding of health impact. There are likely lessons that can be garnered from other fields that have used humour as a communication tool, including advertising and social marketing. Finally, humour-based strategies were largely shared during one session. Future research is needed to track exposure to humour-based messages over time. This will enable greater understanding of their long-term impact on shifting awareness to attitudes, attitudes to intentions and intentions to sustained behaviour change, or conversely, losing their novel engagement appeal and effect altogether.

Conclusion and implications for public health

Research investigating the use of humour-based health promotion strategies during the past decade is relatively limited; however, overall findings indicate that humour may help to reduce uncomfortable responses attached to certain health topics, such as fear, anxiety, and embarrassment, and increase engagement with health promotion

messages and health behaviour intentions. Importantly, this review has provided scope for future research to investigate the use of humour in addressing taboo and stigma attached to certain health issues more closely. Further research examining how humour in health promotion works is needed.

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