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Shared social identification in mass gatherings lowers health risk perceptions via lowered disgust

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Previous research concerning mass gathering-associated health risks has focused on physical factors while largely neglecting the role of psychological factors. The present research examined the effect of experiencing shared social identification on perceptions of susceptibility to health risks in mass gatherings. Participants in Study 1 were asked to either recall a crowd in which they shared a social identity with other crowd members or a crowd in which they did not. Participants subsequently completed measures assessing shared social identity, disgust, and health risk perceptions. Study 2 involved administering the same measures as part of a survey to participants who had recently attended a music festival. The results from both studies indicated that sharing a social identity lowered health risk perceptions; this effect was indirect and mediated via disgust. This highlights the importance of considering social identity processes in the design of health communication aimed at reducing mass gathering-associated health risks.

Large crowd events, or mass gatherings, such as music festivals, pilgrimages, and sports events, pose serious health risks (The World Health Organization (WHO), 2015). Examples of non-communicable health risks include crush injuries, environmental stressors, and trauma incidences related to substance misuse (Steffen *et al.*, 2012). However, the most serious health risk is the transmission of communicable diseases. Being in close physical proximity to masses of people, under often rudimentary living conditions, increases the risk of infection, which may spread beyond the bounds of the mass gathering (Abubakar *et al.*, 2012; Dixon, Ishola, & Phin, 2013; Memish, Stephens, Steffen, & Ahmed, 2012; Tam *et al.*, 2012). Research to date has emphasized physical factors in the transmission of disease in mass gatherings, and thereby physical means of mitigating risks (e.g., disease surveillance and implementation of facemasks and vaccines; Khan *et al.*, 2012; Tam *et al.*, 2012). However, more recently the WHO has come to identify the neglect, yet importance, of psychological factors in mass gathering health research, which are now prioritized in the design and implementation of interventions to mitigate mass gathering-associated health risks (WHO, 2015).

The social identity approach (Tajfel & Turner, 1979; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) provides a theoretical framework for making sense of how psychological

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processes implicate health outcomes in mass gatherings. As a conceptual tool, the framework distinguishes between two types of crowds – physical and psychological crowds (Reicher, 2012). On the one hand, people in physical crowds happen to be in the same place at the same time by chance and retain a strong sense of unique personal identity despite being amongst many 'others' (e.g., travellers at a busy train station). On the other hand, participants in psychological crowds convene for a common purpose, as is the case at music festivals, pilgrimages, and sports events. They perceive one another to belong to the same social group and assume a shared social identity (e.g., 'we/us' festival-goers). Their behaviour is in turn motivated by the norms and values perceived to be characteristic (prototypical) of the group (Hopkins & Reicher, 2016; Reicher, 2012; Reicher *et al.*, 2007). The difference in crowd dynamics between physical and psychological crowds is an important distinguishing feature in the design and implementation of health interventions in mass gatherings in that psychological factors are fundamental to interventions designed for psychological crowds.

The experience of sharing a social identity makes crowds psychologically transformative as it motivates a mutual desire for proximity, social support, trust, respect, and cooperation (e.g., Drury, Cocking, & Reicher, 2009a, 2009b; Novelli, Drury, & Reicher, 2010; Tyler & Blader, 2000). These cognitive and relational transformations also underpin positive health outcomes in mass gatherings. For example, pilgrims at a Hindu festival in India – the Magh Mela – reported improved subjective health over time to the extent that they experienced a sense of shared social identity and perceived their relations with other pilgrims to be intimate and supportive (Khan *et al.*, 2015). Similarly, attendees of an Australian festival for school leavers reported mental health benefits to the degree that they identified with other attendees; in contrast, those who experienced psychological distress were more likely to report social isolation and negative attitudes towards other groups in the mass gathering (i.e., other attendees, the police, and volunteers; Cruwys *et al.*, 2019).

However, the experience of sharing a social identity, at least in small group settings, may also result in negative health outcomes. Evidence from small group settings has shown that the association is partly attributable to the adherence to unhealthy group norms (e.g., smoking and alcohol consumption; Livingstone, Young, & Manstead, 2011; Oyserman, Fryberg, & Yoder, 2007; Tarrant & Butler, 2011). Furthermore, the risks such behaviours pose to health tend to be underestimated by group members (e.g., perceived risk of contracting AIDS from casual unprotected sex and needle sharing in intravenous drug use; Campbell & Stewart, 1992). Still, the negative effects of norms and lowered health risk perceptions on health outcomes in mass gatherings have so far only been theorized. One factor other than norms believed to underpin negative health outcomes in mass gatherings, particularly health risk perceptions, is the disgust response (Hopkins & Reicher, 2016, 2017). Disgust – a feeling of revulsion elicited by potential noxious stimuli – has been proposed to be an evolved defence mechanism to avoid others' pathogens, especially strangers' pathogens to which the immune system is likely ill-prepared to fend off (Curtis, de Barra, & Aunger, 2011; Faulkner, Schaller, Park, & Duncan, 2004). Naturally, disgust sensitivity is associated with heightened health risk perceptions (Karg, Wiener-Blotner, & Simone, 2018). Perceived and experienced disgust therefore affects how people interact with one another – people are indeed less disgusted by those with whom they share a social identity (e.g., Reicher, Templeton, Neville, Ferrari, & Drury, 2016).

Given that the disgust response is attenuated between people who share a social identity, it raises the question of whether this process could lead to lowered health risk perceptions in mass gatherings. For example, people experiencing a shared social identity

may become less concerned with physical proximity and remain near an infectious crowd member, or it may increase resource sharing (e.g., eating utensils and towels) – a known facilitator of disease transmission (Dixon *et al.*, 2013; Hopkins & Reicher, 2016; Khan *et al.*, 2015; Memish *et al.*, 2012; Pellerin & Edmond, 2013). Likewise, people experiencing a shared social identity who are feeling unwell (and may be infected by a virus) may avoid seeking medical help because they expect and receive support from other crowd members (Hopkins & Reicher, 2016). Pilgrims at the Magh Mela in fact reported helping other sick pilgrims and expressed that such support was normative and thereby reciprocated; they also described becoming more tolerant of other pilgrims' asocial actions (e.g., being pushed) and expressed that they expected practical help (e.g., resource sharing) from other pilgrims to overcome hardships at the event (Hopkins *et al.*, 2019; Pandey, Stevenson, Shankar, Hopkins, & Reicher, 2014).

There is a lack of research examining how social identity processes are implicated in negative health outcomes in mass gatherings. Evidence indicating that social identity processes can result in negative health outcomes has not been situated in mass gatherings – this relationship has only been theorized and there currently only exists tentative empirical evidence in support of the proposition. There is therefore a need for research to examine how social identity processes may contribute to health risks associated with mass gathering events. To this end, the aim of the present research was to examine how experiencing a sense of shared social identity in mass gatherings impacts on health risk perceptions. Two studies were conducted drawing on samples of individuals who had been part of either a physical or a psychological crowd (Study 1) and recent attendees of music festivals (Study 2). The studies examined whether sharing a social identity with other crowd members was associated with lowered health risk perceptions and whether this relationship was underpinned by lowered perceived disgust. We wish to highlight that the motivation behind the research was to provide tentative, or proof-of-concept, empirical evidence in support of the so far theorized negative effect of sharing a social identity on health risk perceptions in mass gatherings, and its underpinnings (Hopkins & Reicher, 2016, 2017). This is reflected in the design and scope of the studies.

STUDY 1

Method

Design and sample

The first study employed a between-subjects design wherein participants were asked to recall either a physical or a psychological crowd of which they had been part. The design of the study is in line with previous research that has examined retrospective accounts of the experience and outcomes of sharing a social identity in crowds (e.g., Drury *et al.*, 2009a, 2009b; Drury, Novelli, & Stott, 2015). Participants ($N = 208$) were recruited online via the crowdsourcing[1] platform Crowdflower (www.crowdflower.com) from the United Kingdom and the United States to complete a survey in the survey tool Qualtrics (www.qualtrics.com). The sample was drawn from the United Kingdom and the United States as it enabled sampling from two countries with equivalent levels of English-language proficiency. Participants were first presented with an outline describing and giving examples of social identities in line with the social identity approach, and the main

[1] *See Buhrmester, Kwang and Gosling (2011) and Mason and Suri (2012) for an overview of the validity and reliability of data collected via crowdsourcing.*

difference between a physical and psychological crowd.[2] Providing this information was essential to the manipulation of the study – it ensured participants could discern the category of crowd that they were asked to recall; participants remained blinded to the specific research question throughout the study procedure. Participants were randomly allocated to one of two experimental conditions (the independent variable): a shared social identity condition versus a no-shared social identity condition. Participants in the shared social identity condition (N = 102) were asked to 'recall a time [they] were in a very large crowd of people where [they] felt that [they] shared a social identity with other crowd members (a psychological crowd)'. Participants in the no-shared shared social identity condition (N = 106) were asked to 'recall a time [they] were in a very large crowd of people where [they] felt that [they] did not share a social identity with other crowd members (a physical crowd)'. They were also asked to write down the crowd they were thinking about; their responses served as a qualitative manipulation check to ensure that they had a type of crowd in mind (physical versus psychological) consistent with the condition to which they had been allocated while completing the study measures. Finally, participants were asked to complete the dependent measures assessing shared social identity, disgust, and health risk perceptions in relation to the recalled crowd.

Responses from 350 participants were originally collected, but 142 participants were removed from the data set after data screening as: (1) 50 completed <50% of the survey; (2) seven failed an attention check; (3) 24 completed the survey from an IP address outside the United Kingdom or the United States; (4) 57 provided blank, bogus, or incorrect answers to a qualitative manipulation check which ascertained whether participants recalled the type of crowd they were asked to recall (physical versus psychological crowd; see manipulation checks below for details); and (5) four were identified as univariate outliers as their z-scores derived from a measure exceeding $\pm$ 3.29 (Tabachnick & Fidell, 2007). Of the final sample (N = 208), 107 (51.4%) participants were from the United States and 101 (48.6%) from the United Kingdom, of which 83 (39.9%) were male and 125 (60.1%) were female; age ranged from 18 to 78 years (M = 38.52, SD = 13.00). Sample size was determined based on two planned analyses. First, using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), it was estimated that a sample size of 135 would be required to achieve 80% power with medium global effect sizes for the planned multivariate analysis of covariance (MANCOVA). Second, following recommendations by Fritz and MacKinnon (2007), it was estimated that a sample size of 78 would be necessary to achieve 80% power in case the magnitudes of the relationships in the planned percentile bootstrap mediation models were medium in size (α = .39; β = .39). Estimations of global effect sizes were based on previous research examining relationships and interactions between social identification, health-related outcomes, and/or disgust that yielded medium to large effect sizes (e.g., Novelli *et al.*, 2010; Reicher *et al.*, 2016; Tarrant & Butler, 2011). Ethical approval was obtained from Keele University's Ethical Review Panel (ERP3138); all participants gave their informed consent prior to their participation.

Measures

Measure of shared social identity. *Shared social identity* (SSI) with crowd members was measured on a four-item scale adapted from Doosje, Ellemers, and Spears (1995) and

[2] *Descriptions and instructions provided to participants are outlined in the supporting information (SI1): https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163*

Doosje, Branscrombe, Spears, and Mansted (1998). Example items include the following: 'I identified with other people in the crowd' and 'I was similar to other people in the crowd'. The scale was anchored by the endpoints 1 = 'Strongly disagree' and 7 = 'Strongly agree'; higher scores indicate greater shared social identity. This measure also served as a manipulation check.

Measure of perceived disgust

Perceived disgust (PD) was assessed with seven items adapted from Tybur, Lieberman, and Griskevicius (2009) and Olatunji *et al.* (2007). Participants indicated how disgusted they would feel in seven different hypothetical scenarios if they had occurred in the crowd. Example items include the following: 'Sitting next to a crowd member who has red sores on their arm' and 'Shaking hands with a crowd member who has sweaty palms'. The scale was anchored by the endpoints 1 = 'Not at all disgusting' and 7 = 'Extremely disgusting'; higher scores indicate greater perceived disgust.

Measures of health risk perceptions. *Perceived vulnerability to disease* (PVD) was measured by seven items adapted from Duncan, Schaller, and Park (2009). Example items include the following: 'I would have avoided using public toilets because of the risk that I may have caught something from other crowd members' and 'I was more likely to catch an infectious disease in the crowd'. The scale was anchored by the endpoints 1 = 'Strongly disagree' and 7 = 'Strongly agree'; higher scores indicate greater perceived susceptibility to infectious diseases and emotional discomfort in situations where disease transmission is likely.

Likelihood and perceived riskiness of engaging in health risk behaviours (HRBLI and HRBRI) were assessed using two complementary scales comprising four items, respectively. These measures were broadly based on existing measures of risk perception (Hampson, Andrews, Barckley, Lee, & Lichtenstein, 2003; Weber, Blais, & Betz, 2002). The items were designed to examine health risk perceptions in relation to behaviours that might plausibly occur in mass gatherings and were centred around resource sharing and physical contact. Example HRBLI items include the following: 'If you were extremely thirsty and a crowd member offered you a bottle of water they had been drinking from, how likely is it that you would have drank from the bottle?' and 'If another crowd member displayed flu-like symptoms and suddenly felt too fatigued to stand up on their own, how likely is it that you would have physically supported them?'. HRBLI was anchored by the endpoints 1 = 'Extremely unlikely' and 7 = 'Extremely likely'; higher scores indicate greater likelihood to engage in health risk behaviours and thus lower risk perception. The HRBRI item was as follows: 'How risky would it be for you to do this in relation to your health?' This item was repeated after each HRBLI item (i.e., the scale comprised four identical items). HRBRI was anchored by the endpoints 1 = 'Not at all' and 7 = 'Extremely'; higher scores indicate greater perceived riskiness of engaging in health risk behaviours and thus higher risk perception.

Measurement properties

Before proceeding with the inferential statistics, the dimensionality of each measure was assessed separately through principal components analyses (PCAs) with oblimin rotation and Kaiser normalization.[3] Shared social identity (eigenvalue: 3.54; total variance:

[3] *All items used in the study and tables presenting factor matrices are provided in the supporting information (SI2): https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163*

88.61%), perceived disgust (eigenvalue: 3.45; total variance: 49.30%), likelihood of engaging in health risk behaviours (eigenvalue: 2.27; total variance: 56.66%), and perceived riskiness of engaging in health risk behaviours (eigenvalue: 2.20; total variance: 55.10%), respectively, converged into one-component solutions. The perceived vulnerability to disease items loaded onto two distinct components, explaining 33.98 and 23.49% of the variance, respectively (eigenvalues: 2.38 and 1.64). However, in line with previous research (e.g., see Duncan *et al.*, 2009; Sawada, Auger, & Lydon, 2018; Thompson, 2010), a composite score was used in the analyses. Finally, a PCA (oblimin rotation and Kaiser normalization) including all measures was conducted to examine the discreteness of the measures. The results revealed that the items loaded onto six distinct components and that these corresponded to the pre-defined measures (eigenvalues ranged from 1.38 to 5.62 and the six components explained 63.10% of the total variance). Mean scores were calculated for all scales.

Manipulation checks

First, responses to the qualitative manipulation check, ensuring that participants had recalled a crowd concordant with the condition to which they had been allocated, were assessed independently by the authors. The inter-rater reliability was $\kappa = .86$ (95% CI [0.79, 0.94]), indicating an 'almost perfect agreement' (Landis & Koch, 1977). Disagreements were subsequently resolved through discussion.[4] As noted above, 57 participants were excluded because they had provided a blank or bogus response (e.g., a string of random letters) or not recalled the type of crowd they were asked to recall in the condition to which they had been allocated (e.g., participants allocated to the shared social identity condition who recalled a physical as opposed to psychological crowd). Second, participants allocated to the shared social identity condition reported experiencing significantly greater shared social identity ($M = 5.79$, $SD = 1.01$) compared to participants allocated to the no-shared social identity condition ($M = 2.58$, $SD = 1.28$; $t(206) = 20.02$, $p < .001$, $d = 2.78$).

Analysis plan

The main analysis was conducted in two steps. First, a one-way MANCOVA was employed to examine whether there were any significant differences between the two conditions in perceived disgust and health risk perceptions. Second, mediation analyses were performed to test whether the effects of shared social identity on health risk perceptions could be explained by perceived disgust. Country, age, and gender were entered as covariates in both steps.[5,6]

Results

Descriptive statistics, reliability analyses, and correlations

The Cronbach's alphas, means, standard deviations, and correlations for the included measures are presented in Table 1.

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[4] *A detailed account of the inter-rater reliability process is provided in the supporting information (SI3). https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163*

[5] *The data sets for Study 1 and Study 2 are available in the supporting information (SI4 and SI5): https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163*

[6] *The main analyses were re-run with outliers, without covariates, and with participants who failed the qualitative manipulation check – the findings from these analyses did not deviate significantly from the findings reported in the manuscript.*

Table 1. Cronbach's alphas, means, standard deviations, and correlations (Study 1)

	Measures									
	SSI *M (SD)*		PD *M (SD)*		PVD *M (SD)*		HRBLI *M (SD)*		HRBRI *M (SD)*	
Samples		α		α		α		α		α
Total sample	4.16 (1.98)	.96	4.90 (1.08)	.83	4.55 (0.99)	.65	2.88 (0.91)	.74	2.63 (0.75)	.73
SSIC	5.79 (1.01)	.89	4.68 (1.06)	.80	4.38 (1.02)	.66	3.07 (0.90)	.72	2.58 (0.68)	.66
NSSIC	2.59 (1.28)	.87	5.11 (1.05)	.84	4.73 (0.93)	.61	2.71 (0.89)	.75	2.68 (0.81)	.77
Measures	*r*		*r*		*r*		*r*		*r*	
SSI			−.12		−.17*		.23**		−.01	
PD					.38**		−.37**		.44**	
PVD							−.20**		.31**	
HRBLI									−.17*	
HRBRI										

Notes. HRBLI = likelihood of engaging in health risk behaviours; HRBRI = perceived riskiness of engaging in health risk behaviours; NSSIC = no-shared social identity condition; PD = perceived disgust; PVD = perceived vulnerability to disease; SSI = shared social identity; SSIC = shared social identity condition.
*p <.05; **p < .01.

Mean differences

A one-way MANCOVA was conducted to examine differences between the conditions on perceived disgust, perceived vulnerability to disease, likelihood of engaging in health risk behaviours, and perceived riskiness of engaging in health risk behaviours. The omnibus MANCOVA revealed a significant multivariate main effect for condition, $Box\ M = 20.60$, $p = .028$; $F(4, 200) = 4.02$, $p = .004$, Wilks' $\Lambda = .93$, $\eta_p^2 = .07$. Power to detect the effect was .91. Country, $F(4, 200) = 2.15$, $p = .076$, Wilks' $\Lambda = .96$, $\eta_p^2 = .04$, age, $F(4, 200) = 1.42$, $p = .228$, Wilks' $\Lambda = .97$, $\eta_p^2 = .03$, and gender, $F(4, 200) = 1.63$, $p = .168$, Wilks' $\Lambda = .97$, $\eta_p^2 = .03$, were all non-significant covariates in the model. Given the significance of the overall test, the univariate main effects were examined through a series of one-way ANCOVAs which were conducted as follow-up tests to the MANCOVA. A Bonferroni adjustment was applied whereby statistical significance was accepted at $p < .0125$. Significant univariate main effects for condition were obtained for perceived disgust, $F(1, 203) = 8.88$, $p = .003$, $\eta_p^2 = .04$, perceived vulnerability to disease, $F(1, 203) = 6.76$, $p = .010$, $\eta_p^2 = .03$, and likelihood of engaging in health risk behaviours, $F(1, 203) = 9.32$, $p = .003$, $\eta_p^2 = .04$, but not perceived riskiness of engaging in health risk behaviours, $F(1, 203) = .90$, $p = .343$, $\eta_p^2 = .00$. None of the covariates were significant in any of the ANCOVA models. These results indicate that participants allocated to the shared social identity condition perceived less vulnerability to disease and disgust compared to participants allocated to the no-shared social identity condition. Participants in the shared social identity condition also reported greater likelihood to engage in the health risk behaviours than participants in the no-shared social identity condition did. However, there was no difference between the conditions in perceived riskiness of engaging in these behaviours.

Mediation analyses

Mediation analyses using PROCESS version 3.0 (Hayes, 2017) were performed to examine whether differences in health risk perceptions could be explained by differences in

Table 2. Total, direct, and indirect effects from the mediation analyses (Study 1)

Measure	Total effect	Direct effect	Indirect effect	LLCI	ULCI
PVD	*Coeff* = –.35, *SE* = .13, *p* = .010	*Coeff* = –.21, *SE* = .13, *p* = .103	*Coeff* = –.14, *SE* = .05	–.2456	–.0437
HRBLI	*Coeff* = .38, *SE* = .12, *p* = .003	*Coeff* = .25, *SE* = .12, *p* = .037	*Coeff* = .13, *SE* = .05	.0421	.2380
HRBRI	*Coeff* = –.10, *SE* = .10, *p* = .345	*Coeff* = .04, *SE* = .10, *p* = .713	*Coeff* = –.13, *SE* = .05	–.2305	–.0473

Notes. HRBLI = likelihood of engaging in health risk behaviours; HRBRI = perceived riskiness of engaging in health risk behaviours; LLCI = lower level confidence interval; PVD = perceived vulnerability to disease; ULCI = upper level confidence interval.
Experimental condition is specified as the independent variable and perceived disgust as the mediator variable in all models.

perceived disgust between the conditions. More specifically, the analyses examined the indirect effect (mediating role) of perceived disgust in the relationship between shared social identification and health risk perceptions.[7] Condition was entered as the independent variable (*X*), health risk perception (Model 1 = perceived vulnerability to disease; Model 2 = likelihood of engaging in health risk behaviours; Model 3 = perceived riskiness of engaging in health risk behaviours) as the dependent variables (*Y*) and finally perceived disgust as the mediator (M) in the model. As condition was coded on *X* using a single unit difference (no-shared social identity condition = 1, shared social identity condition = 2), the direct and indirect effects can be interpreted as mean differences on *Y* (Hayes, 2017). The three mediation models were tested using 5,000 bootstrap resamples and 95% percentile bootstrap confidence intervals; the indirect effects are considered statistically significant if zero is not within the confidence intervals. Country, age, and gender were entered as covariates in all models. The total, direct, and indirect effects from the models are shown in Table 2.

The direct effects show that participants allocated to the shared social identity condition reported greater likelihood to engage in health risk behaviours than participants allocated to the no-shared social identity condition. The direct effects onto perceived vulnerability to disease and riskiness of engaging in health risk behaviours were not significant. Examining the indirect effects reveals that differences in health risk perceptions between the conditions could be explained by differences in perceived disgust. More specifically, the reporting of lower health risk perceptions (i.e., lower perceived vulnerability to disease and perceived riskiness of engaging in health risk behaviours, and greater likelihood of engaging in health risk behaviours) in the shared social identity condition was indirect and mediated via perceived disgust.

Discussion

This study set out to examine whether the experience of sharing a social identity in a psychological crowd lowers health risk perceptions via lowered disgust. The results showed that participants who recalled a crowd in which they experienced a shared social identity reported lower perceptions of disgust and health risks compared to participants

[7] *The direct effect does not need to be significant to establish mediation – it is the indirect effect that denotes mediation (referred to as 'indirect-only mediation', see Zhao, Lynch, & Chen, 2010).*

who recalled a crowd in which they did not experience a shared social identity. The results also showed that the effect of sharing a social identity on lowered health risk perceptions was mediated by lowered perceived disgust. Albeit retrospective in nature, the study offers a preliminary empirical basis for how sharing a social identity in mass gatherings can undermine health risk perceptions through lower levels of disgust.

One limitation of this research is that it was a vignette study and relied upon retrospective judgements. People tend to view the past through rose-tinted glasses. That is, their recollection of an event is often more positive than their actual experience at the event ('rosy view'; Mitchell, Thompson, Peterson, & Cronk, 1997), and positive affect associated with the event fades slower than negative affect ('fading affect bias' (FAB); Ritchie *et al.*, 2015). According to FAB, positive experiences elicit positive affect when recalled, whereas negative experiences elicit less negative affect when recalled (Skowronski, Walker, Henderson, & Bond, 2014). By the same logic, it is possible that participants who recalled an event in which they had experienced a shared a social identity, and thereby greater positive affect (Hopkins *et al.*, 2016), were more likely to have experienced positive affect during the recall of the event. They may subsequently have reported lower perceived disgust and susceptibility to health risks than they actually perceived at the event. This prompted the second study examining the same processes in a sample of participants that had recently attended a music festival. That is, participants in Study 2 were asked to recall their experiences of the same type of crowd event in the recent past (i.e., a music festival within the last 4 weeks) rather than any type of crowd event at any time in the past.

STUDY 2

Method

Design and sample

Study 2 employed a cross-sectional survey. Participants ($N = 148$) from the United Kingdom who had recently (within 4 weeks of completing the study) attended music festivals in the United Kingdom were recruited via the crowdsourcing platform Prolific (www.prolific.ac). The sample was drawn from the United Kingdom as it enabled administration of the survey in English and because the authors had greater knowledge of the music festivals organized in the United Kingdom and their respective timings. The study was launched during a time-period (mid-July) when multiple music festivals in the United Kingdom had either recently taken place, were ongoing, or about to commence. The 4-week cut-off point was specified to enable recruitment from a large pool of music festival attendees to maximize the possibility that an optimal sample size could be reached. Furthermore, studies have demonstrated that people tend to be able to recall events accurately within 4-week timeframes (e.g., Budge, Sognikin, Akosa, Mathieu, & Deming, 2016; Valuri, Stevenson, Finch, Hamer, & Elliott, 2005; Weinfurt *et al.*, 2014). Participants were presented with a survey in the survey tool Qualtrics (www.qualtrics.com) and were first asked to report which music festival they had attended most recently and when they had attended the festival. Participants were subsequently prompted to complete the study measures in relation to the music festival they reported having attended most recently (e.g., 'Thinking about [music festival], please indicate the extent to which you agree with the following statements'). The study measures were counterbalanced whereby the placement of measures assessing health risk perceptions and perceived disgust were, at random, presented either before or after the measure of shared social identity.

Responses from 220 participants were originally collected, but 72 participants were removed as: (1) seven completed less than 50% of the survey; (2) one completed the survey from an IP address outside the United Kingdom; and (3) 64 had not attended a music festival within 4 weeks of completing the study. Of the final sample (N = 148), 50 participants were male (33.8%), 97 were female (65.5%), and one participant (.7%) defined themselves as 'Other'. Ages ranged from 18 to 64 years (M = 33.76, SD = 11.50). It was estimated that a minimum of 78 participants would be required to achieve 80% power in case the magnitudes of the relationships in the planned percentile bootstrap mediation models were medium in size (α = .39; β = .39; Fritz & MacKinnon, 2007). Ethical approval was obtained from Keele University's Ethical Review Panel (ERP3155); all participants gave their informed consent prior to their participation.

Measures

The same measures used in Study 1 were administered, with a slight alteration in that crowd members were referred to as 'festival-goers'. Furthermore, while the shared social identity measure served as a manipulation check in Study 1, it was included as a predictor variable in Study 2.

Measurement properties

Confirmatory factor analyses (CFAs) with maximum likelihood estimation were conducted in two steps. The first step involved examining whether the factor structures from the exploratory factor analyses (Study 1) of the respective measures could be supported. The second step involved examining the measures in a single model to ensure that the dimensionality and discreteness of the respective measures could be supported. The comparative fit index (CFI), the standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) were used to evaluate model fit. Values above .90 for the CFI and below .10 for the SRMR and RMSEA indicate acceptable fit – for an evaluation of the fit indices, see Hu and Bentler (1999) and Schermelleh-Engel, Moosbrugger, and Muller (2003). All models exhibited acceptable to good fit (CFI ranged from .914 to 1.000; SRMR .010 to .083; and RMSEA .000 to .093), with only slight modifications (i.e., a total of four within-measure error correlations were specified due to overlap in item content (Byrne, 2010).[8]

Analysis plan

Similar to Study 1, the main analysis involved conducting mediation analyses to examine whether perceived disgust would mediate the relationship between shared social identity and health risk perceptions.

Results

Descriptive statistics, reliability analyses, and correlations

Table 3 presents descriptive statistics, Cronbach's alphas, and correlations.

[8] *CFA model diagrams and respective fit indices are provided in the supporting information (SI6): https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163*

Mediation analyses

Mediation analyses using PROCESS version 3.0 (Hayes, 2017) were performed to examine whether shared social identity had an indirect effect on health risk perceptions via perceived disgust. Shared social identity was entered as the independent variable (*X*), health risk perception (Model 1 = perceived vulnerability to disease; Model 2 = likelihood of engaging in health risk behaviours; Model 3 = perceived riskiness of engaging in health risk behaviours) as the dependent variable (*Y*) and finally perceived disgust as the mediator (M) in the models. The three mediation models were tested using 5,000 bootstrap resamples and 95% percentile bootstrap confidence intervals with age and gender entered as covariates. The total, direct, and indirect effects from the models are shown in Table 4.

The results mirror those of Study 1. The direct effects show that greater shared social identification was associated with greater likelihood to engage in health risk behaviours. The direct effects of perceived vulnerability to disease and perceived riskiness of engaging in health risk behaviours were not significant. Turning to the indirect effects, the results show that perceived disgust mediated the relationship between greater shared social identification and lowered health risk perception. More specifically, the reporting of lower health risk perceptions (i.e., lower perceived vulnerability to disease and perceived riskiness of engaging in health risk behaviours, and greater likelihood of engaging in health risk behaviours) was indirect and mediated via perceived disgust.

Discussion

This study examined the effect of experiencing a shared social identity with other crowd members on health risk perceptions in a sample of participants who had recently attended music festivals. The findings corroborate those of Study 1 and provide further empirical evidence that experiencing a shared social identity in mass gatherings may lower health risk perceptions via lower levels of perceived disgust. They also extend them by drawing on a sample of participants who have very recently attended a specific type of mass gathering – music festivals.

Table 3. Cronbach's alphas, means, standard deviations, and correlations (Study 2)

	Measures				
	SSI	PD	PVD	HRBLI	HRBRI
M (SD)	5.28 (1.28)	4.37 (1.26)	4.22 (1.00)	3.40 (0.90)	2.45 (0.83)
α	.92	.87	.66	.72	.79
Measure	*r*	*r*	*R*	*R*	*r*
SSI		–.28**	–.20*	.35**	–.06
PD			.42**	–.51**	.44**
PVD				–.40**	.34**
HRBLI					–.40**
HRBRI					

Notes. HRBLI = likelihood of engaging in health risk behaviours; HRBRI = perceived riskiness of engaging in health risk behaviours; PD = perceived disgust; PVD = perceived vulnerability to disease; SSI = shared social identity.

*p <.05; **p < .01.

Table 4. Total, direct, and indirect effects from the mediation analyses (Study 2)

Measure	Total effect	Direct effect	Indirect effect	LLCI	ULCI
PVD	*Coeff* = –.14, *SE* = .06, *p* = .027	*Coeff* = –.06, *SE* = .06, *p* = .316	*Coeff* = –.08, *SE* = .03	–.1566	–.0286
HRBLI	*Coeff* = .24, *SE* = .05, *p* < .001	*Coeff* = .15, *SE* = .05, *p* = .003	*Coeff* = .08, *SE* = .03	.0346	.1383
HRBRI	*Coeff* = –.04, *SE* = .05, *p* = .507	*Coeff* = .04, *SE* = .05, *p* = .382	*Coeff* = –.08, *SE* = .03	–.1416	–.0317

Notes. HRBLI = likelihood of engaging in health risk behaviours; HRBRI = perceived riskiness of engaging in health risk behaviours; LLCI = lower level confidence interval; PVD = perceived vulnerability to disease; ULCI = upper level confidence interval.
Shared social identity is specified as the independent variable and perceived disgust as the mediator variable in all models.

GENERAL DISCUSSION

The research reported herein examined the effect of sharing a social identity in mass gatherings on perceived disgust and health risk perceptions. The results from two studies evidenced that experiencing a shared social identity with other crowd members lowered health risk perceptions; this effect was indirect and mediated via perceived disgust. That is, participants who experienced a shared social identity reported lower health risk perceptions because they also perceived less disgust.

While previous research has focused on physical factors in relation to health risks associated with mass gatherings, recent directives and theory highlight the importance of understanding the role of psychological factors in aggravating and mitigating the risks (Hopkins & Reicher, 2016, 2017; WHO, 2015). The current research complements and goes beyond existing research concerning mass gathering-associated health risks (e.g., Abubakar *et al.*, 2012; Memish *et al.*, 2012) by providing initial empirical evidence as to how social identity processes lower health risk perceptions. The research thus offers empirical evidence in support of theorizations about how health risk perceptions in mass gatherings are entwined in social identity processes (Hopkins & Reicher, 2016, 2017).

The findings make two important contributions to the literature. First, the findings reveal that social identity processes may also result in negative health outcomes in mass gathering settings – a phenomenon that has primarily been observed in relation to unhealthy group norms in small group settings (e.g., Tarrant & Butler, 2011). Specifically, the findings show that, similar to group members' underestimation of the risk posed by unhealthy group norms (e.g., Campbell & Stewart, 1992), experiencing a shared social identity in mass gatherings lowers health risk perceptions. Second, the findings elucidate how lowered perceived disgust underpins this negative relationship in the context of mass gatherings; this extends previous research that has shown that sharing a social identity lowers disgust responses (Reicher *et al.*, 2016) and research that has linked disgust sensitivity to heightened health risk perceptions (Karg *et al.*, 2018). The findings pose concerns for the management of mass gatherings; lowered disgust amongst crowd members could facilitate disease transmission by encouraging resource sharing (Pellerin & Edmond, 2013; Reicher *et al.*, 2016) or other practices likely to be affected by an attenuated disgust response. If this defence mechanism against pathogens is attenuated, people may be less vigilant in situations where disease transmission is a risk, which could have serious health consequences (see Hopkins & Reicher, 2016, 2017).

The findings highlight the relevance of considering social identity processes in the planning and management of mass gathering events. Preliminary evidence indicates that drawing on social identity processes can increase the effectiveness of health messages (e.g., anti-smoking ads targeting peer groups with which adolescents identified improved their smoking attitudes; Moran & Sussman, 2014). For example, making salient 'health-aware' and 'care-taking' social identities that protect fellow crowd members' health and discourage health risk behaviours is an effective strategy. That is, health messages could encourage event attendees to consider the degree to which their behaviour may not only affect their own health but also that of their fellow crowd members with whom they identify. Furthermore, associating unhealthy behaviours with an outgroup can lead people to make healthier choices (e.g., linking alcohol consumption to an outgroup reduced consumption amongst undergraduate students; Berger & Rand, 2008). For example, drug testing facilities at music festivals reduce the risks associated with recreational drugs (Hollett & Gately, 2019; Mema *et al.*, 2018), and failure to utilize these facilities could be portrayed as non-normative behaviour unrepresentative of the typical festival-goer. Moreover, targeting social categories (and thereby social identities) representing prototypical frequenters may also prove to be an effective strategy; it has been suggested that communication that makes salient an individual's social identity as a member of a specific group motivates them to act in accordance with the group prototype (Comello, 2013; Comello & Farman, 2016).

There are several limitations to this research that also need to be highlighted. Although Study 2 addressed the limitations of Study 1 in terms of attendance recency, future research should involve field-based studies. For example, collecting data within an ongoing mass gathering event to capture attendees' experiences of sharing a social identity and perceptions of health risks may reduce memory distortions (e.g., see FAB; Ritchie *et al.*, 2015). In addition, the current research did not examine whether the negative relationship between sharing a social identity and health risk perceptions is universal amongst different types of mass gatherings. Normative health-related behaviour will differ depending on the nature of the mass gathering. For example, music festivals are known for (unprotected) sex, alcohol consumption, and drug use (WHO, 2015) – these behaviours are unlikely to be endorsed at religious mass gathering events (e.g., the Magh Mela and Hajj) wherein resource sharing may present more acute risks. Future research would therefore benefit from more fine-grained examinations of differences in normative practices harmful to health between different types of mass gathering events. Moreover, only perceived disgust was considered as a mediator of the relationship between shared social identification and health risk perceptions in mass gatherings. Future research should identify additional mechanisms that underpin the relationship between sharing a social identity and health risk perceptions and behaviours. Given that crowd members who share a social identity expect and receive social support from one another (Alnabulsi & Drury, 2014; Drury, Cocking, & Reicher, 2009b; Hopkins *et al.*, 2019; Khan *et al.*, 2015; Pandey *et al.*, 2014), and that this can enhance well-being (Khan *et al.*, 2015), it is not unreasonable to assume that this relational transformation may lessen concerns about the negative consequences of health risk behaviours. For example, festival-goers may underestimate the risk of using recreational drugs as they feel safe and supported by other crowd members and expect to receive their support if something goes astray. The implications of social support on health-related perceptions and behaviours in mass gatherings are therefore contextual – it can be a cure in one context, but a curse in another (see Haslam, Jetten, Cruwys, Dingle, and Haslam (2018) and Wakefield, Bowe,

Kellezi, McNamara, and Stevenson (2019) for overviews of the 'social cure' versus 'social curse' paradigm).

The present research has provided empirical evidence that shared social identification may undermine health risk perceptions in mass gatherings; it has also unveiled a mechanism through which this negative relationship operates – lowered perceived disgust. These findings have important implications for understanding how social identity processes may aggravate health risk behaviours in mass gatherings. By the same token, the exact same processes can be drawn upon to mitigate health risk behaviours in mass gatherings. Finally, it is important to emphasize that the research does not intend to portray social identity processes as uniquely exacerbating health risks in mass gatherings. The health benefits associated with collective participation (Cruwys *et al.*, 2019; Khan *et al.*, 2015) should not be neglected. Rather, the present research should be seen as contributing to efforts to understand the nature and scope of social identity processes in aggravating and mitigating health risks in mass gatherings (e.g., Hopkins & Reicher, 2016; WHO, 2015).

Data availability statement

The data that support the findings of this study are openly available in the Open Science Framework at https://osf.io/yd3gz/?view_only=fdd81faa144d4513bd9d28bddf9fc163

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