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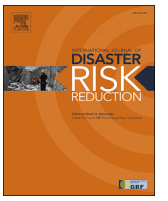

Social norms and risks at mass gatherings: A systematic review

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ABSTRACT

Mass gatherings pose a set of serious health risks to attendees. Yet, the risks at mass gatherings have not been systematically reviewed and categorised, and there has been a lack of research on the role of social norms in shaping risks. This systematic review aimed to identify the types of risks and their prevalence at each type of mass gathering and to evaluate whether social norms are considered in the mass gatherings literature. We conducted our review following the PRISMA checklist and searched the literature comprehensively in May 2021 via six electronic databases: MEDLINE, PubMed, Web of Science, Scopus, PsycINFO, and CINAHL Plus. Articles were included if they met our inclusion criteria in the five domains: population, mass gatherings, risks, methods, and studies characteristics. The review included 183 articles about more than 83 mass gatherings in 42 countries. There were four types of planned mass gatherings: religious, sporting, music festivals, and other/cultural festivals, and four main types of risks: health, behavioural, environmental, and other/mental health risks. Social norms were mentioned in 5 articles. This is the first comprehensive systematic review of the literature regarding risks at mass gatherings with a specific focus on the role of social norms in shaping risks. Each mass gathering poses different types of risks depending on the nature of the event, and social norms can partially explain this. However, social norms are minimally considered in the literature and further studies about the role of identity-related norms in shaping risks at mass gatherings are needed.

1. Introduction

Mass gatherings pose a set of health risks to participants [1], requiring organisers to make intense efforts to ensure the safety of attendees at the events. Yet, the underlying factors in shaping risks at mass gatherings remain unclear. Therefore, understanding where and what the risks are, and what factors shape them is essential to mitigate the risks and enhance the safety of mass gatherings. Mass gatherings can be either unexpected events, such as spontaneous protests and riots, or planned events that occur frequently and bring together large groups of people for a common purpose at a particular location for a defined period of time, such as religious pilgrimages and sporting events [1].

These mass gatherings pose a set of infectious health risks, including respiratory, gastrointestinal, and sexually transmitted infections [2,3], and non-infectious health risks, such as cardiovascular diseases, traumatic injuries, and alcohol and drug-related illnesses [4]. Structural/environmental features of mass gatherings can contribute to these risks. Overcrowding and close physical proximity between attendees can increase the acquisition and transmission of infections at mass gatherings [3,5], whereas the mere exposure to extreme environmental temperatures during mass gatherings can increase the likelihood of non-infectious health risks [4], such as heat-related illnesses [6].

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Attendees' behaviours can also increase the prevalence of health risks at mass gatherings. For example, being carefree at music festivals may encourage attendees to engage in unprotected sex, which can increase sexually transmitted infections [7]. Likewise, the norm of head-shaving at the Hajj encourages pilgrims to share razors, which can increase blood-borne infections [8]. Other behaviours, such as seeking more close physical proximity with others at festivals [9] can increase the spread of infections, and enduring harsh environmental conditions to show religious devotion [10] can increase non-infectious health risks at religious mass gatherings.

Therefore, both physical factors and attendees' behaviours can increase the health risks associated with mass gatherings. However, each type of mass gathering poses different types of risks [4], such as the risks religious mass gatherings pose compared to music festivals [3].

1.1. Social-psychological factors in risk-taking at mass gatherings

Although previous research focused on the physical factors associated with shaping risks at mass gatherings, many neglect the impact of social-psychological factors in risks [11–14], which the WHO [1]recently emphasized as important when managing planned mass gatherings to mitigate risks and ensure safety. Social-psychological factors are unique and fundamentally different from physical factors in two main ways. First, social-psychological factors can underpin physical factors, which is one of the reasons crowd behaviours differ across different types of mass gatherings. For example, behaviours of some music festivals' attendees are characterised by the norms of excess (e.g., smoking, drugs, and alcohol consumption), whereas pilgrims' behaviours at religious mass gatherings are characterised by the norms of abstention [12]. In turn, these variations pose health risks specific to each event [15]. Second, understanding crowd behaviours leads to a comprehensive understanding of the physical factors associated with shaping different risks at mass gatherings [13]. For example, understanding why people endure harsh environmental conditions [10] or seek more physical proximity to other attendees [9] leads to understanding how physical factors shape infectious and non-infectious health risks at mass gatherings.

Understanding how social-psychological factors can be inherent in shaping mass gatherings-associated health risks is feasible through the lens of the social identity approach (see Ref. [16] which consists of Social Identity Theory [17] and Self-Categorization Theory [18]. The social identity approach proposes that people's self-concept is derived from a sense of self-definition in terms of their personal identity as a unique individual distinct from others, and social identities as members of social groups. When the social identity is salient at mass gatherings, people subjectively define themselves in terms of their membership in the social group (e.g., Hajjis, festivals-goers, and football fans). Social identities, therefore, are a way of psychologically categorising the self and others into social groups [19].

When people identify themselves and others in terms of a social group, they experience numerous psychological transformations [12]. People experience a cognitive transformation as they internalize their group's norms and values [19], and shift from acting in terms of their personal beliefs to acting on the basis of shared social beliefs, norms, and values [12,13,15]. People, in addition, experience a relational transformation towards their fellow group members (the ingroup) who are no longer seen as other (the outgroup) and are expected to share similar beliefs, values, and norms [12,13,15]. As a consequence of the social identification, attendees will be more likely to trust, respect, support, and seek agreement with their fellow group members [15]. To the degree that people identify themselves as group members, their behaviours become underpinned by their social identity [13]. Previous research from social psychology indicates that these cognitive and relational transformations underpin crowd behaviours at mass gatherings and are critical to understanding how and why health risks may occur (for a review, see Ref. [14].

At a conceptual level, there is a distinction between physical crowds, in which people are co-present in the same place at the same time without a meaningful sense of social connection (e.g., shoppers at the mall), and psychological crowds, in which people are gathered for a common purpose, such as performing religious rituals at the Hajj, and feel a part of the same group (e.g., we are Hajjis) [20].

1.2. The positive and negative health consequences of identification

Identifying as a member of the group at mass gatherings has both positive and negative health implications. Social identification increases cooperation, social support, respect, and trust among group members [21–23]. It also leads people to seek closer physical proximity to their fellow group members [9]. Furthermore, in a study about perceived safety among crowd density, individuals with a high level of social identification with the crowd felt safer in high densities, whereas those with a low level of social identification felt less safe [24].

Evidence from previous research suggests that social identification and shared social identity with others at mass gatherings can have positive health outcomes. Social identification improved self-reported mental health over time, particularly for strongly identifiers with other people at the mass gathering [25], and shared social identity with others at mass gatherings improved subjective health over time (i.e., increased self-assessed health: physical health, state of mind, and energy levels, and reduced symptoms of ill-health), intimacy, and supportive social relationships [26].

However, social identification with others at mass gatherings can also have negative health implications. For example, people primed to socially identify with others in the crowd reported perceiving lower health risks compared to those who were not primed to socially identify with others [27]. This relationship was mediated by decreased disgust toward fellow group members. Similarly, in a field study conducted at the Schoolies Festival in Australia, social identification was associated with increased trust among the group members and decreased health risk perceptions of attended the mass gathering [28]. Therefore, a higher social identification reduces disgust towards fellow group members and increases trust in fellow group members, which lowers health risk perceptions that, in turn, increases the likelihood of engaging in risk-taking behaviours at mass gatherings. Entwined with this are the specific social norms associated with different events.

1.3. Social norms at mass gatherings

Crowd behaviours vary from one mass gathering to another as a function of the salient social identity [29]. When people identify themselves as group members, their behaviours become motivated by the social norms associated with their social identity [11]. Social norms are shared beliefs among group members that describe the appropriate ways of thinking, feeling, and behaving in a specific social context [30]. People perceive their group's norms when they interact with their fellow group members [12]. They perceive what most people in their group do as acceptable and typical behaviour (descriptive norms) and what people in their group ought to do as appropriate and approved behaviour (injunctive norms) [31,32]. Thus, the degree to which people identify as members of the group at the mass gathering, they behave based on their perceptions of the prototypical group norms [12,15].

Each mass gathering is different in terms of the identity-related norms that can be associated with shaping health risks [11,14]. First, norms can impact health risks via positively encouraging general norm-compatible behaviours. For example, being carefree at music festivals may encourage risky behaviours such as unprotected sex, which can increase the likelihood of sexually transmitted infections [7]. Second, norms can impact health risks via positively encouraging specific behaviours. For example, blowing vuvuzelas (plastic blowing horns) at sporting events can generate and facilitate the transmission of respiratory aerosol [33]. Finally, norms can impact health risks by discouraging/discounting health considerations directly. For example, faithful Muslims must finish the Hajj at least once in their lives, so it is normative that some pilgrims may not hesitate to go to the Hajj or complete the Hajj even if they are infectious or are hoping for death during the Hajj [34]. These acts may threaten their own health and the health of other pilgrims [11]. Therefore, perceiving group norms can increase the likelihood of engaging in risky behaviours that negatively affects the physical health of participants at mass gatherings.

1.4. The present systematic review

A major challenge to mitigating the risks associated with mass gatherings is a lack of categorization, which makes it difficult to understand the underlying socialpsychological factors for these risks. Despite the growing evidence of how social norms may influence risks at mass gatherings, there has been no systematic review of risks at mass gatherings in relation to social norms. Therefore, we need to systematically categorise the types of risks and their prevalence at each type of mass gathering to identify their similarities and differences, and map how these relate to differing social norms. We sought to conduct a comprehensive systematic review based on the theoretical and empirical evidence of how social norms shape risks at mass gatherings [11–14,25,28]. We addressed two questions:

RQ1. What are the main types of risks discussed within the mass gatherings literature?

RQ2. What is the role of social norms in shaping risks at mass gatherings?

The overall goal is to identify the types of risks and their prevalence at each type of mass gathering and to evaluate the ability of (un)shared norms to explain the (dis)similarities of the risks thus identified. We seek to do this by narratively synthesising the types of risks and their prevalence at each type of mass gathering and examining how social norms shape risks at different mass gatherings. We hope that this review will contribute to the field of social psychology in relation to mass gatherings-associated health risks.

2. Methods

The systematic review was pre-registered on PROSPERO (CRD42021295797). The pre-registration template, protocol, tables of results, MMAT scores and instructions for the second reviewer are available on the Open Science Framework (OSF): https://osf.io/wkur7/?view_only=6db53034868d4d8da8d0ceec9da455b7.

2.1. Design

A systematic review of the literature of risks at mass gatherings was conducted following the procedures in the Preferred Recording Items for Systematic Reviews and Meta-Analyses (PRISMA) [35]. The protocol was based on the International Prospective Register of Systematic Reviews (PROSPERO) guidelines. The systematic review went through two main stages. In stage one, we identified and categorised the types of mass gatherings and the types of risks and their prevalence at each type of mass gathering. In stage two, using a narrative synthesis approach, we synthesised the types of risks, mass gatherings, and social norms, and evaluated whether the literature acknowledges the role of social norms in shaping risks at mass gatherings.

2.2. Search strategy

A search string was used to search the literature in May 2021 through the following electronic databases: MEDLINE, PubMed, Web of Science, Scopus, PsycINFO, and CINAHL Plus. The search string was based on key terms relevant to the target literature: [‘mass gathering*’ OR ‘mass event*’ OR (crowd AND ‘mass gathering health’) OR ((‘mass gathering*’ AND health) OR (‘mass gathering*’ AND medicine)) AND ‘risk*’ OR ‘risk perception*’ OR ‘risk tak*’ OR ‘hazard’ OR ‘danger’ OR ‘illness*’ OR ‘disease*’ OR ‘threat*’ OR ‘disaster*’ OR ‘injur*’ OR ‘stampede*‘]. This contained all combinations of the key terms for mass gatherings and types of risks at mass gatherings. The search string was developed for MEDLINE and then adapted for use in the other databases (i.e., through other platforms than EBSCOHost, such as Ovid for PsycINFO or changing truncations in the search string for Scopus). The date parameters of the searches were from 2000 to 2021 to review the recent developments in the literature. The searches were limited to the titles, abstracts and articles written in English due to the large number of retrieved results.

2.3. Inclusion and exclusion criteria

We created five domains that included the criteria for selecting articles in this systematic review. The full information is provided in Table 1.

2.4. Screening and eligibility assessment

All references were imported into a systematic review platform Covidence (www.covidence.org) for screening. Duplicate articles were removed at the beginning of the screening process. Then, an initial screening was carried out, based on the eligible articles' titles and abstracts. Articles that did not meet our inclusion criteria were excluded, and the remaining articles qualified for full-text assessment. We searched Google Scholar and reviewed the references sections of the included articles to identify additional potentially relevant articles.

2.5. Quality assessment

We used the Mixed Method Appraisal Tool (MMAT) [36] to evaluate the quality of the included articles and minimise the risk of bias. Examples of methodological quality criteria include 'Are there clear research questions?' and 'Do the collected data allow to address the research questions?'. The MMAT includes two screening questions and 25 methodological quality criteria (5 for each study design) with 3 responses: Yes, No, and Can't tell. For each study, an overall quality score is described in either using stars (*) or parentages (%) to increase the transparency of the results of the appraisal. The quality score for each included article is presented in Table 2.

2.6. Data extraction

We used a Microsoft Excel sheet for data extraction in which information of each article was recorded into a table containing: authors, year, country, method, sample size, type of mass gathering, type of risk, key findings, and quality score.

2.7. Data synthesis

We used a narrative synthesis approach [215] to achieve the aim of this systematic review. The narrative synthesis went through two main stages. In stage one, we categorised the final sample based on the common purposes of the mass gatherings into four main types and mass gatherings-associated risks into four main types of risks. Then we tabulated the final sample to rate the frequencies and percentages of the types of risks at each type of mass gatherings. In stage two, we evaluated whether the literature either directly or indirectly discussed how socially normative behaviours may contribute to each type of risk at mass gatherings. To do this, we identified social norms that were explicitly mentioned in the articles, beliefs and risky behaviours or religious rituals that may be social norms at the mass gatherings and increase the mass gatherings-associated risks. Finally, we narratively synthesised the types of risks, mass gatherings, and social norms to identify the role of social norms in shaping risks at mass gatherings.

3. Results

3.1. Results of the literature search

The key-term-based searches through all databases initially retrieved 2781 potential articles, which were reduced to 1281 after removing duplicates. We excluded 987 articles that did not meet our inclusion criteria based on screening their titles and abstracts, and the remaining 294 articles were determined eligible for full-text assessment, of which 169 were included in the final sample. Reviewing their references sections and searching Google Scholar revealed 29 additional articles. Of these articles, 14 met our inclusion criteria. Therefore, the final sample consisted of 183 articles (Table 2) about more than 83 mass gatherings in 42 countries. The procedures for selecting articles at each stage are displayed in Fig. 1.

Table 1
Inclusion and exclusion criteria domains.

Domain	Inclusion Criteria	Exclusion Criteria
Population	Articles were included if the primary sample was mass gatherings' participants.	Articles were excluded if the primary sample was not mass gatherings' participants, such as national population, animals.
Risks	Articles were included if they concerned any risks associated with participating in mass gatherings and affecting participants' health and well-being, such as infectious and non-infectious diseases, heat-related illnesses, alcohol-related risks, and sexual-related risks.	Articles were excluded if they did not report the risks, such as the articles about the impact of mass gatherings on hospitals or emergency departments without reporting the health risks.
Mass Gatherings	Articles were included if they concerned planned mass gatherings that occur frequently and bring together large groups of people for a common purpose at a particular location, such as religious pilgrimages and sporting events.	Articles were excluded if they were about spontaneous mass gatherings, such as riots and spontaneous protests.
Methods	Articles were included if they were original research papers and their methods were qualitative, quantitative, and/or mixed method research.	Articles were excluded if they were not original research papers, such as, systematic reviews, literature reviews, meta-analysis, editorial, book chapters etc.
Studies Characteristics	Articles were included if they were written in English, published from 2000 to 2022 and with available full texts.	Articles were excluded if they were not written in English, published before 2000, and no full-text available.

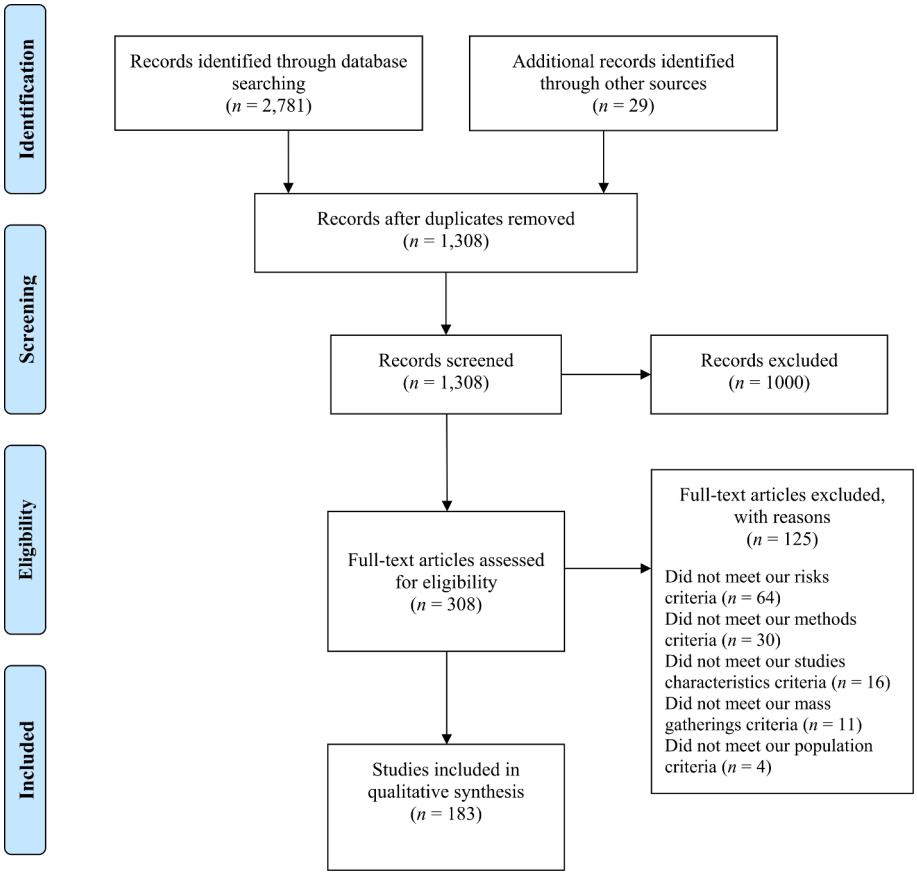

Fig. 1. Prisma flow diagram.

3.2. Quality assessment scores

Most articles employed quantitative methods (93%), followed by qualitative methods (6%), and mixed methods (1%). The final sample underwent quality appraisal using the MMAT [36], in which 91 articles (50%) were evaluated as high (total score = 4–5), 77 articles (42%) were evaluated as medium (total score = 3), and 15 articles (8%) were evaluated as low (total score = 1–2). The quality scores are displayed in Table 2.

The final sample was categorised based on the types of mass gatherings and the types of risks. Two reviewers independently reviewed a randomly selected 10% of the final sample (18 articles) for inter-reliability assessment. There was 100% agreement on the types of mass gatherings. There was an initial agreement for the types of risks on 11 articles and disagreement on seven articles. The disagreement was resolved through discussion in which the two reviewers agreed on the types of risks for 17 articles and left only one article with disagreement; Cohen's Kappa was 0.92. The instructions for the second reviewer, texts reviewed, and agreement are all included in the OSF.

3.3. Geographical distribution of mass gatherings

Geographical distribution of mass gatherings in the included articles is shown in Fig. 2. The highest number of publications on mass gatherings focused on Saudi Arabia (n = 42), which is mainly about the Hajj to Mecca, followed by Australia (n = 26), the United States (n = 26), the United Kingdom (n = 11), Iraq (n = 10), Canada (n = 9), India (n = 8), and Italy (n = 4). There were three articles on mass gatherings in Brazil, France, Germany, Japan, and Senegal. In other countries, Belgium, Greece, Iran, Mozambique, Philippines, and Switzerland, there were two articles from each. One article from the following countries: Argentina, Austria, Haiti, Jordan, South Korea, Japan, Lebanon, Mexico, Micronesia, Morocco, Netherlands, New Zealand, Norway, Pakistan, Samoa, Singapore, Solomon Islands, South Africa, Spain, Sri Lanka, Sweden and Turkey.

3.4. Types of mass gatherings

We categorised the final sample based on the common purposes of the mass gatherings into four main types, in which 79 articles (43%) were categorised as religious mass gatherings, 44 articles (24%) were categorised as sporting mass gatherings, 38 articles (21%) were categorised as music festivals, and 35 articles (19%) that were related to specific cultures or countries and did not fit into the other three categories were categorised as other/cultural festivals. The final sample consisted of 174 articles (95%) about one type

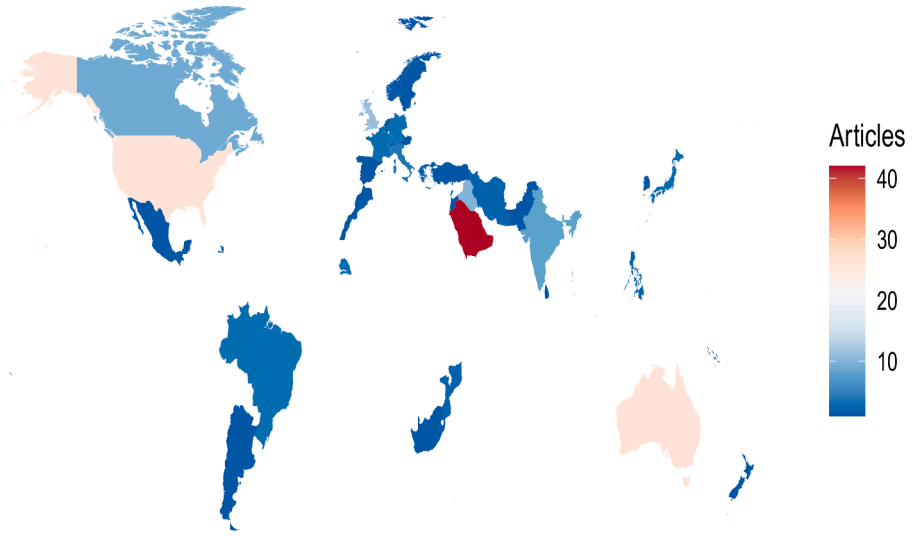

Fig. 2. Geographical distribution of mass gatherings.

of mass gathering, five articles (3%) about two types of mass gatherings, and four articles (2%) about three types of mass gatherings. Fig. 3 shows the number of articles at each type of mass gathering.

3.4.1. Religious mass gatherings

We identified 79 articles about religious mass gatherings, in which 42 articles (53%) were about the Hajj to Mecca in Saudi Arabia, eight articles (10%) were about the Arba'een pilgrimage in Iraq, five articles (6%) were about the Kumbh Mela in India, five articles (6%) were about the World Youth Day in Australia, three articles (4%) were about the Grand Magal of Touba in Senegal, three articles (4%) were about the Pope Francis's visit to the Philippines and Mozambique, and two articles (3%) were about the Sabarimala in India. The remaining 11 articles (14%) were about other religious mass gatherings, such as the Urs of Baba Farid in Pakistan and Ashura in Iraq.

3.4.2. Sporting mass gatherings

We identified 44 articles about sporting mass gatherings, in which 13 articles (30%) were about the Olympic Games, five articles (11%) were about the FIFA World Cup, three articles (7%) were about the Commonwealth Games, two articles (5%) were about the Rugby World Cup, two articles (5%) were about Rugby Match, and two articles (5%) were about the Formula One. The remaining 17 articles (39%) were about other sporting mass gatherings, such as the World Police and Fire Games (WPFG) and the EURO Football Cup.

3.4.3. Music festivals

We identified 38 articles about music festivals, in which 11 articles (29%) were about concerts, 11 articles (29%) were about electronic dance music festivals, and five articles (13%) were about outdoor music festivals. The remaining seven articles (18%) were about other music festivals, such as 'I Love Techno', 'De Nacht' (the largest indoor rave party in Europe; Van Sassenbroeck et al., 2003) and 'Open-Air Music Festival St. Gallen'.

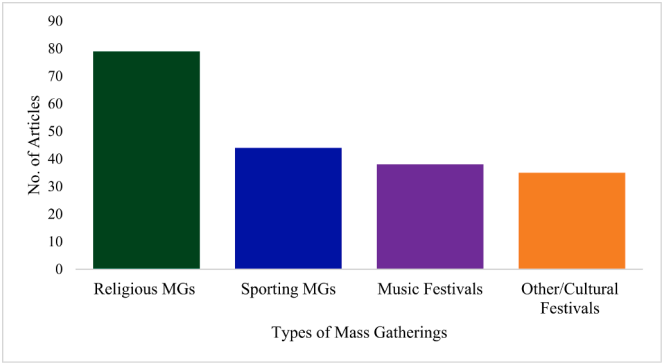

Fig. 3. The number of articles at each type of mass gatherings.

3.4.4. Other/cultural festivals

We identified 35 articles about cultural festivals, in which six articles (17%) were about Schoolies festivals in Australia, three articles (9%) were about the transformational mass gatherings (Burning Man and the Rainbow Family of Living Light [RFLL]) in the United States, and three articles (9%) were about the Royal Adelaide Show in Australia. The remaining 23 articles (66%) were about other cultural festivals, such as the 11th Festival of Pacific Arts (FOPA) and Mozambique's 9th National Cultural Festival.

3.5. Types of risks

We categorised the final sample based on the risks they discussed into four main types, in which 123 articles (67%) addressed health risks, 122 articles (67%) addressed behavioural risks, 53 articles (29%) addressed environmental risks, and 23 articles (13%) addressed other/mental health risks. The final sample consisted of 102 articles (55%) about one type of risk, 37 articles (20%) about three types of risks, 34 articles (19%) about two types of risks and ten articles (5%) about four types of risks. Fig. 4 shows the number of articles at each type of risk.

3.5.1. Health risks

We identified 123 articles addressing health risks directly affecting participants at mass gatherings, including 100 articles (81%) addressing infectious health risks, such as respiratory tract infections, and 68 articles (55%) addressing non-infectious health risks such as cardiovascular diseases.

3.5.2. Behavioural risks

We identified 122 articles addressing behavioural risks as a result of crowd behaviours, including 85 articles (70%) addressing injuries-related risks, 59 articles (48%) addressing alcohol and drug-related risks, and 10 articles (8%) addressing sexual-related risks.

3.5.3. Environmental risks

We identified 53 articles addressing environmental risks as a result of the exposure to extreme environmental conditions, including 39 articles (74%) addressing health heat-related illnesses, 9 articles (17%) addressing exposure to environmental conditions (e.g., polluted or unsafe water), 6 articles (11%) addressing cold-related illnesses, and one article (2%) addressing the risk of hearing loss caused by high music volume.

3.5.4. Other/mental health risks

We identified 23 articles addressing other risks that did not fit into the other three categories, including 19 articles (83%) addressing mental health risks, such as anxiety, low self-esteem, psychological distress, and sleep deprivation, four articles (17%) addressing neurological risks, and one article (4%) addressed the risks of the presence of ISIS during Arba'een pilgrimage in Iraq.

3.6. The types of risks at the types of mass gatherings

Table 3 shows the frequencies and percentages of the types of risks at the types of mass gatherings.

3.6.1. Health risks and behavioural risks at the types of mass gatherings

Health risks and behavioural risks were the most reported types of risks at all types of mass gatherings. While health risks were higher than other types of risks at religious mass gatherings, behavioural risks were higher than health risks and other types of risks at sporting mass gatherings, music festivals, and other/cultural festivals. However, there were some fundamental differences in the nature of risks. For example, behavioural risks at religious mass gatherings were mainly related to injuries. In contrast, those at sporting mass gatherings, music festivals, other/cultural festivals were related to alcohol and drug consumption, sexual risk-taking, and injuries. Table 4 shows the number of articles for the subtypes of health risks and behavioural risks.

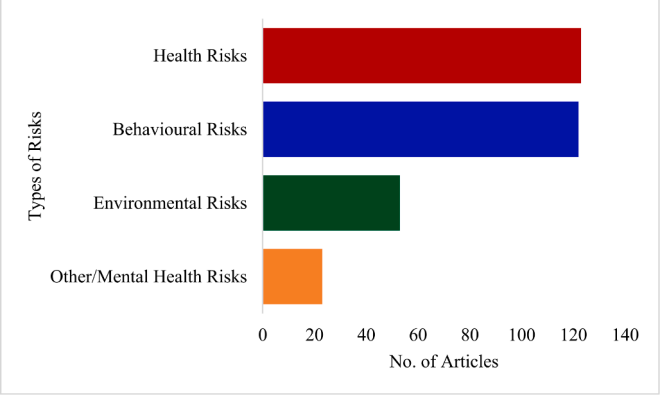

Fig. 4. The number of articles at each type of risks.

Table 3
The frequencies and percentages of the types of risks at the types of mass gatherings.

Types of Mass Gatherings	Types of Risks			
	Health Risks n (%)	Behavioural Risks n (%)	Environmental Risks n (%)	Other/Mental Health Risks n (%)
Religious mass gatherings	67 (85%)	30 (38%)	19 (24%)	7 (9%)
Sporting mass gatherings	31 (70%)	37 (84%)	19 (43%)	6 (14%)
Music Festivals	16 (42%)	36 (95%)	11 (29%)	7 (18%)
Other/Cultural Festivals	21 (60%)	30 (86%)	12 (34%)	8 (23%)
Total	135 (74%)	133 (73%)	61 (33%)	28 (15%)

Note. Most articles (n = 81) include multiple types of risks, and 9 articles were about two or three types of mass gatherings.

Table 4
The subtypes of health and behavioural risks at mass gatherings.

Types of Mass Gatherings	Health Risks		Behavioural Risks		
	Infectious n	Non-infectious n	Injuries	Alcohol and drug-related risks n	Sexual-related risks n
Religious mass gatherings	62	28	30	0	0
Sporting mass gatherings	24	20	32	18	3
Music Festivals	13	13	18	34	3
Other/Cultural Festivals	8	14	23	16	4

3.6.2. Environmental risks and other/mental health risks at the types of mass gatherings

Although environmental risks and other/mental health risks were lower than other types of risks at all types of mass gatherings, there were also some differences in the nature of risks. For example, the exposure to polluted water was reported at religious mass gatherings, whereas the risk of hearing loss due to high music volume was reported at music festivals. In Table 5, you will find the number of articles for the subtypes of environmental risks and other/mental health risks.

3.7. The role of social norms in shaping risks at mass gatherings

We identified where articles explicitly mentioned social norms, as well as beliefs, risky behaviours, and religious rituals (all of which can be social norms) that can be inherent in shaping risks at mass gatherings.

3.7.1. Religious mass gatherings

After synthesising the data, three sets of norms-related risks at religious mass gatherings were identified: norms that emerge at religious mass gatherings compatible with risk-taking, specific risky normative behaviours at religious mass gatherings, and normative dismissal of risk considerations at religious mass gatherings.

3.7.1.1. Norms that emerge at religious mass gatherings compatible with risk-taking. A single norm may increase a variety of risky behaviours that, in turn, increase the likelihood of different types of risks. Some beliefs of pilgrims at religious mass gatherings may encourage pilgrims to engage in risk-taking behaviours that, in turn, increase the likelihood of different types of risks. One of these norms is the belief that endurance shows religious devotions. For example, religious devotion to Shia and Shia saints at Arba'een pilgrimage in Iraq is signalled by enduring the route's difficulties and hardships on foot, as the pilgrims seek divine rewards while walking long distances to the shrine of Imam Hussein in Karbala [158]. This intense physical activity may increase the likelihood of musculoskeletal pain, injuries, and cardiovascular diseases that may lead to sudden death [43,72,104,135–137].

3.7.1.2. Specific risky normative behaviours at religious mass gatherings. Normative religious rituals may include specific risky behaviours associated with increasing the prevalence of health risks. For example, the normativity of bathing rituals, as an endeavour to cleanse both body and spirit, at Kumbh Mela in India encourages pilgrims to take a dip in sacred rivers (e.g., Sangam and Ganga), which are polluted and contain faecal contamination, and drink from it [57,196]. These practices may increase water pollution and the spread of infectious diseases, such as skin infection, water-borne diseases, acute respiratory infection, and acute diarrheal infection [41,58,96]. Communal bathing, communal eating, and poor hygiene are all the norms at the Kumbh Mela [196]. Similarly, the normativity of bathing rituals at Sabarimala in India encourages pilgrims to both taking a dip in a polluted river and drinking from it [156], which may increase the likelihood of water-borne diseases, gastrointestinal infections, and the outbreak of person-to-person

Table 5
The subtypes of environmental and other/mental health risks at mass gatherings.

Types of Mass Gatherings	Environmental Risks			Other/Mental Health Risks	
	Heat-related illnesses n	Cold-related illnesses n	Exposures to environmental conditions n	Mental Health n	Other Risks n
Religious mass gatherings	12	2	7	5	2
Sporting mass gatherings	16	4	0	4	3
Music Festivals	9	1	1	7	0
Other/Cultural Festivals	11	11	1	8	0

diseases [125,156]. Another example can be seen at the Nallur Kandaswamy Temple in Jaffna, where it is normative for Sri Lanka pilgrims to perform the 'side-roll' ritual that increases the likelihood of skin infections [126]. Finally, religious mass gatherings may also include behaviours that are inherently risky/dangerous, in addition to increasing the risk prevalence of disease. For example, pilgrims at Ashura in Iraq engage in self-harm practices, such as using sharp knives to create cuts on their heads and lashing their backs using knives and chains; these injuries also increase the likelihood of infection and disease spread [44].

3.7.1.3. Normative dismissal of risk considerations at religious mass gatherings. Religious mass gatherings may include norms specifically directing people to disregard health as a relevant consideration. Some beliefs at religious mass gatherings may be associated with decreasing health risk perceptions that, in turn, increase the likelihood of engaging in unhealthy behaviours. For example, the belief in destiny and fatalism may encourage pilgrims at Arba'een to participate without preparing to deal with infectious diseases (e.g., vaccination) as they are protected by Allah, which leads them to engage in unhealthy behaviours, such as the consumption of unhealthy food and drinks during their pilgrimage [127]. Similarly, being fatalistic about the risk of illnesses reduces the health risk perceptions of acute respiratory infections among elderly pilgrims at the Hajj to Mecca as they are protected by Allah against any risks to their health during the Hajj [47]. Other beliefs may encourage ill-pilgrims to seek healing by participating, which may be associated with the spread of infections. For example, the belief that visiting the shrine at the Urs of Baba Farid in Pakistan will cure ill people encourages pilgrims with various diseases to visit the shrine [106], possibly spreading diseases to others.

3.7.2. Sporting mass gatherings

Unlike religious mass gatherings, synthesising the data revealed two sets of norms-related risks at sporting mass gatherings: norms that emerge at sporting mass gatherings compatible with risk-taking, and specific risky normative behaviours at sporting mass gatherings.

3.7.2.1. Norms that emerge at sporting mass gatherings compatible with risk-taking. There may be general norms associated with risky behaviours that, in turn, increase the likelihood of different types of risks. Risky behaviours related to the normativity of alcohol and drug consumption have been identified at sporting mass gatherings. For example, at Rugby World Cup, some rugby fans engage in risky behaviours, such as drinking large quantities of alcohol (e.g., beers) [186] which may increase the likelihood of alcohol-related risks (e.g., alcohol poisoning and vomiting). The normativity of alcohol consumption was, also, associated with increased aggression and violence at Rugby Matches [152] and fights at the FIFA World Cup, which increases the likelihood of injuries [150,153]. Similar problems have been observed at the FIFA World Cup [79], the EURO Football Cup [159], and the Commonwealth Games [75].

Other norms at sporting mass gatherings may be associated with different kinds of risky behaviours, such as sexual risk-taking behaviours, that may increase the prevalence of health risks. For example, some rugby fans engage in consensual unprotected sex that might be associated with increasing the likelihood of sexually transmitted infections (STIs) [170].

3.7.2.2. Specific risky normative behaviours at sporting mass gatherings. The nature of sporting mass gatherings can also include other kinds of high-risk activities associated with increasing the prevalence of health risks. For example, participants at the Tough Guy, which is an outdoor endurance challenge course containing large obstacles, specifically attend to engage in high-risk activities as part of the event, such as climbing, swimming, and rafting, but these activities can increase the likelihood of musculoskeletal injuries [40].

3.7.3. Music festivals

Synthesising the data revealed three sets of norms-related risks that were acknowledged at music festivals: norms that emerge at music festivals compatible with risk-taking, and specific risky normative behaviours at music festivals, and normative dismissal of risk considerations at music festivals.

3.7.3.1. Norms that emerge at music festivals compatible with risk-taking. Norms related to risky behaviours that, in turn, increase the likelihood of different types of risks include alcohol and drug consumption that has been explicitly mentioned in two articles about music festivals [77,143]. This norm encourages attendees to engage in risky behaviours, such as excessive alcohol consumption, recreational drugs use [141], and the co-ingestion of alcohol and drugs [62,69,203] all of which increase the likelihood of alcohol and drug-related illnesses.

The normativity of alcohol drinking and substance use may facilitate the norm of resource-sharing in which attendees are more likely to accept and give drinks [77]. Shared drug consumption is accepted and expected [77], which may increase the spread of infections, and those who do not engage in resource-sharing may be viewed as suspicious by others [77].

Similar to sporting mass gatherings, other norms may be associated with different kinds of risky behaviours, such as sexual risk-taking behaviours, that may increase the likelihood of different types of risks at music festivals. For example, engaging in unprotected sex [143] which may increase the likelihood of sexually transmitted infections.

3.7.3.2. Specific risky normative behaviours at music festivals. The environment of music festivals can include other kinds of risky behaviours associated with increasing the prevalence of health risks. For example, moshing, a violent style of dancing involving physical contact, was associated with increasing the likelihood of injuries at music festivals [120,122,148,149].

3.7.3.3. Normative dismissal of risk considerations at music festivals. Music festivals may include norms specifically directing people to disregard health as a relevant consideration. For example, music festivals are characterised by high music volume. The exposure to excessively high music volume is risky, but some attendees may demand it, increasing the risk of music-induced hearing loss [195].

3.7.4. Other/cultural festivals

Similar to music festivals, synthesising the data revealed two sets of norms-related risks that were acknowledged at other/cultural festivals: norms that emerge at other/cultural festivals compatible with risk-taking, and specific risky normative behaviours at other/cultural festivals.

3.7.4.1. Norms that emerge at other/cultural festivals compatible with risk-taking. Some norms that occurred at events which were associated with risky behaviours were acknowledged at other/cultural festivals, including alcohol drinking, resource-sharing, and sexual risk-taking behaviours [25,28]. For example, alcohol and drug consumption became prevalent among attendees of Schoolies festivals, which may encourage attendees to engage in risky behaviours such as excessive alcohol consumption, a mix of alcohol and drugs [216], and alcohol and drug misuse [124]. These risky behaviours may increase the likelihood of alcohol and drug-related illnesses [74]. Another example of risky behaviours related to alcohol and drug consumption can be seen at the Rainbow Family of Living Light (RFLL), in which some attendees engage in binge drinking and recreational drug use [66]. Even at other outdoor festival events celebrating the lesbian, gay, bisexual, and trans (LGBT) community, attendees engage in alcohol consumption and recreational drug use that increases drug and ethanol intoxication [50,204].

Similar to music festivals, the normativity of alcohol and drugs consumption may facilitate resource-sharing, in which attendees tend to accept and give drinks at Schoolies festivals [25,28] that may increase the spread of infections.

Similar to sporting mass gatherings and music festivals, other norms may be associated with sexual risk-taking behaviours at other/cultural festivals, such as having sex with multiple partners that was measured as a descriptive norm at Schoolies festivals [25] and identified at transformational festivals (Burning Man), in which participants engage in unprotected sex with someone they met at the event [60] that may increase the likelihood of different types of risks at other/cultural festivals.

3.7.4.2. Specific risky normative behaviours at other/cultural festivals. Similar to sporting mass gatherings, the nature of other/cultural festivals may include other high-risk activities that increase the prevalence of health risks. For example, attendees at agricultural shows are expected to engage in high-risk activities, such as show jumping and wood chopping [73,160] that may increase the likelihood of injuries. Another example can be seen at the Suwa Onbashira Festival in Japan, where attendees ride logs down steep slopes, which increases the likelihood of injuries [205].

4. Discussion

This is the first comprehensive systematic review of the literature about risks at mass gatherings that has a specific focus on the role of social norms in shaping risks. The initial objective of the review was to identify the types of risks and the prevalence of each at each type of mass gathering and to identify whether the literature acknowledges the role of social norms in shaping risks. The synthesis of the 183 included articles indicated four types of planned mass gatherings: religious, sporting, music festivals and other/cultural festivals; the Hajj to Mecca in Saudi Arabia was the most thoroughly studied planned mass gathering. The synthesis also indicated four main types of risks: health, behavioural, environmental, and other/mental health risks. While health risks were higher at religious mass gatherings than other types of risks, behavioural risks were higher than other types of risks at sporting mass gatherings, music festivals and other/cultural festivals. However, environmental, and other/mental health risks were lower than other types of risks at all types of mass gatherings.

Despite identifying key types of risks that were prevalent across all mass gatherings, there were fundamental differences in the nature of risks that can be partially explained by differences in norms. For example, behavioural risks at religious mass gatherings were mainly related to injuries, whereas the behavioural risks at sporting mass gatherings, music festivals and other/cultural festivals were related to alcohol and drug consumption, sexual risk-taking and injuries. These results are consistent with previous research in social psychology [12,15,29] that have shown how the variations among attendees' behaviours are characterised by the norms, such as excess (i.e., smoking, drugs and alcohol consumption) at music festivals and abstention at religious mass gatherings, that in turn pose health risks specific to each event. Additionally, the results are in line with previous research in the literature of mass gathering medicine (e.g. Refs. [3,4], and social psychology [11,14], in which each mass gathering – rather than a specific type of mass gathering – poses different types of risks depending on the nature of the event. One reason for the variations in the risk-taking that was identified in some of the reviewed articles, which is consistent with research in social psychology, is social norms.

This systematic review uncovers a major gap in the literature of risks at mass gatherings in relation to social norms. As indicated by the synthesis, only five articles explicitly mentioned the norms [25,28,77,143,196], whereas other articles mentioned the attendees' beliefs (e.g. Refs. [47,106,127,158], or risky behaviours and religious rituals that may shape different types of risks at mass gatherings (e.g., Refs. [44,57,126,156,196]. Since there is no clear evidence in the included articles – as they did not measure social identities or state the importance of the identity-related norms – we discuss and interpret the findings here using evidence from research in social psychology.

According to social identity theory [17], established social groups have definitions of what it means to be a member of that group, and what beliefs and actions are normative. These identities can serve as a prism through which phenomena at mass gatherings are interpreted.

The findings indicated some norms associated with risky behaviours that increase the likelihood of different types of risks. For example, the norm of alcohol and drugs consumption (e.g. Refs. [77,143], was one of the reasons for the high percentage of alcohol and drug-related risks at music festivals. In line with previous research from social psychology, the norm of alcohol and drugs consumption may encourage attendees to engage in risk-taking behaviours that, in turn, increase different health risks [13,217]. When the social norms value risk-taking, people are more likely to express their group membership (social identity) with others at the event by en-

gaging in risky behaviours to show that they are part of the group [218]. Therefore, engaging in the norm of alcohol and drug consumption compatible behaviours is a way of affirming/confirming their shared social identity with others at music festivals [217].

Other articles indicated the normativity of resource-sharing at music festivals and other/cultural festivals in which attendees accept and expect sharing drinks (e.g. Refs. [25,28,77], that may increase the likelihood of different types of risks. These findings are consistent with the literature of social psychology that has shown how the norm of resource-sharing, such as sharing water bottles [27] or accepting and giving drinks [25,28] may facilitate the spread of diseases at mass gatherings [11]. The riskiness of resource-sharing varies from one mass gathering to another because what is shared depends on the norms of the mass gathering [14]. For example, sharing drink bottles is normative at festivals, whereas sharing razors for head-shaving is normative at the Hajj [11,12].

The findings indicated specific risk-taking behaviours associated with health risks. For example, having sex with multiple partners has been reported in two articles at other/cultural festivals [25,60]. Previous research in social psychology has shown how a general sort of norm, such as being carefree encourages attendees to engage in unprotected sex [11,14]. Participating at (music) festivals to enjoy and being free from responsibilities encourages attendees to engage in sexual risk-taking behaviours [217]. Therefore, a sense of being carefree and adventurous at mass gatherings may encourage risk-taking behaviours (e.g., unprotected sex), increasing different types of risks [11,14].

Other articles indicated specific risk-taking behaviours associated with normative religious rituals at religious mass gatherings that may shape different types of risks. Examples include bathing rituals at Kumbh Mela [57,196], and the side-roll ritual at the Hindu festival in Sri Lanka [126]. The social identities at religious mass gatherings shape the normativity of these practices in which pilgrims will engage in risk-taking behaviours to express this identity [217]. For example, although the normativity of religious practices may result in health-related risks at religious mass gatherings, pilgrims may interpret their symptoms as a sign of divine rewards in terms of their faith because of their social identities [11,14].

However, while religious rituals might be associated with risky behaviours, there were some risky behaviours identified in the included articles at other types of mass gatherings, such as moshing at music festivals that lead to an increased likelihood of injuries [120,122,148,149]. Evidence from previous research in social psychology has established that attendees may engage in unhealthy norms (e.g., moshing) due to the normative pressure [217]. Furthermore, the desire to be in close physical proximity to members of the same group (for examples see Refs. [9,219,220] increase the likelihood of crowded mosh pits at music festivals that in turn increase the likelihood of injurers [14].

The findings indicted some norms-reinforced dismissal health considerations, particularly if the behaviours were normative. Examples of these norms include the endurance to show religious devotion to Shia and Shai saints at Arba'een foot pilgrimage, which encourages pilgrims to engage in intense physical activities (e.g., walking for long distances) [158]. This normative behaviour was associated with an increased risk of cardiovascular diseases that may lead to sudden death [72]. These findings are consistent with previous research in social psychology literature suggesting that it is normative for pilgrims to endure harsh environmental conditions to show religious devotions at Kumbh Mela [10]. The hardships increase the unity among pilgrims and strengthen shared social identity [217]. Therefore, the norm of enduring the hardships at religious mass gatherings may be a way that pilgrims expressing their sense of shared social identity with one another or being good crowd member of the religious group.

Another example is the belief of being protected by Allah against any health-related risks, which encourage pilgrims to engage in unhealthy behaviours (e.g., consuming unhealthy food) (e.g., Refs. [47,127]. Previous research from social psychology shows how it is normative to trust to faith which may lead pilgrims to engage in unhealthy practices (e.g., stop taking medications) [11]. Therefore, pilgrims at religious mass gatherings may engage in risky behaviours in terms of their belief of being protected by Allah (God) and their symptoms are signs of divine rewords [11].

The findings indicated noise (e.g., higher music volume) as one of the environmental risks associated with mass gatherings. However, previous research from social psychology suggests that noise may be experienced as pleasant – rather than a stressor – depending on the meanings to which participants attribute it [221]. For example, in an experimental study about the auditory experience at the Magh Mela, pilgrims listened longer to a sound-clip recorded in the religious festival, reported positive mood ratings, found the sound-clip more interesting and less uncomfortable compared to those who were told they listened to a sound-clip recorded in a busy city street [221]. This study was followed by a qualitative study in which pilgrims found the sound of public announcement system annoying, but not the noise of the religious music [221]. Therefore, attendees may experience and interpret the noise at mass gatherings differently and positively when it attributes to the meaning of their identity-related sounds at the event.

Therefore, the identity-related norms may have an (in)direct impact on attendees' health at mass gatherings. People tend to accept and follow the prototypical behaviours – engaging in line with the group's norms – to the degree that they identify themselves as members of the social group [11,14]. Engaging in (normative) risky behaviours may be a way of expressing/confirming their social identification with others [217], especially if the group norms value risk-taking [218], which makes it easier for them when the behaviours are expected and accepted [222].

4.1. Strengths and limitations

To the best of our knowledge, this is the first review that has novel findings about the types of mass gatherings and the types of risks and their prevalence at each type of mass gatherings from a social identity perspective. Our review has some strengths, such as having a novel methodology and findings, making contributions to interdisciplinary knowledge (e.g., mass gathering medicine and social psychology), and covering almost all types of mass gatherings and risks that have been reported in the literature of risks at mass gatherings from different disciplines (e.g., nursing, psychology, sociology, medicine, and emergency hospital).

Despite including 183 articles about many mass gatherings across the globe, there may be other articles about mass gatherings-associated risks that were not included because they did not meet our review scope or inclusion criteria as they were reported in non-

academic sources and not covered in the empirical literature (e.g., Ref. [223]. For example, despite searching for literature on stampedes, instances of stampedes are mainly reported in non-academic sources and evidence for them is exceedingly rare in the empirical literature.

However, our review has some limitations. Although we included 79 articles about religious mass gatherings, most of these articles were about three religions: Islam, Christianity and Hinduism, which means that if other religious mass gatherings took place they were not included in this review. Another limitation is that most of the included articles about music festivals and other/cultural gatherings were focused on Western countries (e.g., the United States, the United Kingdom, Canada and Australia); these limitations may reduce the generalisability of the findings. We also limited our search to articles published in English and did not include relevant articles published in other languages. Finally, only five included articles explicitly mentioned the role of social norms. Other articles did not use the term social norms when describing the behaviours as risk factors associated with shaping different types of risks. Therefore, there is a lack of evidence of whether social norms may explain the variations between the types of risks at the types of mass gatherings.

4.2. Implications and future directions

The paucity of articles addressing the role of social norms in shaping risks at mass gatherings indicates a major knowledge gap in this area. It is important that the mass gatherings medicine literature should look at literature on social identity theory. In addition to this, it is imperative that we clarify, from studies across different mass gatherings and populations, the extent to which perceived social norms are associated with shaping different types of risks at mass gatherings. Further studies investigating the role of identity-related norms in shaping risks at mass gatherings are needed. Studies should consider how attendees perceive their identities-related norms and how these may encourage them to engage in risk-taking behaviours that increase the likelihood of different types of risks at mass gatherings. That is collaborative work between researchers in mass gathering medicine and social psychology is required to investigate in depth both physical and socialpsychological factors in shaping risks at mass gatherings. Together, understanding the role of social norms in shaping risks may help in mitigating the risks and ensure attendees' safety at mass gatherings.

5. Conclusion

This review has made a contribution in identifying and categorising the types of mass gathering and the types of risks at mass gatherings. Each mass gathering poses different types of risks depending on the nature of the event review. This highlights the scarcity of studies on the role of social norms in shaping risks at mass gatherings. Only five articles explicitly mentioned the role of social norms in shaping risks at mass gatherings. More studies about the role of identity-related norms in shaping risks at mass gatherings are needed.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

I have shared the link to my data/code at the attach file step.

Acknowledgment

We thank Sam Vo for reviewing 10% of the included articles in this review.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijdrr.2023.103586.

Appendix A

Table 2
A summary of the included articles.

ID	Article	Type of MG(s)	Type of Risk(s)	Quality Score
1	[37]	Religious MG	Health Risks	High
2	[38]	Religious MG	Environmental Risks	High
3	[39]	Religious MG	Behavioural Risks	Medium
4	[40]	Sporting MG	Health Risks and Behavioural Risks	High
5	[41]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
6	[42]	Religious MG	Health Risks	High

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Table 2 (*continued*)

ID	Article	Type of MG(s)	Type of Risk(s)	Quality Score
7	[43]	Religious MG	Health Risks and Behavioural Risks	Medium
8	[44]	Religious MG	Health Risks, Behavioural Risks and Other/Mental Health Risks	Medium
9	[45]	Religious MG	Behavioural Risks	High
10	[6]	Religious MG	Environmental Risks	High
11	[46]	Sporting MG	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	Medium
12	[47]	Religious MG	Health Risks	High
13	[48]	Religious MG	Health Risks	Low
14	[5]	Religious MG	Health Risks	Medium
15	[49]	Sporting MG, Music Festival and Other/Cultural Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	Medium
16	[50]	Other/Cultural Festival	Behavioural Risks	Medium
17	[51]	Sporting MG	Health Risks and Behavioural Risks	Medium
18	[52]	Religious MG	Health Risks	High
19	[53]	Sporting MG	Behavioural Risks	Medium
20	[54]	Religious MG	Health Risks	High
21	[55]	Religious MG	Health Risks and Other/Mental Health Risks	High
22	[56]	Religious MG	Health Risks	High
23	[57]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Low
24	[58]	Religious MG	Environmental Risks	Low
25	[59]	Religious MG	Health Risks	High
26	[60]	Other/Cultural Festival	Behavioural Risks	Medium
27	[61]	Religious MG	Health Risks	High
28	[62]	Music Festival	Behavioural Risks	Medium
29	[63]	Other/Cultural Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	High
30	[64]	Religious MG	Health Risks	Medium
31	[65]	Religious MG	Health Risks, Behavioural Risks and Other/Mental Health Risks	High
32	[66]	Other/Cultural Festival	Health Risks and Behavioural Risks	High
33	[67]	Other/Cultural Festival	Health Risks and Behavioural Risks	Medium
34	[68]	Sporting MG	Behavioural Risks	Medium
35	[69]	Music Festival	Health Risks and Behavioural Risks	High
36	[70]	Music Festival and Sporting MG	Health Risks and Behavioural Risks	Medium
37	[71]	Music Festival	Behavioural Risks	Low
38	[72]	Religious MG	Behavioural Risks	High
39	[73]	Other/Cultural Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	High
40	[74]	Other/Cultural Festival	Behavioural Risks and Other/Mental Health Risks	Medium
41	[25]	Other/Cultural Festival	Behavioural Risks and Other/Mental Health Risks	High
42	[28]	Other/Cultural Festival	Behavioural Risks	High
43	[75]	Sporting MG	Behavioural Risks	High
44	[76]	Music Festival and Sporting MG	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	Medium
45	[77]	Music Festival	Behavioural Risks	High
46	[78]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	High
47	[79]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	High
48	[80]	Religious MG	Health Risks	Low
49	[81]	Sporting MG	Health Risks	Medium
50	[82]	Religious MG	Health Risks	High
51	[83]	Religious MG	Health Risks	High
52	[84]	Music Festival	Health Risks, Behavioural Risks and Environmental Risks	Medium
53	[85]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Low
54	[86]	Music Festival	Behavioural Risks	High
55	[87]	Religious MG	Health Risks	Medium
56	[88]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
57	[89]	Music Festival	Behavioural Risks	High
58	[90]	Music Festival	Health Risks, Behavioural Risks and Other/Mental Health Risks	Medium
59	[91]	Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	Medium
60	[92]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
61	[93]	Religious MG, Sporting MG and Other/Cultural Festival	Health Risks	High
62	[94]	Music Festival	Behavioural Risks	High
63	[95]	Religious MG	Environmental Risks	Low
64	[96]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Medium

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Table 2 (*continued*)

ID	Article	Type of MG(s)	Type of Risk(s)	Quality Score
65	[97]	Sporting MG, Music Festival and Other/Cultural Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	Low
66	[98]	Music Festival	Behavioural Risks	High
67	[99]	Other/Cultural Festival	Behavioural Risks and Environmental Risks	Low
68	[100]	Sporting MG	Health Risks	Medium
69	[101]	Sporting MG	Behavioural Risks	Medium
70	[102]	Sporting MG	Health Risks and Behavioural Risks	Medium
71	[103]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
72	[104]	Religious MG	Health Risks and Behavioural Risks	High
73	[105]	Sporting MG	Behavioural Risks	Low
74	[106]	Religious MG	Health Risks and Behavioural Risks	Medium
75	[107]	Sporting MG	Behavioural Risks and Environmental Risks	High
76	[108]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	High
77	[109]	Religious MG	Health Risks	Medium
78	[110]	Religious MG	Health Risks	High
79	[111]	Religious MG	Health Risks	High
80	[112]	Religious MG	Health Risks	Medium
81	[113]	Religious MG	Health Risks	High
82	[114]	Religious MG	Health Risks	High
83	[115]	Religious MG	Health Risks	Medium
84	[116]	Sporting MG	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	High
85	[117]	Other/Cultural Festival	Health Risks	Medium
86	[118]	Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	High
87	[119]	Music Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	High
88	[120]	Other/Cultural Festival	Behavioural Risks	Medium
89	[120]	Music Festival	Health Risks and Behavioural Risks	Medium
90	[121]	Sporting MG	Health Risks and Behavioural Risks	High
91	[122]	Music Festival	Behavioural Risks	Medium
92	[123]	Other/Cultural Festival	Behavioural Risks	Low
93	[124]	Other/Cultural Festival	Behavioural Risks and Other/Mental Health Risks	Medium
94	[125]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	High
95	[126]	Religious MG	Health Risks	High
96	[127]	Religious MG	Health Risks	High
97	[128]	Religious MG	Other/Mental Health Risks	High
98	[129]	Religious MG	Environmental Risks	High
99	[130]	Religious MG	Health Risks, Behavioural Risks and Other/Mental Health Risks	Medium
100	[131]	Sporting MG	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	High
101	[132]	Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	Medium
102	[133]	Religious MG	Health Risks	Medium
103	[134]	Religious MG	Health Risks	Medium
104	[135]	Religious MG	Health Risks	High
105	[136]	Religious MG	Health Risks	High
106	[137]	Religious MG	Health Risks and Behavioural Risks	Medium
107	[138]	Other/Cultural Festival and Religious MG	Health Risks and Behavioural Risks	High
108	[139]	Sporting MG and Other/Cultural Festival	Behavioural Risks	Medium
109	[140]	Music Festival	Environmental Risks	High
110	[141]	Music Festival	Behavioural Risks	High
111	[142]	Music Festival	Health Risks, Behavioural Risks, Environmental Risks and Other/Mental Health Risks	Medium
112	[143]	Music Festival	Behavioural Risks and Environmental Risks	High
113	[144]	Music Festival	Behavioural Risks	Medium
114	[145]	Music Festival	Health Risks and Behavioural Risks	Medium
115	[146]	Religious MG	Health Risks	High
116	[147]	Religious MG	Health Risks	High
117	[148]	Sporting MG and Music Festival	Health Risks, Behavioural Risks and Environmental Risks	Medium
118	[149]	Music Festival	Behavioural Risks	High
119	[150]	Sporting MG	Health Risks and Behavioural Risks	Medium
120	[151]	Religious MG	Health Risks	Low
121	[152]	Sporting MG	Behavioural Risks	High
122	[153]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
123	[154]	Religious MG	Health Risks and Behavioural Risks	High

(*continued on next page*)

Table 2 (*continued*)

ID	Article	Type of MG(s)	Type of Risk(s)	Quality Score
124	[155]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	High
125	[156]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Low
126	[157]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
127	[158]	Religious MG	Behavioural Risks and Other/Mental Health Risks	High
128	[159]	Sporting MG	Behavioural Risks	High
129	[160]	Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	High
130	[161]	Music Festival	Behavioural Risks	High
131	[162]	Music Festival	Behavioural Risks	High
132	[163]	Music Festival	Behavioural Risks	Medium
133	[164]	Music Festival	Behavioural Risks	Medium
134	[165]	Religious MG	Health Risks and Behavioural Risks	Medium
135	[166]	Other/Cultural Festival	Health Risks and Behavioural Risks	High
136	[167]	Sporting MG	Environmental Risks	High
137	[168]	Sporting MG	Health Risks and Behavioural Risks	High
138	[169]	Music Festival	Behavioural Risks	Medium
139	[170]	Sporting MG	Health Risks and Behavioural Risks	Medium
140	[171]	Sporting MG	Health Risks	High
141	[172]	Other/Cultural Festival	Health Risks	Medium
142	[173]	Music Festival	Behavioural Risks	High
143	[174]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
144	[175]	Religious MG	Health Risks	High
145	[176]	Other/Cultural Festival	Behavioural Risks	High
146	[177]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	High
147	[178]	Religious MG	Health Risks	Medium
148	[179]	Religious MG	Health Risks	Medium
149	[180]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
150	[181]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
151	[182]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	High
152	[183]	Religious MG	Health Risks	Medium
153	[184]	Religious MG	Behavioural Risks	Medium
154	[185]	Religious MG	Health Risks	High
155	[186]	Sporting MG	Health Risks, Behavioural Risks and Environmental Risks	Medium
156	[187]	Other/Cultural Festival	Health Risks and Environmental Risks	High
157	[188]	Other/Cultural Festival	Health Risks, Behavioural Risks and Other/Mental Health Risks	Medium
158	[189]	Sporting MG	Behavioural Risks	High
159	[190]	Music Festival	Health Risks, Behavioural Risks and Other/Mental Health Risks	High
160	[191]	Religious MG	Health Risks, Behavioural Risks and Other/Mental Health Risks	Medium
161	[192]	Religious MG	Health Risks	High
162	[193]	Music Festival	Health Risks and Behavioural Risks	Medium
163	[194]	Sporting MG, Music Festival and Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	Low
164	[195]	Music Festival	Environmental Risks	High
165	[196]	Religious MG	Health Risks, Behavioural Risks and Environmental Risks	Low
166	[197]	Music Festival	Health Risks and Behavioural Risks	Medium
167	[198]	Other/Cultural Festival	Health Risks	Medium
168	[199]	Sporting MG	Health Risks	High
169	[200]	Music Festival	Behavioural Risks	High
170	[201]	Sporting MG	Behavioural Risks	High
171	[202]	Sporting MG	Health Risks	Medium
172	[203]	Music Festival	Behavioural Risks	Medium
173	[204]	Other/Cultural Festival	Behavioural Risks	Medium
174	[205]	Other/Cultural Festival	Health Risks, Behavioural Risks and Environmental Risks	Medium
175	[206]	Religious MG	Health Risks	High
176	[207]	Religious MG	Health Risks	High
177	[208]	Religious MG	Environmental Risks	High
178	[209]	Religious MG	Health Risks	High
179	[210]	Religious MG	Health Risks and Behavioural Risks	High
180	[211]	Other/Cultural Festival	Health Risks and Behavioural Risks	Medium
181	[212]	Other/Cultural Festival	Behavioural Risks	High
182	[213]	Other/Cultural Festival	Behavioural Risks	Medium
183	[214]	Sporting MG	Behavioural Risks	High

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