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TITLE PAGE

TITLE: Psychosocial Influences on Patient Presentations: Considerations for research and evaluation at Mass-Gathering Events

RUNNING TITLE: Psychosocial influences at mass gatherings

AUTHOR(S):

Prof Alison Hutton, PhD in Nursing[1]

Dr. Jamie Ranse, PhD, Research Fellow in Emergency Care[2]

Ms. Katherine L.Gray, BSPH[1]

Dr. Sheila Turris, NP, PhD[3,4]

Dr. Adam Lund, MD, MEd, FRCPC [3, 4]

Dr. Brendan Munn, MPhil, MD, CCFP(EM), DA(SA)[5]

AFFILIATION(S):

1. The University of Newcastle, Australia

2. Menzies Health Institute Queensland, Griffith University Gold Coast, Australia

3. Department of Emergency Medicine, University of British Columbia, Vancouver, British Columbia, Canada

4. Justice Institute of British Columbia, New Westminster, British Columbia, Canada

5. Department of Family Medicine, University of British Columbia, Vancouver, British Columbia, Canada

CONTACT AUTHOR:

Katy Gray

Email: katy.gray@newcastle.edu.au

SUMMARY STATEMENT

What is known about the topic?

- The psychosocial domain is the least investigated

- The psychosocial domain is largely subjective and difficult to quantify

- Psychosocial factors include crowd behavior and mood, individual motivation and behavior, crowd interests, and reason for attendance.

What this paper adds or contributes?

- Proposes a consistent reporting data standard for the collection of psychosocial data at mass-gathering events.

- This paper documents psychosocial variables currently collected and documented.

ABSTRACT

Aim

This paper discusses the need for consistency in mass gathering research and evaluation from a psychosocial perspective.

Background

Mass gatherings occur frequently throughout the world. Having an understanding of the complexities of mass gatherings is important to determine required health resources. Factors within the environmental, psychosocial and biomedical domains influence the usage of health services at mass gatherings. A standardized approach to data collection is important to identify a consistent reporting standard for the psychosocial domain. The psychosocial domain includes crowd behaviour and mood, individual motivation and behaviour, crowd interests, reason for attendance, length of stay and use of alcohol or drugs.

Method

This research used an integrative literature review design. Manuscripts were collected using keyword searches from databases and journal content pages from 2003 through 2018. Data were analyzed and categorized using the existing MDS as a framework.

Results

In total, 31 manuscripts met the inclusion criteria. The main variables identified were use of alcohol or drugs, crowd behavior, crowd mood, rationale, and length of stay.

Conclusion

In collecting psychosocial data from mass gatherings, an agreed-upon set of variables that can be used to collect de-identified psychosocial variables for the purpose of making comparisons across societies for mass gathering events would be invaluable to researchers and event clinicians.

INTRODUCTION

A mass gathering (MG) can be defined as an event where a group of people come together for a common purpose within a particular space or venue for a pre-determined range of dates and times. Examples of mass gathering include agricultural shows, music festivals, and sporting events. In a health context, a mass gathering can be defined as an event "where there is the potential for a delayed response to health emergencies because of limited access to patients or other features of the environment and location".[1] For many years it has been widely argued that three domains influence the presentations of patients at mass gathering events: environmental, psychosocial and biomedical.[2] This discussion began within the context of biomedical[3] and environmental[4] aspects of care; this paper takes the third step by examining the psychosocial aspects.

BACKGROUND

Although there are many descriptors and theories of crowd behaviour the psychosocial domain is the least understood of the three domains used to understand the potential for injury and illness at mass gathering events.[5] Psychosocial literature has traditionally focused on crowd behaviour, mood, motivation and event type, but also includes alcohol and other drugs, and length/duration of event.[2, 6] Measurement of the crowd-related variables is still one of the most difficult variables to measure due to its subjective nature.[7, 8] Hutton et al (2010) [8] showed that through using subjective descriptors of crowd behaviour, mood and type, a picture of activities during the event can be developed.[8] When described against the environmental backdrop of the event, behaviour creates context for patient outcomes. In addition, Robertson, Brown and Hutton(2018) [9] argue that the music program is a strong influence on behaviour at outdoor music festivals and should be considered as part of the psychosocial domain. A comprehensive approach to psychosocial data collection would ideally encapsulate all variables listed above.

Aim

This paper aims to initiate a consistent reporting data standard for the psychosocial domain and to include a set of variables for research and consideration for patient presentations at mass gathering events.

METHODS

Design

This research used an integrated literature review to identify psychosocial factors that are reported in the mass gathering literature.

Search Strategy

The search strategy included different combinations of Medical Subject Headings (MeSH) terms and keywords that are relevant to psychosocial factors and mass gathering events (Table 1). Terms and keywords in the columns were combined using the OR search strategy, while terms and keywords in the rows were combined using AND combinations.

Table 1: MeSH terms and keywords

	Psychosocial Factors	Mass Gathering
MeSH Terms	Crowding Social identification Social behavior Mass behavior Alcohol and other drugs Affect	Celebrating Celebration
Keywords	Psychology Group processes Social norms Mood Behavior Motivation Crowd interest	Mass gathering Large event Major event Event medicine Planned event

Inclusion and Exclusion Criteria

All identified papers were assessed against the following inclusion and exclusion criteria.

Inclusion criteria:

- Event level data
- Written in English Language
- Peer-reviewed journal
- 2003-current

Exclusion criteria:

- Editorials
- Discussion papers
- Theoretical papers

Findings

The search returned 304 potentially relevant papers from *MEDLINE* (see Fig. 2 – PRISMA flow diagram). Of the 304 articles retrieved, 245 papers were excluded based on title, there were 6 duplicates, 19 papers were excluded based on abstract review with the remaining 53 papers undergoing a detailed full text examination. One paper was identified through scanning the reference list of papers. After full examination of the remaining 35 papers, 4 of those were excluded because they did not meet the inclusion criteria (Figure 1).

Figure 1 – PRISMA Flow Chart

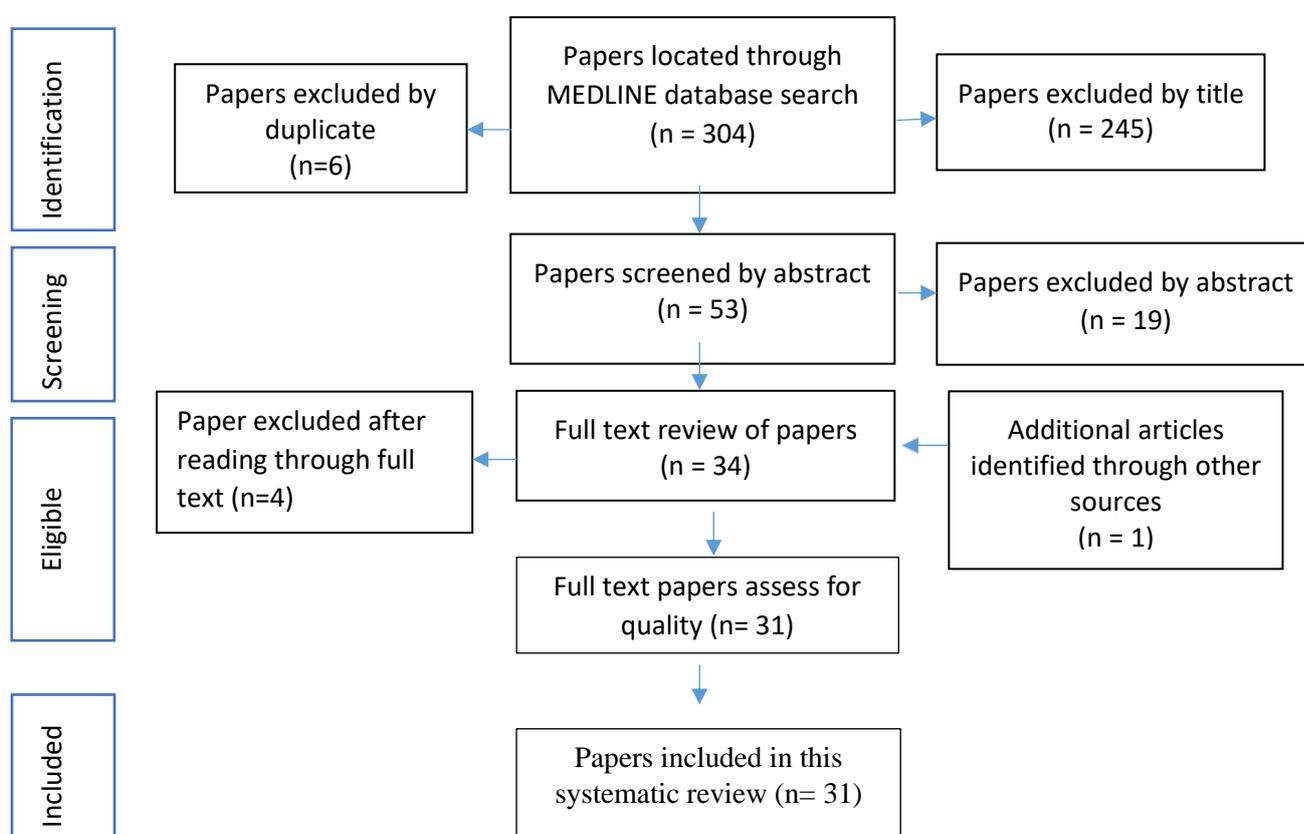**Figure 1.** PRISMA flow diagram.[10] Evaluation tools - scoping review

Critical Appraisal of Manuscripts

Overall the quality of the current evidence is low. Sixteen of the studies reviewed were retrospective, systematic, literature, comprehensive, or critical reviews. Four of the studies were reports, nine of the studies were original research case studies. There was one expert opinion and position statement

Data Analysis

In order to determine psychosocial factors that influence patient presentation rates at mass gatherings articles were grouped in a pragmatic manner (Table 2).

FINDINGS

Arbon's[2] mass gathering model was used as a starting point for this review. Table 2 outlines psychosocial variables reflected in this model and other variables identified in the literature.

<<INSERT TABLE 2 HERE>>

DISCUSSION

It is important to "initiate international discussion for consistency in the reporting of data from mass gatherings whilst acknowledging the meaningful data collection and reporting across societies and mass gatherings needs to be flexible".[3] Accordingly, in the discussion below the authors argue that there are several sub-domains within the domain of "psychosocial" as originally conceptualized by Arbon[2], which include: crowd type, crowd mood, and crowd behaviour.

Use of alcohol or drugs

In a study of 15 mass gatherings in Australia, during summer months, the authors reported Ninety percent of patient presentations occurred at events where alcohol was available.[11] Alcohol or drugs spans across all three domains of the mass gathering conceptual model and is an influential variable, and was the most identified variable in this review with 21 of 31 papers referencing it. Violence has been associated with intoxication and injuries at sporting and music mass gatherings. [12-14]   In Anikeeva, Arbon, Zeitz et al (2018) study of 15 mass gathering events in South Australia alcohol availability was categorized as either, "alcohol available for purchase,' or, 'dry event." However, in most of the reviewed literature, the use of alcohol is unclear and difficult to capture. The nonlinear study conducted by Arbon et al (2018) for predicting patient presentation rates (PPR) for MGs states the accuracy of collecting alcohol or drug use data is limited to possible discrepancy between the official and actual presence, and the effect of "loading" prior to the event.[15]

Crowd behaviour

There are numerous theories of crowd behaviours to explain the tendencies of crowds, but few practical applications to monitor and assess crowd behaviours in MGEs have been discussed or examined. Of the 18 papers that cited crowd behaviour as a key influence on MG patient presentation rates only 9 outlined a tool for collecting this data. Through the collection of individual behaviour crowd behaviour can be determined. One study used a two-part self-reporting survey respondents from the school leavers' celebrations outside of Perth, Australia, recorded the likelihood or of negative consequences associated with alcohol and other drug use and other risk factors at the school leavers' celebration. Consequences relating to individual behavior included emotional outburst, heated argument, physically aggressive, unprotected sex, blackout, stolen private/public property, act of vandalism, and arrests for intoxicated behavior.[14]

Patient presentation trends at 15 MGEs in South Australia had fieldworker's record behaviour on the crowd characteristics questionnaire.[11] The crowd characteristics questionnaire recorded the number and proportion of patients presenting to on-site health care service by crowd characteristics variables, which included crowd density, male to female ratio, proportion of crowd seated or stationary, proportion of crowd in motion, proportion of crowd displaying cohesive behaviour, and proportion of crowd wearing cohesive dress.[11] Hutton et al's 2010 study collected crowd behaviour once every hour at five designated collection points using a tool adopted from the work of Zeitz, Tan, and Zeitz (2009). The main form of data collected was descriptive field notes collected via observation categorized into behaviours; dancing, singing, sitting, resting, walking, talking, chatting, talking on a mobile, sending SMS, fighting, wrestling, videotaping, taking pictures, celebrating, or socialising. [7, 8]. In addition, Hutton et al's (2011) study evaluated crowd mood using descriptive tools developed by Pines and Maslach (1993), and crowd type using Berlonghi's (1995) model, applying a scoring system. Although the study was interpretive, through participant observation, pre-event training was provided to ensure comprehensive and uniform data collection. Stampedes and sexual assaults have been recorded as crowd behaviour.[12] Sampsel et al (2016) published the first reports of mass gatherings associated with sexual assaults and found that sexual assaults peak at mass gatherings on specific holiday events, including New Year's Eve, Canada Day, Halloween, and University Freshmans' week.[16] Hawkins et al conducted a retrospective review by Emergency Medical Services (EMS) and hospital Emergency Department (ED) records of patients injured as a result of risk taking celebratory behaviour from University of North Carolina

(UNC) mass gathering. Characteristics of patients evaluated in relation to crowd behaviour included assault, and bonfire-associated burn.[17] Hutton et al (2015) documented social environmental factors at mass gatherings using Haddon's matrix, an epidemiology tool used to determine potential injuries, such as dancing or 'moshing'.[14] Whereas Milsten et al's (2017) collected data retrospectively from prehospital patient care reports for analysis of mosh-pit related injuries at rock concerts, festivals, and electronic dance music events.[18] Hartman et al used a scoring system that measured crowd intention as either 'animated, intermediate, or calm', but did not outline the merits behind classification.[19] Turris et al (2014) listed classification examples of crowd behaviour as: mood, activity levels, queuing, movement, behaviour, predispositions, motivations, crowd movement, and flow. [20] Zeitz et al[7] sites the Emergency Management Australia descriptors for "crowd types," which include behaviour (Table3).[21] Within this comprehensive review the authors underline the lack of congruence with the use of terminology between "crowd behaviour," "crowd type," "crowd management," and "crowd mood." Demographics of a crowd is an environmental descriptor of a "crowd type."[7] For example, the profile at a football game are typically male dominated who are passionate and loyal fans. This crowd type makes predictable crowd behaviour.[22]

<< Insert Table 3>>

Crowd mood

The term, "crowd mood," is a descriptor of crowd emotion and tone, which has become an indicator of probable crowd behaviour outcomes.[5] Although crowd mood is less visible than crowd behaviour it can still be quantified. Pines and Maslach developed a practical matrix that classified the mood of crowd as passive, active, or energetic (Table 4) [23] This table scores the amount of verbal noise, physical movement, and overall audience participation into a numerical grading system.[5] Hutton et al adapted a psychosocial data collection tool from Zeitz et al[24] and Emergency Management Australia [21] to group crowd mood as energetic, active, festive, passive, subdued, or delighted.[8] Despite Pines and Maslach's (1993) tool being used in Hutton et al's study (2010) Turris et al (2014) found that objective measures of crowd mood are not yet well developed for use in a MG context. "Crowd mobility and density are sometimes used as proxies for crowd mood or indicators of risk (qualitative)." [20] Crowd mood was retrospectively collected in the development of an online event and patient registry.[25] Evidence suggests that crowd mood can be influenced by factors such as type of music,[9, 26, 27] sporting rivalry,[28] and unexpected occurrences

that can result in paranoia and mass hysteria leading to crowd crush and violence between attendees at MGs.[11] Ranse and Hutton (2012) included anxiety and psychiatric disorder under the mental health header in their patient data set and entry codes. Anxiety was observed as, "Presentation related to anxiety or panic attack, not necessarily psychiatric in nature or substance related," and psychiatric disorder was defined as, "Psychiatric or mental health related presentations," in the data dictionary to supplement MDS and entry codes.[3]

<< Insert Table 4 >>

Reason for attending event (motivation)
The reason for attending an event has a strong impact on the bio-medical domain, as the individual's motivation for attending and their behaviour at a MG can also be a factor in injury presentation.[8] Motivation for attending an event is a key influence on crowd behaviour, however due to visibility, Hutton et al (2011) suggested crowd behaviour should be the focus as the observable and measurable element.[5] Reasons for attendance were categorized in the comprehensive review by Ranse et al (2012) within individual demographics as either participant, spectator, official, or other.[3] Hartman et al (2009) scored crowd intentions data with a point value as animated, intermediate, or calm.[19] Hawkins et al (2010) carried out a retrospective review of a MG to celebrate the success of UNC men's basketball championship. Although FitzGibbon et al (2017) and Friedman et al (2017) did not specifically collect data on motivation for crowd attendance in their studies, Jaensch et al (2018) and Lam et al (2014) found that a core part of motivation for festival-goers at outdoor music festivals was to use alcohol and other drugs.[29, 30] Whereas, participants that go to religious festivals or pilgrimages the norm motivations are focused on abstinence and faith.[31] Like religious festivals, sporting events bring attendees together for a shared sense of belonging.[6, 12] However, many of these sport enthusiasts may be motivated to fit in with the crowd, which leads to overconsumption in alcohol.[6]

duration
Of the papers reviewed, nine included length of stay or event duration as a variable that was or should be collected at MGEs.[5, 8, 19, 20, 25, 28, 30, 32, 33] Multiple-day events are generally associated with higher rates of medical use.[32] Data from Hutton et al pilot project (2011) showed that there is a change in crowd behavior from the start of the event and the

end of the event.[5] For some of the research papers duration was a fixed variable, which remained the same for all of the events.[28]

Individual behavior

Crabtree et al's [34] study found that patients from rural/regional areas were twice as likely to require advanced treatment and review by health care professionals.

Additional variables such as crowd interest/culture, and individual motivation are not as frequently mentioned but for specific mass gatherings are an important aspect of data collection.

Study Limitations

Despite the use of a rigorously designed search strategy there is potential that the search outcomes and the subsequent findings of this literature review are at risk of selection bias. The search strategy was restricted to studies published in English and as such may have not identified relevant studies written in other languages. A further limitation of this review is that only articles from the past fifteen years were included.

<< INSERT TABLE 5 HERE>>

Future Opportunities

As outlined by Arbon[2], there are three categories which influence the preparedness of health services at mass gatherings: biomedical, environmental, and psychosocial. This paper has provided a framework for collecting psychosocial variables that influence patient presentation rates at MGEs. In regards to crowd behaviour the majority of the literature focuses on the negative effects to crowd safety, however there are some potential benefits to social wellbeing, which may be explored in future research.[35]

CONCLUSION

This paper has presented a range of psychosocial variables that are currently collected at MGs. The collection of variables may be subjective however they help to paint a picture of activities that take place which influence injury and illness at events. Use of alcohol or drugs

was the most common variable collected, which highlights the need for preventive strategies such as encouraging sensible alcohol consumption and safe drug use. It is not expected that all variables documented in this manuscript will be collected at each mass gathering however it is expected that each researcher will determine data collected upon their own needs. As mass gathering science develops a set of minimum psychosocial variables is needed to collect data for the purpose of making comparisons across societies for mass gathering events.

Table 2: Psychosocial Factors which Influence PPR at MGEs

Author(s)	Year	Country	Variables	Description
Ahmed, Q.A.[12]	2018	Saudi Arabia	• Crowd behaviour • Crowd mood • Crowd interest/culture • Rationale • Use of alcohol or drugs	Violence is associated with intoxication and injuries at music festivals and Electronic Music Dance events. Religious mass gathering pilgrims can have a collective spirituality that benefit public health.
Alnabulsi, H.[35]	2014	Saudi Arabia	• Crowd behaviour	It is suggested to apply the social identity approach to understand a range of crowd phenomena, including urban riots, football crowds, protest demonstrations, and audience experiences at music festivals.
Alquthami, A.H.[32]	2014	Review	• Length of stay/duration • Use of alcohol or drugs	Majority of events that were multiple days had higher rates of medical use, which confirmed the previous systematic review of data before 2002. Yet the "Toronto Rock," single-day event had higher rates than many multiple day events, due to the youthful crowd, the usage of alcohol, and the confined space.
Anikeeva, O.[11]	2018	Australia	• Crowd behaviour • Crowd mood • Use of alcohol or drugs	Anecdotal evidence suggests that crowd mood may be influenced by factors such as music, rivalry between sporting teams, and unexpected occurrences, which can contribute to an increase in paranoia and mass hysteria leading to crowd crushing and violence between attendees. Nearly 90% of patient presentations occurred at events where alcohol was available.
Arbon, P.[2]	2004	Australia	• Crowd mood • Use of alcohol or drugs	Relationship model, proposes the strength of influence between the MG domains. The environmental domain, such as ease of access and crowd density, have a strong influence on features of the psychosocial domain. A densely packed crowd will be more frustrated and be inclined to be

				violent. Preventive strategies encourage sensible alcohol consumption and safe drug use.
Arbon, P.[15]	2018	Australia	• Crowd behaviour • Use of alcohol or drugs	Study on non-linear modelling of MG variables found the role of alcohol was unclear, because of accuracy of collecting availability data, the effect of "loading" prior to the event, and consumption. Model is best used when less information is required to support the prediction.
Crabtree, N.[34]	2017	Australia	• Individual behaviour	This study found that patients from rural/regional areas were twice as likely to require medical attention. One factor that can explain the poorer socio-economic status residents higher incidents are risk taking behaviour. Two previous studies reported significantly higher PPR and TTHR, which may be due to high risk nature of events and both being multi-day music/arts festival with the majority of attendees residing onsite for the duration of the event. This study found the PPR to be significantly decreasing.
FitzGibbon, K.M.[33]	2017	USA	• Rationale • Use of alcohol or drugs • Length of stay/duration	Both the Arbon and Hartman models poorly predicted the required resources for EDM festivals. Howard County DFRS found that alcohol availability and the hosting of multi-day events were the only variables that significantly affected patient presentation and transport rates.
Friedman, M.S.[26]	2017	USA	• Crowd mood • Individual behaviour • Rationale	Crowd mood and event type are correlated. Heavy metal bands attract rambunctious crowds, and sedating music generally has calm crowds. EDMFs combine high risk elements: hot weather, active mobile crowds, and frequent alcohol and illicit drug use.
Hartman, N.[19]	2009	USA	• Crowd behaviour	Crowd intentions were assessed according to the event type and

			• Crowd mood • Rationale • Use of alcohol or drugs • Length of stay/duration	any historical data that was available about the event. Crowd intentions categorized into, "Animated 2 points", "Intermediate 1 point," or "Calm 0 points".
Hawkins, E.R.[17]	2010	USA	• Crowd behaviour • Crowd mood • Rationale • Use of alcohol or drugs	Study results were consistent with previously published MG literature showing that events associated with a high availability of alcohol and in a celebratory nature have higher rates of medical usage. Concerts with high-risk activities, like "mosh pits," have a high MURs. Celebratory fire-jumping is another example of high-risk crowd behaviour, but had relatively lower injury rates due to a smaller proportion of the crowd participating.
Hopkins, N.[31]	2016	UK	• Individual motivation • Individual behaviour • Crowd interest/culture • Rationale • Health benefits?	A psychological crowd is where people assume a shared social identity. Instead of following their own individual values the cognitive transformation shapes their behaviour to those identified in a group. Norms are specific to a given group, for example: religious festivals are characteristically a matter of abstinence while at music festivals they are more to do with excess.
Hutton, A.[8]	2010	Australia	• Crowd behaviour • Crowd mood • Rationale • Individual behaviour • Use of alcohol or drugs • Length of stay/duration	A psychosocial data collection tool was adopted from the work of Zeitz et al (2009) to measure crowd behaviour in a systematic way. The main reason for participation at the event was to be social and the mood was active, energetic, ambulatory, and participatory.
Hutton, A.[5]	2011	Australia	• Crowd behaviour • Crowd mood • Individual behaviour	Researchers used a conceptual framework tool to description of the participants' behaviour to be analysed.

			• Rationale • Use of alcohol or drugs • Length of stay/duration	The length of the event was measured by the event timetable for three nights, three days festival. The presence or absence of alcohol and drugs was harder to determine. It was a dry event, but some young people drink prior to event.
Hutton, A.[13]	2013	Australia	• Crowd behaviour • Crowd interest/culture • Use of alcohol or drugs	Culture of the event and of the audience are important factors for predicting likely behaviours and assessing for risks at events.
Hutton, A.[14]	2015	Australia	• Crowd interest/culture • Use of alcohol or drugs	The dancing and moshing, and the availability of alcohol contributed to injuries at the outdoor music festival.
Hutton, A.[6]	2018	Australia	• Individual motivation • Use of alcohol or drugs • Rationale • Crowd interest/culture	Attendees at outdoor music festivals reason for attendance is partially to escape everyday life, and this escapism may include the use of alcohol and other drugs. This attitude can modify crowd behaviour.
Lam, T.[30]	2014	Australia	• Individual behaviour • Rationale • Use of alcohol or drugs • Lengthen of stay/duration	The "holiday effect," a phenomenon where individuals on holiday tend to engage in risky behaviours, like at schoolies with heavy alcohol use. As the drinking rates (SDs per hour) appeared similar to the last social event attended, it is possible that the longer hours available at the celebratory event accounted, to some extent, for the substantial quantities of alcohol consumed.
Locoh-Donou, S.[36]	2016	USA	• Use of alcohol or drugs	The presence of alcohol is associated with a 12% increase in the PPR, which is not significant statistically. Since crowd mood was not readily measurable, it was not included in variables because of the difficultly to define and measure.
Lund, A.[25]	2012	Canada	• Crowd mood	A MG medicine registry was designed to standardize data

			• Use of alcohol or drugs • Length of stay/duration	collection. Data fields in "Event Description," pertaining to the psychosocial domain included: total event hours for day, crowd mood, drugs and alcohol use/sale at the event.
Milsten, A.M.[18]	2017	USA	• Crowd behaviour • Crowd interest/culture • Use of alcohol or drugs	Crowd culture at rock, punk, or heavy metal concerts includes moshing, stage diving, pushing, and/or shoving. "Patrons move in a 'highly energized collective motion," balancing between violence and order. The authors of the study theorize that rock concerts have a higher energy drink intake than alcohol use.
Moore, R.[37]	2011	USA	• Crowd behaviour • Use of alcohol or drugs	Event type is related to crowd behaviour, such as rock concerts the crowd participation in moshing, crowd surfing, and missiles thrown from the crowd. Mood of event can also be anticipated from event type, for example collegiate football games have widespread alcohol use and excitable fans.
Nable, J.V.[38]	2014	USA	• Crowd behaviour	Using the Hartman method to categorize an event as minor, intermediate, or major, one of the variables is crowd intention. Two points if the crowd is animated. Events with a score greater than 5 are classified as "major events."
Ranse, J.[3]	2012	Australia	• Crowd behaviour • Crowd mood • Crowd interest/culture • Rationale	The psychosocial domain includes the crowd mood, behaviour, crowd culture, and reason for attendance.
Schwartz, B.[39]	2015	Canada	• Crowd behaviour • Use of alcohol or drugs	Predictive tools have been based on retrospective data and expert opinion and require prospective validation. Injures due to violence and substance abuse require special care.
Soomaroo, L.[40]	2012	UK	• Crowd behaviour	Moshing, which primarily happens at live music events, is a crowd behaviour that increases risks of injury. Mosh pit crowd control guidelines have been

				implement, such as isolating the area from the main audience, provision of nearby first aid, and protocols to stop artists performance should crushing develop.
Steffen, R.[27]	2012	USA Saudi Arabia	• Crowd mood • Use of alcohol or drugs	Crowd mood can be affected by the type of MG and the use of alcohol and drugs. Sporting and music events, rivalry might turn into aggression. Reports from Woodstock Festival show that the mood might change depending on the type of music. One study, nearly half the patients treated during a rock concert had admitted to using illicit drugs or alcoholic beverages.
Templeton, A.[41]	2015	Review	• Crowd behaviour • Individual motivation	"Self-categorization theory suggests that shared social identity, people's cognitive representation of their relation to others, is what makes collective behaviour possible."
Turris, S.A.[20]	2014	Australia	• Crowd behaviour • Crowd mood • Length of stay/duration • Use of alcohol or drugs	Crowd mood and behaviour influence the tone of the event, and can increase the risk profile, such as political rallies. Objective measures of crowd mood are not yet well developed for use in MG context. However, crowd mobility and density are used as indicators for crowd mood.
Zeitz, A.[7]	2009	Australia	• Crowd behaviour • Crowd mood	Matrix tool was used to classify the mood of the crowd as passive, active, or energetic. Crowd mood was found to impact medical workload.
Zeitz, A.[28]	2013	Australia	• Crowd mood • Rationale • Length of stay/duration	Density effects crowd mood. Supporters of different football teams generated different PPR.

Table 3: Crowd types/behaviours[42]

Crowd Type	Comment
Ambulatory	Walking, usually calm
Disability/limited Movement	Crowd has limited or restricted movement; requires additional planning
Cohesive/Spectator	Watching specific activity
Expressive/Revelous	Emotional release, for example, community fun runs
Participatory	Involved in actual event, for example, pickets, marches
Aggressive/Hostile	Initially verbal, open to lawlessness
Demonstrator	Organized to some degree, for example pickets, marches
Escape/Trampling	Danger may be real or imaginary
Dense/Suffocating	Reduction of individual physical movement
Rushing/Looting	Attempt to acquire/obtain/steal something, for example, tickets
Violent	Attacking/terrorizing

Table 4: Crowd Mood Classifications

Mood Descriptor	Crowd Descriptor
Passive	Little or no talking Little or no physical movements Little or no physical contact Little or no audience participation Cooperative
Active	Moderate degree of talking Moderate degree of physical movements Moderate degree of physical contact Moderate degree of audience participation Cooperative
Energetic	Considerable degree of talking Considerable degree of physical movements Considerable degree of physical contact Considerable degree of audience participation May be episodes of violence

Table 5: Quality of Research

Schwartz, B.	2015	Position Statement
Arbon, P.	2004	Expert Opinion
Ahmed, Q.A.	2018	Review
Hopkins, N.	2016	Review
Moore, R.	2011	Review
Steffen, R.	2012	Review
Hutton, A.	2013	Critical Review
Ranse, J.	2012	Comprehensive Review
Zeitz, A.	2009	Comprehensive Review
Alquthami, A.H.	2014	Systematic Review
Templeton, A.	2015	Systematic Review
Soomaroo, L.	2012	Literature Review
Hawkins, E.R.	2010	Retrospective Review
Locoh-Donou, S.	2016	Retrospective Review
Milsten, A.M.	2017	Retrospective Review
Nable, J.V.	2014	Retrospective Review
Zeitz, A.	2013	Retrospective Review
Hartman, N.	2009	Retrospective Review
FitzGibbon, K.M.	2017	Case Study (Retrospective)
Crabtree, N.	2017	Case Study (Retrospective/Descriptive)
Alnabulsi, H.	2014	Case Study
Anikeeva, O.	2018	Case Study (Longitudinal)
Lam, T.	2014	Case Study
Arbon, P.	2018	Case Study
Hutton, A.	2015	Case Study (Descriptive)
Hutton, A.	2010	Case Study
Hutton, A.	2011	Case Study
Friedman, M.S.	2017	Descriptive Report
Hutton, A.	2018	Special Report / Opinion
Lund, A.	2012	Special Report
Turris, S.A.	2014	Special Report

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