Re-opening live events and large venues after Covid-19 'lockdown': behavioural risks and their mitigations

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Re-opening live events and large venues after Covid-19 'lockdown': Behavioural risks and their mitigations

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Abstract

This article reviews the behavioural risks and possible mitigations for re-opening large venues for sports and music events when Covid-19 infection rates and hospitalizations begin to decline. We describe the key variables that we suggest will affect public behaviour relevant to the spread of the virus, drawing upon four sources: (1) relevant evidence and recommendations from the Scientific Pandemic Influenza Group on Behaviours produced for the Scientific Advisory Group for Emergencies (SAGE); (2) research evidence from non-pandemic conditions; (3) research on behaviour during the pandemic; and (4) relevant theory. We first outline some basic risks and a framework for understanding collective behaviour at live events. We then survey some trends in UK public behaviour observed over 2020 and how these might interact with the opening of live events and venues. We present a range of mitigation strategies, based on the framework for collective behaviour and on what is known about non-pharmaceutical (i.e. behavioural) interventions in relation to Covid-19.

Key words

Live events, venues, behavioural science, Covid-19, psychology, guidance

Highlights

Mass gatherings where there is high shared identity are at most risk for spread of virus among large social networks

Travelling to the venue and gathering beforehand and afterwards may be a source of greater problems than gathering at the event itself

Mitigations include sufficient ventilation, lowering density to enable physical distancing, mandating wearing of face-coverings, and providing multiple hand-sanitizing stations

Understanding of crowd psychology provides a powerful tool for reshaping collective practices at live events in ways that make them less risky

1. Introduction

The live events industry plays a significant role in society, economically, socially and psychologically. The industry is normally worth several billion pounds to the UK economy each year. A recent estimate suggested that for sporting events the annual total spend is around £2.3 billion, for festivals it is £1.1 billion, and for other music events it is around £1.3 billion, with an estimated 570,000 full-time equivalent jobs in the events sector as a whole (Eventbright, 2016). In addition, attending mass gatherings is associated with positive emotions (Novelli, Drury, Reicher, & Stott, 2013) and can contribute to mental health and wellbeing (Drury, 2020; Hopkins & Reicher, 2016b).

In response to the Covid-19 pandemic, live events venues around the world were forced to close to prevent the spread of infection. As infection rates and hospitalizations begin to come down, relevant government departments, licencing authorities, and event and venue managers will consider how to re-open safely. In particular, they need to understand the areas of risk and the mitigations can be put in place. The present paper is a behavioural science contribution to this discussion, focused on the UK situation (though the evidence and principles also apply to many other countries).[1] The events we focus on here are music and sports arena and stadium events. However, some of our analysis and recommendations can also apply to other venues and events, such as theatres and other indoor and outdoor performances.

2. Objectives and methodology

In this review paper, our objectives are (1) to describe and analyse the key variables that we suggest will affect public behaviour relevant to the spread of the virus in the context of the re-opening of live events and venues, and (2) the mitigation measures which should be considered in order to reduce the risks of transmission to a sufficiently safe level.[2]

[1] An earlier version of this paper was published on the Gov.Uk site as a SPI-B paper (SPI-B, 2020d). By publishing this work, we hope to contribute to the process of bringing transparency to the ways in which evidence is fed into policy and practice during extreme events.

[2] We do not cover within this article the logistical challenges of use of technologies for enabling venue entry, such as those that measure temperature or the likely use of rapid Covid-19 testing or passporting, which is

We draw from four types of sources: (1) relevant evidence and recommendations from the Scientific Pandemic Influenza Group on Behaviours (SPI-B) produced for the Scientific Advisory Group for Emergencies (SAGE); (2) research evidence from non-pandemic conditions; (3) research on behaviour during the pandemic; and (4) relevant theory. We first outline some basic risks and a framework for understanding collective behaviour at live events. We then survey some trends in UK public behaviour observed over the summer 2020, when the UK government was considering a phased re-opening of live events (including pilot events), and in the autumn when cases started to surge again. We look at how these trends in behaviour could interact with the opening of live events and venues. The remainder of the paper considers a range of mitigation strategies, based on the framework for collective behaviour and on what is known about non-pharmaceutical (i.e. behavioural) interventions in relation to Covid-19.

3. Background: Risks of transmission associated with live events and venues

Covid-19 is caused by the SARS-CoV-2 virus, which spreads between people through close contact, including droplets and aerosols, both in the air (particularly in conditions of poor ventilation) and via contaminated surfaces (WHO, 2020a). In the context of the Covid-19 pandemic, any mass gathering is likely to amplify the transmission of the virus by increasing the number of contacts between people (WHO, 2020b).

It is important to recognise, however, that risks of spreading infection are not confined to an event itself. In many cases, attendance at the event is integrally bound up with group activities surrounding the event: travelling to the event, meeting at the pub, walking together to the venue, entry and exit (SPI-M-O, 2020b), and going back to the pub afterwards – in addition to people watching the event with close contacts in private homes. Hence it is important to consider behaviour in all these sites (which are generally less surveilled than at venues) and also to consider how people travel to and from live events. Careful consideration, coordination and resourcing is needed to manage this. This could include staggering travel, entry and exit times or making more carriages available shortly before and after the events. It is worth investigating how this was done in the case of the London Olympics, where a combination of different communication strategies successfully managed

currently being examined by UK football clubs and authorities (Sports Ground Safety Authority, 2020) and live music venues (Gottfried, 2020).

the scheduling of movement of thousands of people around crowded public transport systems for the events (IOC, 2013).

In addition to the risks associated with events taking place, it is also important to consider the risks of events *not* taking place. In the UK and other countries, all live events were stopped at the beginning of the pandemic. Sports events later resumed without fans in the stadium, but all indoor music events remained banned through most of 2020. But if crowds are banned from attendance at football matches (which are in outdoor stadia), it could lead them to congregate in bars and private homes to watch (which, being indoors, create a greater risk of transmission). Moreover, if certain genres of music events are banned (say pop concerts) while others are allowed to go ahead (say classical concerts), and if this maps on to important demographic differences in the audiences affected (age, social class), then even when there are good epidemiological reasons for the decision (singing, dancing, and touching are more likely at the pop concert which increases risks of transmission), it may nonetheless be seen as illegitimate, and so undermine adherence and even lead to collective conflicts (Reicher & Stott, 2020; SPI-B, 2020a, 2020c).

4. A framework for understanding collective behaviour, behavioural risks, and mitigations at live events and venues

4.1 Group identities

The types of gatherings covered in this paper (i.e., sports and music arena and stadium events), as well as many theatre and other indoor public events and performances are typically different psychologically from other common types of gathering (e.g., at shopping centres, transport hubs, beaches) in certain key respects. In the types of gatherings covered in this article, people typically attend to be with other people, and in particular other people they see as sharing their aims – that is, to appreciate the event in the same way as themselves, and hence to contribute to the 'atmosphere' (Bennett, 2015; Neville & Reicher, 2011; Templeton et al., 2020; Uhrich & Benkenstein, 2010). The crowds at these events are typically made up of one or more *psychological crowds* (Neville & Reicher, 2011) – to varying degrees, they share a social identity and see themselves as a 'we' or 'us' in that context (Drury et al., 2015; Novelli et al., 2013; Templeton et al., 2020). At sporting events, there will generally be two or more such psychological crowds (e.g., representing fans of each team, with police possibly seen as a further group) (Stott, Adang, Livingstone, & Schreiber, 2007; Stott, Hutchison, & Drury, 2001). People typically attend these events in pairs or groups rather than as lone

individuals (Aveni, 1977; Neville & Reicher, 2011). However, because they see the rest of the crowd at the event as 'us', they interact with strangers differently (in terms of both quality and quantity) than they would do in mere physical crowds where there is no sense of shared identity or psychological unity (such as those at a shopping centre or transport hubs) (Drury et al., 2015; Hopkins et al., 2019; Neville & Reicher, 2011; Novelli et al., 2013). In addition, many of the people who attend these events are connected through digital networks outside the event itself (Billings, Qiao, Conlin, & Nie, 2017; Lacasa, Zaballos, & de la Fuente Prieto, 2016), meaning that at each event there will be a number of other people that they already know, even if just as acquaintances. This creates the conditions for extensive interaction between people who normally belong to different social networks (e.g., geographically, occupationally).

Compared to being in a physical crowd (e.g., a shopping centre crowd), among people in a psychological crowd there tends to be more: proximity-seeking (Neville et al., 2020b; Novelli et al. 2010, 2013); interaction/ talking Drury et al., 2015); intimacy/ touching (Hopkins et al., 2019; Neville & Reicher, 2011); mirroring of actions and emotions (Neville et al., 2020a); coordinated movement/ joint action (Templeton et al., 2018); mutual trust (Cruwys et al., 2020); mutual concern and helping (Drury et al. 2015); and willingness to make personal sacrifices for others and for the collective good (Hopkins & Reicher, 2017). Crucially, this be the case among strangers and casual acquaintances in the crowd, as well as within groups of friends/ family.

In addition to these factors shaping behaviour in a psychological crowd, people's behaviour will be shaped by the physical environment of the venue including the flow and density of people in the space (Templeton et al., 2018). In addition, certain kinds of music events are likely to have greater risk potential, in terms of free movement between people (rather than seating), consumption of alcohol which can lead to greater risk-taking (Graham, Wells & West, 1997), and the fact of loud noise which means people will have to shout and stand closer to each other to communicate (Memish et al., 2019). We elaborate on this point about physical environment factors in the section below on the key health behaviours to deliver for a COVID-19 mitigated event.

4.2 Norms

There are generic or societal norms that shape behaviour at these kinds of events (e.g. politeness conventions), but also *group* norms specific to the culture or genre of an event, and

these moderate the behaviours characteristic of psychological crowds. For example, all queues outside music venues are social systems with sets of rules (e.g., no pushing in) but some artists' followers may have a specific set of additional rules of the queue (Helweg-Larsen & LoMonaco, 2008). To take another example, at some rock concerts, intense physical contact (in the form of moshing) (Spencer, 2014) might look uncontrolled and even violent to those unfamiliar with it, but this kind of dancing is constrained by a set of informal rules: it is limited to the 'pit' area in front of the stage and is structured to limit the 'violence' (Tsitsos, 1999).

A key point about all high-risk behaviours at many mass gatherings (singing, chanting and dancing, alcohol use, food sharing) is that they tend to be group-normative (Hopkins & Reicher, 2020; Stott et al., 2001, 2007). This means several things. First, it means that they will be valued, encouraged, and expected in the group (Pearson, 2012). Second, it means that people join in with them when others start (Mann et al., 2013). Third, it means that even when people are more emotionally involved, their behaviour will continue to be in line with these norms, though in a more extreme way (rather than abandoning the norms) (Spears, 2021).

Because many of these behaviours are normative, trying to prevent them by coercively 'policing them out' can become a source of conflict and lead to a loss of trust with authorities (Reicher & Stott, 2020). For example, in the case of trying to prevent football fans from celebrating a goal by jumping up and down and cheering, simply banning these behaviours and punishing those who ignore the ban is likely to be seen as illegitimate (Reicher & Stott, 2020). This is also true for attempts to ban alcohol in the context of football, which can have unintended consequences of increasing other forms of risk such as drinking more quickly outside the ground (Pearson & Sale, 2011).

However, it may be possible to work with crowd members to develop less risky expressions of these norms (Hopkins & Reicher, 2020) -- for instance, finding alternative ways of expressing passionate commitment for one's team besides chanting, shouting and hugging when goals are scored. This will be discussed below.

5. Trends in public behaviour and belief as 'lockdown' eased that are relevant for behaviours at live events and venues

It is useful to examine the extent to which broader trends in public beliefs and behaviours before and during the pandemic might affect crowd behaviours at live events. In particular,

it's important to focus on proximity behaviours, since physical distancing has been a key mechanism for preventing transmission and might be difficult to maintain at live events. Here we summarize what is known about proximity behaviours (1) in normal times, (2) during the height of 'lockdown', (3) during the easing of 'lockdown' in the UK (summer 2020), and (4) during the second 'wave' of the pandemic in the UK (from September 2020). We then examine how these trends might interact with behavioural regulations at live events.

5.1 Proximity behaviours at live events pre-pandemic

As mentioned previously, spatial distancing behaviour – how close people seek to be when they stand, sit and move together – varies between physical and psychological crowds (Neville et al., 2011). This behavioural variation is a function of variation in levels of identity. When *personal* identity is salient (e.g., in crowds in shopping centres and transport hubs), individuals normally seek to maintain personal space from strangers (Novelli et al., 2010). In many of the crowds that attend sports events, festivals and music events, and some religious events, it is much more likely that strangers feel comfortable in close proximity; in these cases, the proximity of others is not experienced as an invasion of personal space but as sharing 'social identity space', and therefore something tolerable or even positive (Novelli et al., 2010, 2013). In such events, people can also feel safer in such close proximity (Alnabulsi & Drury, 2014).

Research on proxemics across 42 countries suggest that in normal circumstances, social interaction happens at an average of 135.1cm for formal interaction and 91.7cm for interaction with friends (Sorokowska et al., 2017). In psychological crowds, a smaller distance is likely to feel comfortable than in physical crowds. For example, at music events, many seek out the most dense areas of a venue, and it is here that some say that there is the best 'atmosphere' (Novelli et al., 2013). At such events, there will often be an extremely crowded area in front of the stage (up to 9 people per square metre). The bar area will also often be subject to similar levels of density (although not as deep). In addition, toilet facilities during breaks in performances or matches at half time are places where numbers and hence density typically builds up. In these locations in and around the venue, people will tolerate, enjoy and even seek proximity and engage in forms of intimacy characteristic of psychological crowds (such as touching, coming close to others to speak into their ear, sharing drinks, and greeting others with handshakes, kisses and hugs) (Neville & Reicher, 2011).

It is crucially important to note that this general tendency towards greater proximity and greater intimacy in psychological crowds can, in certain circumstances, be over-ridden by specific social norms. For instance, in some mass gatherings such as religious festivals, crowd members express their intimacy with others by giving them space, not interacting with them and so allowing them to devote themselves to spiritual activities (Reicher et al., 2020). As we explain below, this potential for 'normative over-ride' may be of use in developing mitigations against proximity at live events (Drury et al., 2020).

5.2 Distancing behaviours during the height of 2020 'lockdown'

On a number of self-report measures, during the height of 'lockdown' compliance with the regulation on physical distancing was high – the regular UCL survey for March and April found that over 98% of respondents scoring very high on compliance, with less than 0.1% of respondents reported not complying at all with the guidelines (Fancourt et al., 2020a). The Office of National Statistics (ONS) survey for May 15th similarly found that over 90% reported avoiding contact with other people when outside their homes (ONS, 2020a). Behavioural observations also suggested that distancing behaviours were a new norm in public spaces (Laurier et al., 2020).

5.3 Trends in distancing behaviours and relevant beliefs/ perceptions that occurred with the easing of 'lockdown'

From 20th May, the UCL weekly survey began to report that the numbers reporting that they were following all the behavioural regulations (including physical distancing) were down (Fancourt et al., 2020b), though the ONS survey of 29th May continued to report high levels of adherence to physical distancing (ONS, 2020b). The easing of some aspects of 'lockdown', which took place on July 4th, and was preceded by a considerable media fanfare (e.g., using terms such as 'freedom pass' and 'end of lockdown'), as well as a public discussion about whether the 2 metre 'social distancing' rule would be changed. Both ONS (2020c) and the UCL survey (Fancourt et al., 2020c) reported in mid-July that only about half respondents were consistently maintaining physical distancing. In terms of process or mechanism, these trends are contemporaneous with several factors, all of which could contribute (Drury, Carter, Ntontis, & Tekin Guven, 2021): decline in trust in the government (Fancourt et al., 2020c, p. 16), decline sense of national togetherness (Duffy & Allington, 2020), and decline in perceived risk (ONS, 2020b). Over the summer and early autumn,

however, adherence levels, including distancing, levelled off and remained relatively high, with little evidence of public 'fatigue' (Michie, West, & Harvey, 2020)

5.4 Trends in public behaviour occurring with the second 'wave' (from September 2020)

There was a sharp rise in confirmed Covid-19 cases in the UK from September onwards, which peaked in mid-November (Independent SAGE, 2020). Levels of public stress were reported to have increased by October, indicative of increased awareness of risk (Fancourt et al., 2020d). In response to the rising number of cases and deaths, a second UK-wide 'lockdown' was implemented. The regular UCL survey suggested that compliance with the behavioural measures including distancing rose slightly compared to the summer months, although adherence was lower than in the spring lockdown (Fancourt et al., 2020e).

4.5 How these trends might interact with the opening of live events and venues

Changes in general adherence may impact on levels of adherence at live events. In addition, the reopening of large venues may, alongside other developments – for example the reopening of schools, universities and other sites – send a signal (SPI-M-O, 2020a) that the threat of the virus has receded and hence precautions, including behavioural measures such as physical distancing, are less necessary. This could lead to an increase in risky behaviour in general, not just at the live events – at a time when the combination of seasonality and education resuming may substantially increase infection rates.

At the same time, there are reasons to think that the impact of the existing societal trends on proximity behaviours at large venues and live events might be moderated by (1) other behavioural trends (2) interventions.

(1) While adherence to required distancing behaviours have sometimes declined, adherence to other required behaviours has increased. A survey of 2,237 UK residents carried out in July 2020 found a significant increase in mask wearing, up to 70% from 19% in April (Allington et al., 2020). This was informed by widespread belief (81%) that face masks help reduce the spread of coronavirus and the requirements to wear face masks on public transport (from 15th June 2020) and in shops (from 24th July 2020) in England. The survey authors also argued that 'Covid-secure' behaviours seem to be sticking, with 88% of respondents reporting washing their hands more regularly (Allington et al., 2020). While the extent of these behaviours may be overestimated by self-report, and is lower in some sectors of the community likely to attend live events (such as younger adults; Fancourt, Bu, Mak, &

Steptoe 2020d), the growing acceptance and normalisation of protective health behaviours will help to provide a basis for implementing them at public events.

(2) Venues for live events are typically well controlled with surveillance systems and hence may be better able to support and encourage protective health behaviours such as mask wearing, physical distancing, and increased hand hygiene. In this way, they may actually contribute to normalising such behaviours and increasing their general adoption. In addition, because participants at these events share identities, and in addition will be committed to ensuring the continuation of future events and economic survival of the host (e.g. local football clubs, music venue) (Templeton et al., 2020), they also represent opportunities to translate the already normalised protective health behaviours, such as mask wearing, physical distancing, and increased hand hygiene, into these crowded places through promotion or reinforcement of new norms – as discussed below.

5.6 Downstream Risks

As other examples have shown over the course of the pandemic, the public perception that government decisions were incorrect (and required backtracking) has serious consequences for the public's relationship with the government and hence with adherence to the advice the government gives out (Fancourt, Steptoe, & Wright, 2020; Wright, Steptoe, & Fancourt, 2020). There was substantial criticism of the sporting authorities for holding mass events when infection rates were rising in March (e.g., Wood & Carroll, 2020). If the re-opening of events is associated with rises in cases, this is likely to seriously undermine trust in the management of the pandemic. While evidence from autumn 2020 shows public support for greater restrictions (YouGov, 2020), equity and hence legitimacy of some impositions has become an issue (Swift, 2020). The imposition of renewed restrictions may therefore lead to dissent and potential conflict if some live events were stopped while others continued (Reicher & Stott, 2020).

Therefore, it is important to re-open with caution, taking particular account of the local context and levels of infection both in the locality and amongst those attending. It is also critical to have a comprehensive Covid safety plan developed, validated, and monitored by Health and Safety inspectors. We suggest some specific mitigation strategies below.

6. Key behaviours required to deliver a COVID-19 mitigated event and how these should be communicated

The key behaviours required to deliver Covid-19 mitigated events are physical distancing; wearing of face coverings; and regular hand-washing or sanitising (WHO, 2020a). In addition, specific behaviours that are commonplace at live events - such as singing, shouting, chanting, hugging, jumping up and down - need to be limited or substituted.

Many of the behaviours required, or that need to be limited, can be moderated by the environment in the venue:

i. Limited access/density and effective management of the flow of people in and around the venue

ii. Enforced wearing of face coverings (with special arrangements for those unable to wear them)

iii. Hand-hygiene stations at multiple points in the venue

iv. Minimal shared surfaces that require touching (e.g. contactless doors and lavatories).

Our recommendations for a communication strategy that will enable the public and staff to engage with these behaviours is based on what we know about the identity processes and social norms that govern behaviour, as summarized above. In addition, the following suggestions are derived from some 30 years of peer-reviewed research on the psychology of leadership and social influence and also from recent analyses of health behaviours at mass gatherings (Hopkins & Reicher, 2016b, 2016a). The classic outline of this work is contained in Turner (1991). Recent reviews of the accumulated research evidence are provided by Hogg and Gaffney (2017), Spears (2021), and Haslam, Reicher and Platow (2020). A version of the same principles is contained in guidance developed with and for colleagues in the live events industry and is currently being employed by crowd safety managers in Denmark and other locations in Europe (Drury et al., 2020).

A key objective of the communication strategy is to make the behaviours listed above into *new norms* for those attending music and other gatherings – i.e. internalized as an inherent part what it means to be one of the relevant group – and, conversely, to make risky behaviours (such as physical closeness and sharing food and drink) at odds with being a good group member. There are four elements to creating and encouraging new norms for safer spaces at events and venues.

First, ensure that the venue is organised in such a way as to make desired behaviours (such as distancing) possible and employ all the facilities in the venue (from loudspeaker announcements to scoreboard displays) to promote the core communication strategy.

Second, draw on an understanding of the relevant group identity in order to promote the new norms (or rather, to promote new forms of behavioural expression for old social norms). For instance, while it is a basic norm of many sports crowds that people express passionate support for their team, and without that the whole activity has little meaning, by working together with group members themselves it may be possible to develop new and distinctive way of expressing that passion (e.g., stamping, clapping etc.) that are of lower risk than shouting or singing.

These new forms of expression can then be validated and made normative by associating them with higher-order group values ('we look after each other'; 'we are prepared to suffer a little inconvenience for the good of the group'). In this way, adhering to mitigations becomes a way of demonstrating commitment to (and hence acceptance in) the group and its shared values. This message can be built into the mitigations themselves. For example, event organisers could provide masks with identity-relevant logos (e.g., club crests) and messages.

Effective communication should stress the following messages about risk: Unsafe behaviours put fellow group members at risk and not only within the venue; they also put everybody's families at risk and also the entire community at risk; this in turn would present a major risk to the standing of the group in the community.

More concretely, messaging designed to promote COVID-mitigated behaviours should centre on presenting these behaviours as:

- For our greater good
- For our public health
- For keeping those we care about safe
- In line with our values
- As a way of showing solidarity
- Because they are good citizens
- As a way of expressing who we are

Third, it is important that messages address not only what group members *should do* (so-called 'injunctive norms'), but also what they *are typically doing* ('descriptive norms') (Cialdini et al., 2006). Messages which convey examples of bad practice and say 'don't do this' can backfire because they can suggest that many people in our group are behaving like this anyway, even if they know they shouldn't. Consequently, it is important to provide concrete examples of people showing concern for each other, for example by keeping their distance (instead of hugging or sharing). It is particularly important that prominent individuals (e.g., players and club officials at a sports event or performers at a concert), who are prototypes or norm-definers for the group, scrupulously observe restrictions such as not hugging each other after a success or not shaking hands with the opposition.

Fourth, the source of information is as important as its content. Any attempt to change norms from the 'outside' will be useless at best and could actively rebound. This must be an activity co-produced with and led by the group itself (SPI-B, 2020b). Equally, communications are unlikely to be listened to if they are just imposed on a group from the outside. It is crucial that the messages are seen as the voice of the group itself, and this too means involving group members in the development of the new norms (Bonell et al., 2020). Well-known and respected members of the group who are seen to embody the collective values should be the face and the 'voice' of any messaging campaign. These messages should be reinforced by performers and players at an event. Messages can be disseminated via mass and social media. Feedback should be sought from group members in order to develop and refine the messages. In sum, reconfiguring group norms must be something that is done *with* and not *to* a group.

We suggest a nested communication strategy with similar materials for the general public, at point of ticket purchase, at point of entry to the venue, and during the event. For instance, in the same way the #BlackLivesMatter messages have been printed on sports performers' clothes and rituals (e.g., taking the knee) have been incorporated into events, similar practices should be built in relation to COVID-19 and should be evaluated.

7. The most effective mitigation measures to reduce risks of transmission suitable for live events and large venues

In line with the communication/ co-production strategy described above, it might be helpful to develop a set of communications for people who will be attending the events/ venues that can be made available a month in advance. Training courses can also be designed and run

with and for staff responsible for public safety and public-facing roles at the event. A review of counter-terror training courses with industry stakeholders operating in crowded places in the UK identified the need for the inclusion of evidence-based design and evaluation to increase the likelihood of organisational learning (Aplin & Rogers, 2019).

As there is growing evidence that aerosol-generating activities can substantially increase transmission (and face coverings cannot eliminate transmission, especially if not very well fitted) (Morawska & Milton, 2020), it will be necessary to establish with participants new norms for avoiding these as described above – including alternatives to cheering, chanting, dancing or jumping. Physical and or management mitigation measures for the venue should include:

- Low density to enable 2 metre physical distancing
- One-way flows of people within the venue
- Adequate ventilation
- Effective, frequent cleaning
- Provision of hand-sanitising stations at multiple points across the venue
- COVID-mitigated lavatories – i.e. require no touch and effective management of flow through lavatory spaces. Restrictions on numbers that can use facilities at any one time may mean queues forming for longer times in restricted and enclosed spaces which will need to be managed accordingly.
- Attendance dependent upon agreement to wear a face covering and provision of contact information for contact tracing.
- Effective ticket management policy to allow for limited entry. This could include a 'home fans' only policy to enable greater spaces. However, this must be venue specific as some stadia can easily facilitate large numbers of away fans safely and the increased revenues will be central to economic viability.
- Access to refreshments via service to attendees in their seats

Based on the existing evidence, we did not form a consensus view on the banning of alcohol, and therefore we call for more study of this subject. On the one hand, there is an argument for a ban, due to the known associations between alcohol and disinhibition (Graham et al., 1997) – including the recent evidence showing that as people in pubs drink

more, so they become less strict about observing physical distancing regulations (Fitzgerald, Uny, Brown, Eadie, Ford, Lewsey, & Stead, 2021). On the other hand, evidence from the football context suggests that a more nuanced approach to managing access to alcohol should be considered (Pearson, 2012; Pearson & Sale, 2011). Facilitating access to alcohol can be functional. For example, if alcohol is served in seated areas of football stadia fans may attend earlier and in more staggered flows, easing demand on transport and entry points as well as concourses and areas near toilets. Their levels of drinking can be monitored as well as their behaviour, and they would not congregate as much as they would otherwise do in pubs prior to the event. As with pubs, any transgressions can lead to ejections, showing strong norm enforcement on the part of the stadium authorities. By contrast banning alcohol could mean that fans gather in pubs beforehand, stay as long as they can to 'load' on beers and then enter stadia late, causing congestion on transport and at entry points and toilets (because they need to access them to urinate having drunk heavily before entry). They might also be harder to manage as they will be more heavily intoxicated on arrival with no opportunity for a graduated and differentiated approach to behaviour management. An approach which enables alcohol to be served in the stadium in the way outlined (Pearson & Sale, 2011) could be combined with a communication strategy that discourages fans from ‘loading’ on alcohol before the game.

It would be useful to produce a set of communications with and for audiences which go through these various points and which they would need to see and agree to before attending the event. This could be achieved, for instance, by a resource which people have to complete before buying tickets online.

In addition to communication, it is important to consider means of sanction or incentivisation to adhere to COVID-mitigated guidelines. As with reducing violent or racist behaviour at sports, this can be implemented at two levels. On the one hand, this can be applied at the individual level. Thus, in football grounds, it would be possible to identify those who violate guidelines and to apply sanctions such as being barred from the ground. On the other hand, sanctions can also be applied at the collective level. Thus, if there are significant levels of violation, the club as a whole could be sanctioned including fines, fans barred from the ground, docking of points, or even (as has been mooted in Scotland when players violated guidelines) stopping the sport entirely. Clearly, any sanctions need to be used carefully and consistently and accompanied by strong messaging (using the principles of co-production and using ingroup voices as advocated above) in order to retain legitimacy. But if

used well, they can create powerful collective pressures which prevent individuals from behaving in irresponsible ways.

8. Designing pilot studies and evaluations of events to inform strategies for opening events with minimal risk of transmitting the virus

Venues should pilot the running of events at capacity below that estimated to be safe for the events that are likely to take place. A number of organisations (e.g. the English Football League) ran a number of pilots at sports events in August and September 2020 (e.g., Templeton et al., 2020). Moreover, sophisticated pilot studies measuring contact levels have been carried out in Germany, in a project called Restart-19 (https://restart19.de/en/ ; Moritz et al., 2020).

At the time of writing (December 2020), results from the analysis of one of the Restart-19 studies have been published (Moritz et al., 2020). Over a thousand volunteers at a concert in August at the Quarterback Immobilien Arena in Leipzig, Germany, were monitored via contact tracers. The study found that the total number of contacts that lasted a few minutes was relatively low during the event. There were a higher number of contacts during entry to the venue and in the breaks. The researchers concluded from this that concerts could be possible under pandemic conditions, so long as there was good ventilation and adherence to the behavioural regulations.

The Sports Ground Safety Authority survey of a number of sports events that took place in the UK in Summer 2020 (Templeton et al., 2020) measured participants' perceptions of safety, messaging, trust in the organizers, adherence, and other relevant constructs. The researchers found that on average, respondents believed all safety measures present were important in mitigating the spread of Covid-19. Respondents also showed high trust in the event organisers to maintain safety. They reported high levels of adherence to the safety measures both for themselves and for other spectators. Effective sources of information included signage, stewards, announcements during events, online information, pre-event communications, and other spectators, events. Seeing others adhere to the safety guidance led to higher expectations that crowd members would support one another to keep safe, which was associated with higher reported adherence oneself. However, the strong sense of feeling part of a group (shared social identity) was also associated a reduced perception that others in the crowd could put them at risk through germ spread, in line with what is known about

reduced risk perceptions in the company of ingroup members (Alnabulsi & Drury; 2014; Cruwys et al., 2020).

We recommend pilot studies that combine self-report and observational measures of behaviour used in these previous pilot studies to build a more comprehensive evidence-base on mitigating risk of transmission in large venues and events. Pilots should be aimed at examining the effects of some of the key factors that we have identified in this paper – such as the effects of having alcohol served to seats vs sold as usual, vs banned; or else the impact of different types of communications and pre-event communications.

Both observational methods (including use of CCTV technology and electronic sensors worn by audience members) and self-report (interview and questionnaire) data are necessary. These will allow for accurate measurement of what people actually do (for example in terms of distancing) and of what they think and feel – but also, critically, the relationship between these variables. Such a design would also allow a test of the extent to which people listen to official communications. This would allow us to examine whether what people think and feel about the source of information affects trust, influence and adherence to the message. It should also be possible to analyse contact data to understand how far people travel, examine routes of access via transport modes, and explore age demographics (some events involving predominantly young people may be judged less 'risky' than events where the mean age is >50 years old, for example).

9. Conclusions

The closure of the live events industry in the UK has already had significant societal impacts and is likely to have considerably more. Figures from the Event Industry Board published in December 2020 suggested that more than half a million jobs were at risk in the industry, with three quarters of companies likely to fold before February 2021 if live events were not resumed (Stainton, 2020). The cultural and psychological impact of such damage to the sector are likely to be profound. For example, the closure of licenced events over the summer in 2020 saw the re-emergence of illegal raves and unlicenced block parties (SPI-B, 2020c). It is important, therefore, to understand, and where possible mitigate, the risks of re-opening live events and large venues. Behavioural science can provide guidance and advice to facilitate this.

The types of gatherings at live events covered in this article are mostly ones where being with other like-minded people is part of the attraction. Prima facie, those gatherings

where there is high shared identity and hence high trust and intimacy are at most risk for spread of virus among large social networks that will not normally be physically in close contact. Among these, events where people are freely standing and moving and where there is noise, music, and alcohol pose risks associated with contact and proximity.

In addition, the extent to which people interact with others around them can vary within an event. For example, in sports stadia they may not be freely standing while watching an event but may be so when getting refreshments. Mitigations need to be nuanced accordingly and there will not be a universal approach that is adequate.

There are several ways of mitigating against these risks. These include careful environmental redesign and re-organization: enabling sufficient ventilation if indoors, lowering the density of people in a space, mandating wearing of face-coverings, serving refreshments in seats, providing multiple hand-sanitizing stations, and ensuring minimal surfaces requiring contact.

The tendency of people in psychological crowds to move closer to other in-group members, like other intimacy related behaviours, is a variable which can be modified by specific group norms. An understanding of crowd psychology – and more particularly, an understanding of the specific social identities of specific crowds – provides a powerful tool for reshaping collective practices in ways that make them less risky. Critically, however, this is much more likely to be effective if this is done *with* members of the group, led by members of the group and communicated through members of the group.

It is also important to recognise that the highly controlled environment of most venues, in which there are sophisticated systems of surveillance and communication, may be particularly beneficial in terms of developing ways of improving adherence. By contrast, it is in travelling to the venue, gathering (for instance in pubs) beforehand and afterwards that greater problems may arise. Hence any risk assessment and any plans for reopening live events must take a holistic approach and consider all elements involved in attending these events.

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