



## **Research Study Template:**

### Study name

Study of attendee behaviours and crowd densities associated with transmission risk at events that simulate full capacity

### Event locations for study

- England v New Zealand Test Cricket, Edgbaston – 10<sup>th</sup>-14<sup>th</sup> June
- England v Croatia EURO 2020, Wembley – 13<sup>th</sup> June
- England v Scotland EURO 2020, Wembley – 18<sup>th</sup> June
- Royal Ascot Horse Racing, Ascot – 15<sup>th</sup>-19<sup>th</sup> June
- Download Pilot Event, Castle Donington – 18<sup>th</sup>-20<sup>th</sup> June

### Principal investigators

Dr Aoife Hunt and Simon Owen, Movement Strategies

### Key research question(s)

What is the impact of full capacity events in different settings on crowd densities and attendee behaviours that could influence transmission risk?

- a. To what extent do attendees adhere to behavioural guidance designed to reduce the transmission of COVID-19 during these events?
- b. What are the effects on attendee behaviour of the risk mitigation measures or interventions put in place as part of the events?

### Link to a published protocol for Phase I (if relevant)

<https://www.gov.uk/government/publications/events-research-programme-science/work-plan-crowd-movement-and-behaviour-study>

### Study design

The overarching approach adopted during this study will be a continuation of Phase 1, which can be read in detail in the published work plan (see link above).

Data collection and observations will focus on four aspects associated with crowd movement and behaviours:

- Occupancy and Clustering (number of people, queuing and time spent)
- Social Distancing (densities and change over time)

- Mitigation Measures (face coverings, hand hygiene)
- Observed behaviours (seating vs standing, active vs passive audience behaviours, eating and drinking behaviours, event organisation and staff behaviours)

A range of quantitative and qualitative sources will be used to extract information on how these aspects vary between settings and across settings over the course of the event. The principal sources are:

- Video capture and subsequent manual analysis of footage;
- On-site measurements of key areas of interest, supplementing CAD plans, to understand the size and layout of spaces;
- On-site observations by the Movement Strategies team at the event, in the form of videos, photos and written observations;
- Automated video counting software which extracts occupancies and volumes over time;
- In-venue wi-fi networks or sensor networks deployed at the event, to provide data on attendee dwell times and itineraries;
- Ticket scan data (if provided) to identify profile and distribution of arrivals;
- Concession/Retail transaction data (if provided) to identify profile of demand and typology of purchases;
- Planning documentation supplied by the event organisers that defines their proposed operation.

The data collected and analysed will be framed against the categorisation of venue locations and activity phases summarised below.

Venue Location Categorisation
Arrival/Departure Areas
Dwelling Areas (e.g., Waiting Areas/Concourses)
Concessions/Bars – Standing
Bars/Restaurants – Seated
Main Activity Areas (Structured)
Main Activity Areas (Unstructured)
Toilets, Lifts, Stairwells

Event Phase Categorisation
Ingress (Zone Ex)
Ingress (Venue)
Event
Circulation (GA)
Circulation (Hospitality)
Egress (Venue)
Egress (Zone Ex)

### Key outcome measures

The data collection will be closely aligned with other research teams from the outset to facilitate cross-referencing and triangulation of movement data sets and observations with other environmental and behavioural aspects.

A key output will be to produce data that can be cross-referenced with environmental data to build a cumulative picture of the risk of attendee exposure to factors associated with disease transmission across the different events.

The data produced will include the following - for each location type during different event phases:

- Time spent by attendees in key locations;
- Population densities over time in the locations where environmental data is collected;
- Peak density in all location categories observed;
- Standing vs seated behaviour in seating areas, over time;
- Mask usage where it is required (i.e., proportion of people wearing face coverings correctly, incorrectly, or not at all);
- Hand sanitizer usage (i.e., uptake of hand sanitizer stations as attendees pass them);
- Written summary of qualitative observations (i.e., behaviours observed during the event).

We will also seek to capture and feedback any location-specific advice to individual venues which can support their planning for future events, as well as any general findings applicable to guidance on risk management and venue operations.

#### NPIs being changed

The study is intended to capture metrics and observations on crowd movement behaviours and studies across each of the settings, and for results to indicate the variation by location and time. As such, the study will collect data that can allow for comparisons in behaviour to be captured with and without any given intervention in place.

The nature of these interventions will either be implemented by the event organisers themselves (in agreement with DCMS) or by recommendation from members of the wider research group. At the time of writing these were not yet finalised.

#### Engagement with participants and communications

Movement Strategies study will not involve direct interaction with attendees at the pilot events. Any data collected will be done so in a passive way. The one exception to this would be with the deployment of any wearable technology intended to be used to understand movement within a clearly defined space. In this circumstance, the wearables will be directly handed out to attendees and at that time they will be free to decline to be involved in this aspect of the research.

For all data collection, Movement Strategies is committed to protecting the privacy of the personal data we process. We adhere to best practice across all of our functions and are compliant in accordance with the Data Protection Act 1988, and General Data Protection Regulation 2016/679.

#### Peer review

This protocol was reviewed and approved by the Events Research Programme Science Board on 2nd July 2021.

#### Ethics approval

For the studies undertaken by Movement Strategies no personal details are collected from attendees and the studies do not require human participation. Studies will draw on publicly

collected data in line with the privacy agreements and terms and conditions of the event organisers.