

Exploring the positive ripple effects for communities that engage in

Mass Participation Sporting Events

Hosting a large-scale mass participation sporting event (MPSE) is recognised to be a boost to the profile and economic prosperity of a city or region.



PROFESSIONAL TRIATHLETES ORGANISATION

Running events such as fun runs (e.g. City to Surf Sydney, J.P. Morgan Corporate Challenge) and marathons (e.g. Boston, London and Gold Coast), triathlons (e.g. Hawaii IRONMAN, Noosa Triathlon), cycling events (e.g. Capetown Cycle Tour, L'Etape Australia), ocean swims (e.g. El Cruce Mexico), and obstacle course races (e.g. Spartan & Tough Mudder) bring people together, benefit public health, create jobs, drive economic growth, and raise money for charity.

The success of these events is often measured through tourism figures such as accommodation occupancy rates, hire car availability and theme park attendances. In part, these measures of success are due to the weight of economic benefit placed on such events, but also partly due to the feasibility in measuring the full scale impact of social, emotional and physical benefits. Yet further to economic metrics, there is emerging research that suggests that the benefits of mass participation may be more compelling and widespread – which could significantly shift the perceived value proposition of hosting MPSEs.

Distinct from large-scale sporting events such as the Olympic Games, Commonwealth Games and World Championships that involve mass participation of professional athletes, MPSEs are specifically convened to attract widespread mainstream participation

involving some professionals, of course, but integrating and welcoming amateur athletes too, perhaps even those participating for the very first time in the sport. In fact, the high frequency of competition availability through MPSEs (rather than a one-off Olympic event every four years) may be helpful in sustaining wellness and embedding an active sporting identity in the mainstream population over the longer-term.

Involving such a vast and diverse participant pool--some events draw up to hundreds of thousands of people--presents significant commercial opportunities for governments and sponsors to reach a diverse, engaged and committed market. And yet, particularly now, MPSEs face immense challenges.

The disruption of COVID-19 has hit the industry hard and even as economies work towards reopening – the ongoing uncertainty of intermittent lockdowns and the general discouragement of mass gatherings of people (as demonstrated by WHO publication: 29 May, 2020) mean that up to 87% of the MPSE industry may not survive. And yet, at the same time, the role of communities, collaboration and civic spirit has perhaps never been more relevant – from residents singing across balconies through lockdown in Italy to the high prevalence of virtual fund-raising concerts (e.g. Music from the Home Front¹; One World: Together at

Home²) using video-networking platforms during isolation.

While forced isolation in many communities has resulted in novel ways to keep people connected during the pandemic, emerging literature suggests that prolonged inactivity and binge-eating during COVID-19 is likely to lead to poor physical and mental health (Phillipou et al., 2020).

Given this context, it is critical that we understand, and can communicate effectively, not just the health benefits of MPSEs on individuals, but also their very real impact on the rejuvenation and maintenance of physical, mental and social community wellness.

This paper seeks to better understand how MPSEs impact communities in terms of social, emotional and physical benefits and how these might spread further than those who directly participate. With COVID-19 impacting every aspect of our society including our connectedness, physical and mental health, quality of lives and sense of community, there's a current desire to better understand how we can support entire cities and regions to positively build their population's wellness and prosperity.

¹Music from the Home Front – see <https://musicfromthehomefront.com.au/>

²One World: Together at Home – see <https://www.globalcitizen.org/en/connect/togetherathome/>

Direct benefits of MPSEs

Intuitively, we should expect that participating in a MPSE would increase fitness levels and bring a range of physical benefits for a participant. This is especially evident, it turns out, in participants new to an activity and for those training and preparing for the event itself. For example, studies examining new, inexperienced participants in an event (e.g. cyclists and runners who were previously inactive) stayed involved in the activity post-event for long enough that the majority of participants noticed an increase in physical fitness (Bowles, Rissel, & Bauman, 2006; Crofts, Schofield, & Dickson, 2012; Malchrowicz-Moško, Poczta, & Adamczewska, 2019). Beyond just 'going for a run' or starting a gym membership, it seems that the action of 'investing' in the MPSE through advanced registration, buying the right equipment, setting attainable goals, and putting in place active training programs motivates entrants to present the best version of themselves at race time in a way that has positive impacts down the track (see Coleman & Sabire, 2016).

Funk et al. (2011) also explored the role of MPSEs in increasing positive attitudes to physical leisure activities, specifically people's motivation, commitment and intentions towards participation. The MPSE they studied promoted stronger attitudes towards regular exercise for those who were more satisfied with their MPSE experience, were less active before participating and had completed fewer organised events previously. In other words, new, inexperienced participants who had a positive experience stood to gain most. The authors concluded that this research demonstrates that MPSEs can serve as important social and environmental correlates of physical activity.

Indeed, the time, money and energy invested in the lead-up to the MPSE suggests that the benefits of participation may extend far beyond just physical fitness. As well as the obvious physical benefits, participating in MPSEs yields a range of holistic social and emotional benefits including powerfully satisfying the human need for people to identify and belong to groups of like-minded people. The proverb 'birds of a feather flock together'--also referred to as homophily--suggests as humans we naturally tend to find and associate with those who are like us. But, in addition, we also understand that as humans we naturally seek out groups - or tribes - to join and belong to. Explored and validated extensively through social psychology and social neuroscience (not to mention centuries of evidence of the power of tribes across all cultures), we know that humans need to belong. Feelings of belongingness, identity, social integration, and social support have a profoundly positive impact on human physical health and may well lie at the heart of MPSE participation (Christakis & Fowler, 2007; Haslam et al., 2019).³

From a conceptual standpoint, social identity theories have long understood that how we see ourselves as individuals is shaped by the groups we feel we belong to (Greenaway et al., 2015).

³For an extensive review of the science across many disciplines for the power of belonging, see 'Burrow (2013). NeuroPower: Leading with NeuroIntelligence, 3rd Edition' - see <https://www.amazon.com.au/NeuroPowerLeading-NeuroIntelligence-Peter-Burrow/dp/099251357X>



Put simply, it means something to say, for example, 'I am a marathon runner', or, 'I am a cyclist' (or even, more specifically, 'I'm part of the Upper West Side Track Club - we've put a team in for the St Patrick's Day Fun Run'). The tendency for people to adopt group behaviours such that their identity aligns to the group is an influential factor in the success and sustainability of MPSEs. In fact, the glue that binds people to one another can be likened to an extension of self, e.g. self-esteem, self-identity, self-efficacy and self-interest, which, it can be said, are the building blocks of positive behavioural and emotional wellness (Baumeister, Campbell, Krueger & Vohs, 2003; Reicher, 2012).

Indicators of psychological wellness related to social identity also extend to the link between positive group memberships and lowered risk of depression, anxiety and even mortality (Rees et al., 2015; Steffens et al., 2016). A large-scale loneliness study with 54,000 people conducted in Australia in 2019 revealed that only 54% of Australians expressed 'rarely' or 'never' feeling lonely. Despite the prevalence of virtual connectivity through social media platforms, only 32% of young people aged 18-24 expressed 'rarely' or 'never' feeling lonely, compared to 71% of older people aged 65-75 years (Haslam, Haslam, & Cruwys, 2019).

Participating in activities such as MPSEs where there is apparent common interest, shared identities and interpersonal bonds activates feelings of belongingness that promote health efficacy akin to a social cure (Bradshaw & Muldoon, 2019; Haslam, Jetten, & Haslam, 2012). Indeed, it seems that the more social groups we belong to and consider valuable, the less likely we are to succumb to low self-esteem (Jetten et al., 2015), stress, anxiety, and depression (Haslam et al., 2016). The importance of belonging to groups extends further with social identity researchers generally concluding that if you belong to no group but decide to join one, you cut your risk of dying over the next year in half (Steffens et al., 2016).

It is any wonder that in challenging times and in response to significant life events, people are magnetically drawn to one another, seeking solace, optimum health, and self-actualisation in large numbers. In this sense, MPSEs may be a social panacea; activating passion, motivation and a commitment to shared values and belief systems that result in sustainable psychological wellness - in addition to the physical benefits (Mellor, Stokes, Firth, Hayashi & Cummins 2008; Reicher, 2012; Roffey, 2013; Vallerand, 2012).

The origins of network contagion

With governments wrestling with the cost, planning and policies of healthcare amid a global health pandemic, understanding the network contagion effect of events that increase the physical, social and emotional wellbeing of communities is both timely and pivotal to support holistic health. As we move through this pandemic, there's an opportunity for MPSE's to play a larger role in the holistic health of communities, however the US Congress recently received a report that 87% of the MPSE industry will disappear before 2021 without significant. Part of that intervention is first understanding the specific benefits for a region that hosts a MPSE.

While the more direct and tangible benefits of MPSEs are well noted, it is the subtle, less obvious flow-on effects that are yet to be truly understood. For instance, are there any indirect, extenuating effects of the presence of these events that might ripple across the community in other unexpected ways?

Network contagion research suggests that there may be far wider reaching and impactful benefits of mass participation events. While the term 'contagion' may evoke negative connotations--particularly in light of the current COVID-19 pandemic--there are many underlying positive benefits to being so indelibly connected.



The concept of network contagion suggests that emotions and behaviours can be contagious, as in the context of happiness (e.g. Coviello et al., 2014), social media posts (e.g. Kramer, Guillory, & Hancock, 2014) and COVID-19 pandemic behaviour (e.g. Iglesias-Sánchez et al., 2020).

How does this type of contagion work? The human brain's mirror neurons fire when we experience an emotion; as well as when we observe someone else experiencing that emotion (Prochazkova & Kret, 2017). Research shows that humans have a cortisol response (measured through saliva) after hearing a baby crying – which can't be explained just by an 'unpleasant' sound. This is an important link to build the idea that an experience someone else is having can directly affect 'my' body (Yong & Ruffman, 2014).

While the physical and emotional benefits of participating in MPSEs is well documented for the people directly involved (e.g. Grunseit, Richards, & Merom, 2017; Murphy, Lane, & Bauman, 2015; Rees et al., 2015), network contagion would suggest that participants' friends and family indirectly benefit – and perhaps that the friends of their friends could too.

While the research in this field is still emerging, associated network benefits are found in up to three degrees of separation from the participant (Christakis & Fowler, 2012).

What this means for MPSEs is that, even if a person is not directly involved in the activity itself, they may still indirectly benefit from the physical, emotional and social benefits of an event. This would mean an exponential increase in the lives impacted from a MPSE – for an event of just 20,000 participants, upwards of 720,000 people in a city or region could experience benefits.

Otherwise known as 'degrees of separation', network contagion is analogous to describing social network concentric circles. Travers and Milgram's 1969 'small world' sociological experiment stemmed from curiosity about how connected people are to one another.

Choosing an unknown random target recipient, participants were asked to send a letter to someone they knew. Recipients would then send the letter on to someone they knew and so

on, until the letter eventually reached its final destination (Travers & Milgram, 1969). Turns out that Travers and Milgram were right – that the world is in fact a small place. That is, regardless from where a letter emanated, letters arrived at their final destinations having passed through no more than six sets of hands (which coined the phrase, 'six degrees of separation').

Applying the same social network experiment to email technology, Dodds (2003) had 60,000 participants send an email to someone they knew until the email eventually reached one of 18 target recipients in different parts of the world.

More recently, this experiment has been replicated to demonstrate the social effects of contagion to influence pro-social behaviour via social media in schools.

In an anti-bullying experiment conducted throughout 56 schools containing 24,191 students, Paluck, Shepherd, and Aronow (2016) recruited 20 to 32 students in each school (i.e. 15% of each school's population; known as 'seed' students) to determine the effect of social and emotional contagion across each school. It was hoped that the positive message campaign disseminated by the seed students via social media would result in fewer instances of peer conflict.

Without any further intervention by the experimenters or advising any other students of the experiment, over a period of one year peer conflict incidents had reduced across the school network by 30% demonstrating the power of social influence to foster positive behaviour.

Spread over almost 50 years, each of these experiments highlighted the same principle – that people are all socially interconnected by a complex web of network matrices.

Across the entire population, all people are obviously not known directly to one another. However, it is clear from network contagion research that through a series of social chains, acquaintances and associations, people vicariously influence one another.



Network contagion of physical, emotional and social benefits

Christakis and Fowler, in their 2009 book, 'Connected: The Surprising Power of our Social Networks and How They Affect Our Lives' suggest that contagion exists across social networks that vicariously influence behaviour, decisions and even health.

To arrive at this tenet, Christakis and Fowler (2007) observed 32-year longitudinal data from the Framingham Heart Study to determine that obesity could be associated with a person's friends, spouse and siblings. Calculating the imminent risk of a person becoming obese, it was posited (and confirmed) that this risk extended to three degrees of separation.

At one degree, the risk of obesity was 45% higher (and 57% higher if this person was a friend), at two degrees the risk was 20% higher and at three degrees of separation, the risk of obesity was 10% higher.

The authors found no relationship between obesity in participants with four degrees of separation. In their findings they reflected, "the closeness of friendship is relevant to the spread of obesity".

Recognising that the composition and infrastructure of an individual's social network may vary considerably, the authors proposed that social clusters reinforce social contagion more rapidly than in other more limited social networks.

With MPSEs forming and nurturing social clusters, with strong social identity, the network contagion impacts could be amplified.

Under the same network contagion banner, further studies have been conducted in several different contexts with risk determinants made across degrees of separation that predicted behaviour in several other contexts, not least of which included smoking (Christakis & Fowler, 2013), cooperation (Jordan et al., 2013) and exercise

behaviours (Aral & Nicolaides, 2017) – see Figure 1.

One of the earliest proponents of network contagion (or the 'ripple effect') described the transfer of positive emotions to influence mood, group processes and collective attitudes (Barsade, 2002).

In line with this perspective, Westman (2001) studied traditional and conservative wife-husband dyads and found critical mechanisms that created social transference of states including: life events, shared characteristics, social support and communication (also among other things e.g. coping).

Similar research has now been applied to workplace settings, examining emotion transfer between employees and friends as well as between trainers and trainees (Hartel & Page, 2009; Westman, Shadach & Keinan, 2013; Zagenczyk, Powell & Scott, 2020).

Figure 1. Ripple effects: Degrees of separation probabilities

	First degree	Second degree	Third degree	Reference
Obesity	45%	20%	10%	Christakis & Fowler (2007)
Running	<ul style="list-style-type: none"> Run further Run faster Run for longer Burn more calories 	-	-	Aral & Nicolaides (2017)
Happiness	15.3%	9.8%	5.6%	Fowler & Christakis (2008)
Sleep (less than seven hours per night)*	29%	17%	8%	Mednick, Christakis & Fowler (2010)
Smoking risk	61%	29%	11%	Christakis & Fowler (2008)
Marijuana use	190%	88%	38%	Mednick, Christakis & Fowler (2010)
Loneliness	52%	25%	15%	Cacioppo, Fowler & Christakis (2009)

*An important correlate of optimal physical and psychological wellness (Watson et al., 2015)

The transfer of emotions, behaviour and attitudes also prevails in crowd psychology with respect to group norms, merging affect and united behaviour (Templeton, Drury, & Philippides, 2015). Pertinent to the support ecosystem of MPSEs and mega-sporting events such as the Olympics, groups of volunteers benefit from increased self-esteem, heightened sense of belonging and a permeating zest for life (Fyffe & Wister, 2016). While it must be acknowledged that negative and sinister behaviours can indeed pervade groups, the strength of positive group energy--if channelled towards a health-centric MPSE--has greater capacity to influence groups in a positive and pro-social way.

Network contagion and MPSEs

So if social connectedness can predict whether a friend, friend's friend, or friend's friend's friend might adopt similar behaviours to one another (whether they are known to each other or not), the question then becomes how can we explore and quantify the less obvious 'contagious' benefits of MPSEs?

In other words, beyond the benefits to an individual who signs up to run (or ride, or swim, etc.), how does one person taking part impact a participant's family (who sees their excitement, dedication and discipline in weeks before the event); or a friend (who holds the bike between laps or drives the support car)?

⁴(e.g. Singapore marathon: 10,000 visitors x 3.5 room nights @ \$350/night = \$12.25m economic impact. 40,000 local participants x ripple effect = 1.4million people x \$5 reduced health costs x \$5 increased social benefits and productivity = Y hundreds of millions in health and social impact.



Research in exercise science and leisure studies suggests that the presence of a MPSE may predict behaviours such as the take-up of the related activity in recognition of the perceived health and exercise benefits associated with the sport (Grunseit et al., 2018; Coleman & Sabire, 2016; Murphy et al., 2015). This direct adoption of the activity may not seem altogether surprising, yet social identity research points to an enmeshment of behaviours that embed a person's sense of belonging to the sport to the extent that a person might even invest in merchandise, apparel and equipment to align themselves with lauded stars of the sport (Rees et al., 2015).

While the salience of a sporting activity might pique intrigue in either observing or participating in the sport on offer or indeed adopting a shared identity, longer-term participation in the sport beyond the event itself yields mixed results. For example, Willem et al., (2017) learned through experimental research that while there is an apparent community uptake in motivation associated with a MPSE, the adopted behaviour wanes and peters out after four months for 25% of participants (Willem, De Rycke, & Theeboom, 2017).

Conversely, Aral and Nicolaides (2017) demonstrated that running behaviours and the associated motivation to remain active in the sport appear to be socially contagious. Interestingly, however, less active runners seem to demotivate active runners, rather than the other way around. From this perspective, then, 'fun-run'-style initiatives that help individuals move from inactive to more regularly active are likely to have a significant net positive impact on overall exercise levels in any community. Effects of gender also suggested that men and women influence men, but only women influence women (Aral & Nicolaides, 2017).

While the findings above are deemed to be valid and relevant to influencing exercise behaviours, what is yet to be established is the extent to which the contagion of a MPSE endures in dispersed social networks beyond an event of this magnitude.

Consideration of the possibilities of links between network contagion and social identity in impacting – or even potentially driving – the ripple effect of influence across social network architectures

is a concept that warrants further investigation.

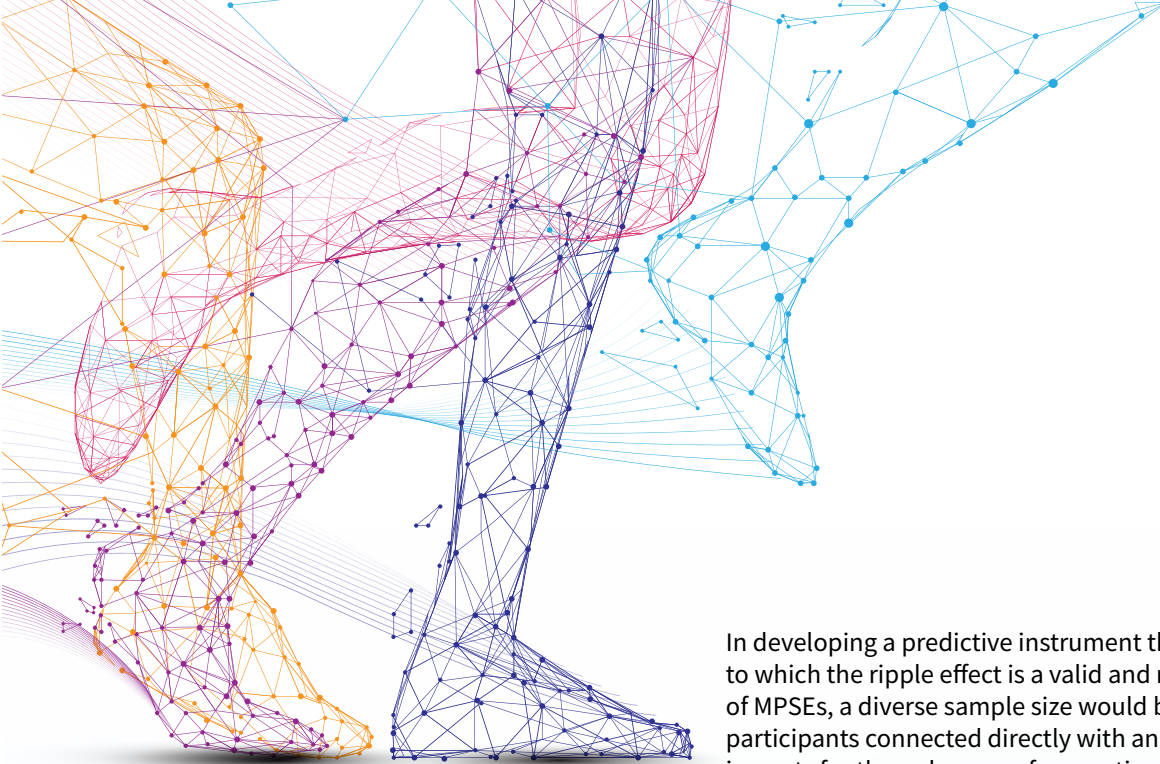
Government public relations campaigns have focused on enlivening participation activity in sport (e.g. Sports Day in Canada – White et al., 2016) and found an increased focus on sporting activity is generally beneficial to enhancing public health. The more compelling question here with regard to network contagion ripple effects is whether a person up to three degrees of separation away from the participant is unconsciously influenced—psychologically, or physiologically—by a MPSE. If that is the case, then the benefits of hosting and broadcasting a MPSE become exponentially powerful.

Benefits of MPSE – connecting the dots

The core aim of this paper is to present a valid and reliable quantifiable measure of the social, emotional and physical benefits of MPSEs informed by the tenet of Christakis and Fowler (2009). Rigorous scientific testing of the validity of three degrees of separation in a MPSE context may be achieved by conducting quantitative and qualitative research with not only participants, but their extended families, friends and supporters in the hope to present a compelling case for the resumption of MPSEs in communities and cities around the world.

Network contagion research has well-established challenges which would need to be accounted for, such as homophily (the tendency for individuals to choose similar friends), confounding effects (the tendency for connected individuals to be exposed to the same external stimuli) and simultaneity (the tendency for connected individuals to co-influence each other) (Aral & Nicolaides, 2017).

While it is difficult to completely account for the unpredictability of human social interactions, it is possible to build a robust algorithmic predictive model to strengthen the methodological validity and economic worth of MPSE ripple effects. For example, assuming the ripple effect of MPSEs is confirmed it should then be possible to develop a reliable estimate for the dollar value of reduced physical and mental health costs together with increased social and productivity benefits.⁴



In developing a predictive instrument that may determine the extent to which the ripple effect is a valid and reliable claim in the context of MPSEs, a diverse sample size would be required. This may include participants connected directly with an event, as well as measuring impacts for three degrees of separation from the participants. In exploring further research of this nature, Aral and Nicolaides (2017) suggest leveraging quantified self and fitness tracking data collected by wearable devices that record detailed exercise activities (among other data) will advance and accelerate the effectiveness of this type of research.

If social contagion was found to implicate MPSEs, we might see a person in the community adopt: (a) exercise behaviours; (b) an associated social identity and an increased sense of group belonging; (c) cultural and community-type behaviours; and (d) collective optimism and life satisfaction.

Conclusion

It is probably fair to say that many of us could recount a mystical 'small world' story of social connection that we don't quite understand. Being connected to other people via 'x degrees of separation' has remained largely confined to popular vernacular. However, in recent years, social researchers have revealed compelling evidence that may quell this mystique and add some solid basis to social network anecdotes. A comprehensive scan of the literature has shown that across three degrees of separation, people do have behavioural and attitudinal influential effects on one another, whether they know one another or not.

Applying this phenomenon to MPSEs is not only revolutionary, but timely, suggesting that a small investment in MPSEs could lead to significant benefits to individuals and communities. While the process of socially distancing humans to quash the spread of disease might seem epidemiologically prudent today, it is evident that humans are social by nature and can flourish when sharing positive identity and common interests.

Scientifically quantifying the social, emotional and physical effects of MPSEs using Christakis and Fowler's (2009) network contagion principle is a critical step towards recognising the potential health benefits of MPSEs. Rejuvenating such events that harness the communal ripple effects created from positive human energy, motivation and passion may just be the social remedy that humanity needs to accelerate a global pandemic recovery.

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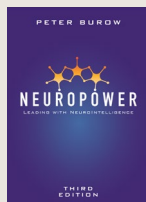


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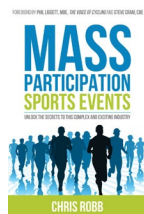


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