

# Examining Evidence of a Trickle-Down Effect in Multiple Host Country Contexts: UEFA Euro 2020

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4	Examining Evidence of a Trickle-Down Effect in Multiple Host Country Contexts: UEFA
5	Euro 2020
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22	Submission to Special Issue: Addressing "Wicked" Problems and Opportunities

23	Highlights
24	• Euro 2020's impact on inspiring sport and physical activity is examined.
25	Mixed evidence for participation increases with co-hosting and success.
26	Protective effects associated with co-hosting and success observed.
27	Cause and effect difficult to establish and requires better data.
28	Abstract
29	This paper examines the trickle-down effect (TDE) phenomena in relation to the 2020 UEFA
30	European Football Championship (Euro 2020). The co-hosting format of this event; together with
31	the availability of consistent data from the Eurobarometer (population-level data per country) on
32	sport and physical activity participation across multiple jurisdictions presented a unique research
33	opportunity. Using pre-event (2017) and post-event (2022) Eurobarometer surveys, we tested the
34	main mechanisms by which TDEs are theorised to occur through quantitative secondary data
35	analysis. The findings from our study provide tentative evidence in support of a TDE in some Euro
36	2020 co-host countries, but a direct cause and effect relationship is difficult to establish. We
37	contend that the combination of hosting and success can contribute to protecting against declines
38	in participation at population-level. Our findings highlight the most predominant wicked problem for
39	TDE research – the best available data is not always sufficient to evaluate TDEs.
40	Keywords: Trickle-down effects, sport participation, major events, football,
41	Eurobarometer

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44	Euro 2020

The impacts of major sport events on individuals and communities have been thought of 45 as a wicked problem (c.f. Byers et al., 2020). With recent evidence challenging the scale of 46 47 economic benefit that major sport events were once thought to bring to host communities (Thomson et al., 2019), proponents of major sport events are turning to social impacts to justify 48 staging such events (Teare & Taks, 2021; Thomson et al., 2019). One such claim of positive 49 social impacts of major sport events is that of the Trickle-Down Effect (TDE). TDEs refer to an 50 51 international sport event's capacity to inspire increased grassroots sport and/or physical activity (PA) participation (Weed et al., 2015). Forms of TDE include increases in participation frequency; 52 participating in sport after a long hiatus; switching of participation between activities; and/or, an 53 increased number of new participants in a sport (Weed et al., 2015). TDEs can have varying 54 spatial impacts ranging from host communities (Potwarka & Leatherdale, 2016) to host nations 55 (Kokolakakis et al., 2019), to non-host nations (Potwarka et al., 2023). While these forms of TDEs 56 have been posited, a pervasive issue regarding researchers' ability to understand the 57 phenomenon is the (lack of) ability to robustly evaluate nuanced mechanisms of TDEs. Therefore, 58 59 an additional layer of wicked problems has emerged with the study of TDEs: there is a lack of robust and consistent population-level data to longitudinally and cross-nationally assess these 60 effects (Annear et al., 2019; Potwarka & Wicker, 2021). 61

Despite issues that arise with available data, several mechanisms have been identified that have been thought to underpin TDEs. Sport scholars and practitioners have proposed that sport participation can be stimulated in a host country through *hosting major sport evets*; experienced among residents of a successful nation through *success at a major sport event*; or by *spectating/watching elite athletes (i.e., role modelling)* (e.g. Potwarka & Wicker, 2021). As discussed in the literature review below, evidence for these three mechanisms of TDEs has been mixed. However, robust and empirically valid evidence demonstrating the spatial reach and scope of event impacts is sparse, which has led to calls for consistent and reliable

70 participation data to be collected over time and across geographic borders (Potwarka et al.,

71 2023; Potwarka & Wicker, 2021).

Moreover, these mechanisms by which TDEs might occur have been considered in a 72 73 traditional single-host nation format. A recent phenomenon with major sport event hosting is that of co-hosting between two or more nations, however, little empirical work on the implications of 74 this phenomenon has been conducted to-date (Bakhsh et al., 2018). A co-hosted event format 75 76 could have implications for TDE mechanisms. Specifically, the mechanism of hosting a major 77 sport event could expand the geographic reach of the TDE phenomenon to multiple cities, in multiple nations hosting the event. Additionally, there is potential for the mechanism of role 78 79 modelling to be further examined in a co-hosting context because the intersection of hosting and experiencing success for multiple countries exists in this unique context. As a co-hosted format 80 81 between multiple countries is gaining momentum (e.g., FIFA 2026 and 2030; Ludvigsen et al., 2019), developing an understanding of the potential impacts of event co-hosting can help plan 82 for and manage TDEs. 83

More nuanced understandings of TDE mechanisms related to both hosting and 84 85 experiencing success has yet to be examined through a co-hosting model. Moreover, consistent multi-jurisdictional data sources that allows for legitimate cross-national analysis in cases where 86 the same event is co-hosted by multiple nations have been lacking in TDE research. This paper 87 88 therefore serves dual purposes. First, to address the gap in the knowledge about TDEs in 89 relation to event co-hosting, we consider the specific case of UEFA Euro 2020 (postponed until 90 2021 due to the COVID-19 pandemic), which was staged across venues in 11 different host European countries (i.e., Azerbaijan, Denmark, England, Germany, Hungary, Italy, Netherlands, 91 Romania, Russia, Scotland, Spain). In doing so, we address three key research questions (RQs): 92 93 1. What were the population-level changes in sport/exercise based on co-hosting status?

94 2. What were the population-level changes in sport/exercise based on the relative95 performances of host national teams?

96 3. What were the population-level changes in sport/exercise based on the intersection of co-97 hoisting status and team performance?

98 The second purpose of this paper is to critically assess data availability and applicability to 99 evaluate TDEs robustly across multiple jurisdictions.

This paper responds to calls for more robust investigations of TDEs across multiple jurisdictions, using consistent and reliable participation data (Potwarka & Wicker, 2021; Potwarka et al., 2023). In doing so, it strengthens theoretical understandings of TDEs by adding further nuance to the mechanisms by, and contexts in, which TDEs might occur. By drawing from consistent and best available participation data, this investigation also provides support for the insights that can be gained from secondary analysis of population-level datasets and strengthens calls for international communities to coordinate data collection efforts.

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#### Literature Review

As outlined above, multi-city hosting is an increasingly common event format that has yet to be examined in terms of their potential to deliver TDEs. The following sections will present what is currently understood about multi-city event hosting, followed by an examination of TDE mechanisms and the potential effects that multi-city hosting might have for each mechanism. Finally, some insights on the importance, and currently limited availability, of participation data across hosting regions for evaluating TDEs in a multi-city hosting context will be offered.

114 **Co-hosted Major Sport Events** 

Major sport events have recently been criticized for the high economic and environmental costs to the host region (Thomson et al., 2019). As a result, there has been a decline in the number of cities bidding to host such events (MacAloon, 2017). In attempts to mitigate these economic and environmental concerns, bids for major sport events are beginning to take a co-hosted structure, where more than one city hosts the event (Byun et al., 2019). This

co-hosted format can see multiple cities within one country house venues for events (Bakhsh et
al., 2018), or multiple cities across multiple countries can host aspects of the event (Byun et al.,
2019). This format is thought to ease the burden of hosting through pooling and sharing
resources (e.g., venues, financial resources; Byun et al., 2019) and potential social and
economic benefits.

When this co-hosting phenomenon began to emerge, scholars were interested primarily in the strategic motivations behind bidding to co-host events (Byun et al., 2019, 2021; Wise & Lee Ludvigsen, 2022), and the practice of implementing co-hosted events through examining governance structures (Hoff et al., 2023; Kristiansen et al., 2018; Ludvigsen, 2019; Ludvigsen, 2020). Largely, co-hosting major sport events can be a strategic tool for organizational legitimacy (Byun et al., 2021), strategic alliances (Byun et al., 2019), and for geopolitical goals (Wise, 2022).

Recently, the impacts of co-hosted events have begun to be considered and evaluated. 132 Perceived event benefits for host residents were higher when the co-hosted event was 133 perceived as one event, revealing the importance of event branding (Walzel & Eickhoff, 2023). 134 In terms of TDEs, Hahm et al. (2020) examined if the FIFA World Cup co-hosted by South Korea 135 136 and Japan in 2002 could serve to inspire increased football participation among adult males in the two countries. Their study findings support the ability for co-hosted events to have 137 inspiration effects across host jurisdictions. With some future major sport events also set to take 138 on a multi-country host format (e.g., FIFA 2026 and 2030), further insights into the potential of 139 140 these events to elicit TDEs is worthy of investigation. While Hahm et al. (2020) provided preliminary support for the potential of TDEs to occur from co-hosted major sport events, there 141 has yet to be a population-level investigation into TDEs and co-hosted events. As such, our 142 study addresses this gap and adds further nuance to the mechanisms by, and contexts in, which 143 144 TDEs might be achieved.

145 **TDE Mechanisms** 

146 Investigations into TDEs at the population-level have yielded mixed results. Some 147 investigations have found that there are no observable changes in sport and/or physical activity related to major sport events (e.g., Craig & Bauman, 2014), others have found temporary 148 increases in sport and/or physical activity (Pappous, 2011; Potwarka et al., 2018; Veal et al., 149 150 2012), and some have found positive changes in participation rates (e.g., Aizawa et al., 2018; 151 Kokolakakis et al., 2019; Potwarka & Leatherdale, 2016). Until recently, the ways in which these population-level changes have been realized have received little research attention. 152 153 In their conceptualization of TDEs, Potwarka and Wicker (2021) identified three 154 mechanisms by which TDEs might occur: 1) spectating/watching elite sport performance can inspire participation; 2) major sport events can stimulate participation in the hosting regions; and 155 3) success at a major sport event can inspire participation in the successful athlete/team's home 156 region. The following sections provide an overview of research conducted on these three 157 158 mechanisms, and how a co-hosted format might affect these mechanisms.

### 159 **Spectating**

While some scholars question the ability of watching elite sport performances to inspire 160 sport participation at a mass level (e.g., Boardley, 2014), others have found that watching elite 161 athletes can have a temporary inspirational effect (e.g., Potwarka et al., 2018). Literature on 162 sport participation outcomes from watching elite sport performance in-person has yielded 163 positive findings. It has been consistently found that live spectatorship can serve to inspire those 164 165 already involved or interested in sport to be more committed to or increase their participation 166 frequency (Ramchandani et al., 2019), to try a new sport (Potwarka et al., 2020; Teare et al., 2021), or to try the sport on display (Potwarka et al., 2018). When considering a co-hosted 167 format, the wider geographic reach of event venues can create more opportunities to access 168 live spectator experiences, thus harnessing potential for amplified TDEs through spectating. 169 170 Hosting

Some investigations into changes in rates of sport and physical activity at a populationlevel have largely found little to no support for TDEs. This was the case for investigations
considering various editions of the Olympics and Paralympic Games including Sydney 2000
(e.g., Veal et al., 2012), Athens 2004 (e.g., Pappous, 2011), Vancouver 2010 (Craig & Bauman,
2014), and London 2012 (e.g., Henry, 2016).

Potwarka & Leatherdale (2016) found similar results at the national and provincial level. 176 however, at the regional level, significant increases in leisure time physical activity were found in 177 178 regions that housed event venues. This finding indicates that TDEs might occur in specific 179 contexts. Similarly, Kokolakakis et al. (2018) found that regular sport participation in England increased after the London 2012 Olympic and Paralympic Games. However, the increase was 180 largest in the year following the Games, and it was realized differently among different 181 182 populations. Relatedly, Aizawa et al. (2018) found that cohorts that experienced the 1964 183 Olympic Games in Tokyo lived more active lifestyles than cohorts that did not decades after the event. This finding indicates that TDEs might also appear long after the event concludes. As 184 with spectating, a co-hosted format expands the geographic reach of an event, with potential 185 effects in multiple jurisdictions. While mass participation changes in sport and physical activities 186 187 are not typically found with single-city hosted events, the multi-city context remains relatively unexplored. There is support for TDEs in specific contexts; perhaps the co-hosted format is 188 aligned with these special circumstances? 189

Of note, many of these changes (or lack thereof) can be explained by the specific contexts of the host region. Specifically, if strategic tactics were used by organizations in the host region to stimulate sport participation (i.e., if/how the event was leveraged; Chalip, 2006, 2014). Indeed, community sport clubs are necessary to facilitate and accommodate an increase in sport participation from a sport event (Castellanos-García et al., 2021; Hayday et al., 2017). Many investigations have found that community sport clubs lack capacity to engage in 196 leveraging or take on new participants, or did not engage in leveraging (Misener et al., 2015;

197 Taks et al., 2018).

# 198 Sporting Success

Similar to the hosting mechanism described above, the findings around athlete/team 199 200 success inspiring participation in their home nation or region are also mixed. For instance, 201 Storm and Holum (2021) found that there was no increase in Danish soccer club membership associated with Danish national team success. Frick and Wicker (2016) found an increase in 202 203 soccer club membership among males, but not females, in Germany associated with German 204 men's national team success. Frawley and Van den Hoven (2015) concluded that girls, women, and men's participation in soccer increased in Australia when the national team qualified for the 205 2006 FIFA World Cup, but participation among boys under the age of 15 decreased. Haut and 206 207 Gaum (2018) reported that success in international table tennis served to inspire participation in 208 some countries, but not others. Taking a more regional approach, Potwarka et al. (2023) found that Canadian youths' leisure time physical activity levels increased in hometowns of Canadian 209 athletes that medaled in the London 2012 Olympic Games. Indeed, findings regarding this 210 mechanism are inconsistent and inconclusive. In the context of a co-hosted event across 211 212 multiple jurisdictions, there is an opportunity to consider the interactive effects of elite athlete/team success and hosting the event. We advance the position that the presence of 213 multiple TDE mechanisms can amplify the ability of an event to inspire participation. 214

215 Data Availability

As evident from the discussion above, findings around the occurrence of TDEs and its underlying mechanisms, particularly hosting and success, are somewhat mixed and inconsistent. What many of the population-level studies have in common is that they use the best *available* data, rather than the *best data* to answer the research question. Much of the population-level data available is not sport-specific (e.g., general sport measures) or specific to sport (e.g., leisure time physical activity), and varies between countries in terms of definition of

sport/physical activity, how the questions are asked, and when the data collection occurs. The
lack of uniform, consistent, and relevant sport participation data to assess TDEs is not a new
realization. In fact, scholars have been calling for consistent, cross-national, longitudinal data to
assess TDEs (e.g., Annear et al., 2019; Potwarka & Wicker, 2021).

226 While not dedicated to specific sports, the Eurobarometer survey assesses physical 227 activity and is simultaneously disseminated across European Union member countries. The Eurobarometer therefore addresses several calls for consistent cross-national physical activity 228 229 surveillance data. Further details about the relevant data captured by the Eurobarometer and 230 how this data has been utilised in our study is explained in the methods later. As such, the Eurobarometer has been drawn from to address many issues in sport management related to 231 physical activity. For example, Van Tuyckom (2011) used the dataset to examine differences in 232 233 physical activity levels among member nations. The Eurobarometer has also been used to 234 consider wellbeing from a cross-national perspective in relation to physical activity (Wicker & Frick, 2015) and sport volunteering (Wicker & Downward, 2019). 235

Recently, Potwarka and Ramchandani (2023) examined the 'success' mechanism of 236 TDE using the Eurobarometer by assessing the relationship between Olympic athlete 237 238 participation and medal success, and physical activity rates in athletes' home countries around the time of the Summer and Winter Olympic Games. In alignment with previous TDE findings, 239 the results were mixed, largely revealing that athlete success might be associated with a 240 241 reduced decline in physical activity levels in their home countries, compared to other countries 242 whose physical activity rates were declining at a much faster rate. With a co-hosted format, the 243 prospect of an intersection of elite athlete success and hosting can serve to amplify the inspirational effect of major sport events. 244

245

Methods

246 Study context

247 The UEFA European Football Championships (Euro) are a major sport event held every four years. Like many other major sport events, the Euro tournament has been posited to bring 248 about social impacts (Horne, 2010). For instance, Ludvigsen and Wise, (2024) posit that 249 250 collective pride, passion, and joy can be harnessed prior to the event to amplify feel-good 251 effects related to Euro 2024. In terms of closer to the time of the event, Mutz (2019) found a 252 temporary increase in life satisfaction among football fans that was not sustained long-term. Interestingly, Garbacz et al. (2017) and Jaskulowski and Surmiak (2016) both considered 253 residents' perception of impacts of the Euro 2012 tournament, with contradictory findings. While 254 255 Garbacz et al. (2017) did find that residents had some negative perceptions of the event, they also found that host city residents felt the event improved city destination image, and brough 256 257 community members together. Jaskulowski and Surmiak (2016), however, found that residents 258 had a lack of trust in the government and were not convinced the event had wide-reaching 259 impact. Indeed, these contradictory findings resonate with the broader body of literature on social impacts from sport events that highlights the need for further research. To the best of our 260 knowledge, there has been no previous attempt to assess the TDE of any Euro tournament. 261 Euro 2020 was the 16<sup>th</sup> edition of the tournament, which was staged in 2021 due to 262 263 COVID-19 restrictions. A total of 24 countries qualified for Euro 2020 and matches were played in venues spread across 11 host cities and countries. The selection of the host cities did not 264 guarantee an automatic gualifying place to the national team of that country. Table 1 shows the 265

location of the venues, the number of matches they staged and whether the respective national
teams qualified for the tournament. Two host countries – Azerbaijan and Romania – did not
qualify.

269

#### <<INSERT TABLE 1 ABOUT HERE>>

## 270 Data sources

Eurobarometer is the polling instrument used by the European Commission, the European Parliament and other EU institutions and agencies to monitor regularly the state of

public opinion in Europe on issues related to the European Union as well as attitudes on
subjects of political or social nature. Eurobarometer surveys rely on a randomly selected sample
of at least 1,000 persons aged 15 years and more per country or territory reported. A sample
size of 500 persons is used in countries or territories with a population of below one million
inhabitants. Respondents for Eurobarometer surveys are selected randomly and the total
sample is weighted to ensure demographic and geographical representativeness.

We utilised data from the 2017 (pre Euro 2020) and 2022 (post Euro 2020) iterations of 279 the Special Eurobarometer survey on Sport and Physical Activity to assess whether there were 280 281 any population-level changes in sport/exercise participation in countries that were involved in co-hosting the tournament and how this compared with non-host countries. We also examined 282 whether the level of success achieved by national teams in the tournament was associated with 283 any changes in sport/exercise participation rates observed the same time period. Because sport 284 285 and physical activity data are not collected on an annual basis through Eurobarometer, the 2017 iteration provided the most recent data prior to the staging of Euro 2020 and the 2022 iteration 286 provided the most recent post-event data that could be examined. Respondent-level data were 287 not available for secondary analysis, and only country-level statistics were accessible for the 288 289 purpose of our study. These factors, in turn, influenced the study design and the scope of the analysis that could be conducted with the best available data at our disposal; for these reasons, 290 other techniques such as panel regression cannot be employed. 291

The 2017 Special Eurobarometer survey was carried out in 28 EU Member States in December 2017 and had an overall sample size of 28,031. The 2022 Special Eurobarometer survey was carried out in 27 EU Member States (excluding the UK) between April-May 2022 and the sample size achieved was 26,578. Both these surveys covered the frequency of exercising or playing sport, which was measured using the following question:

How often do you exercise or play sport? By "exercise" we mean any form of physical activity

which you do in a sport context or sport-related setting, such as swimming, training in a fitness

299 centre or a sport club, running in the park.

Responses to this question were captured using the following options: *'never'*; *'seldom'* 

301 (3 times a month or less often); 'with some regularity' (1 to 4 times a week); 'regularly' (5 times a

302 week or more). In our analysis we have considered two participation thresholds: (1) any

303 frequency – which includes 'seldom', 'with some regularity' and 'regularly'; (2) weekly –

304 comprising 'with some regularity' and 'regularly'.

The surveys contain sport/exercise participation data for 17 countries that co-hosted and/or

qualified for Euro 2020. Countries for which data are not available include: Azerbaijan (co-host),

307 England (co-host and qualified), North Macedonia (qualified), Scotland (co-host and qualified),

Russia (co-host and qualified), Switzerland (qualified) Turkey (qualified), Ukraine (qualified), and
Wales (qualified).

# 310 Sample selection and analytical approach

Our study incorporates the 17 countries that co-hosted and/or gualified for Euro 2020 for 311 which data on participation in sport/exercise was available from the 2017 and 2022 Special 312 313 Eurobarometer surveys. Our final sample consists of six co-hosts that qualified for the tournament (Denmark, Germany, Hungary, Italy, Netherlands, and Spain), one co-host did not 314 gualify (Romania), and ten non-host gualifying countries (Austria, Belgium, Croatia, Czech 315 Republic, Finland, France, Poland, Portugal, Slovakia, and Sweden). To address RQ1 (i.e., 316 317 What were the population-level changes in sport/exercise based on co-hosting status?), we conducted a comparative analysis of changes in sport/exercise participation rates over time for 318 each country included in the sample, comprising co-hosts (n=7) and non-hosts (n=10). 319 The analysis of performance is confined to the 16 countries who qualified for Euro 2020 320 321 (excluding Romania who co-hosted but did not qualify). As shown in Table 2, among this cohort

322 (n=16), eight countries performed better than they did at Euro 2016, including two co-hosts –

323	Denmark and the Netherlands – who did not qualify for the previous edition of the tournament
324	and therefore improved by virtue of qualification for Euro 2020. Two non-host countries
325	matched their Euro 2016 performance. For six countries, their performance between the 2016
326	and 2020 editions of the tournament deteriorated, including two co-hosts – Germany and
327	Hungary. This comparative data on the level of success achieved by countries at Euro 2020 was
328	utilised to address RQ2 (i.e., What were the population-level changes in sport/exercise based on
329	the relative performances of national teams?).
330	< <insert 2="" about="" here="" table="">&gt;</insert>
331	For the 16 countries listed in Table 2, we also developed five mutually exclusive clusters
332	based on a combination of their hosting status and comparative performance: (1) Hosted and
333	performed better (n=4); (2) Hosted and performed worse (n=2); (3) Non-host and performed
334	better (n=4); (4) Non-host and maintained performance (n=2); and, (5) Non-host and performed
335	worse (n=4). These clusters were used to address RQ3 (i.e., What were the population-level
336	changes in sport/exercise based on the intersection of co-hoisting status and performance?).
337	Results
338	Co-hosts versus non-hosts (RQ1)
339	Table 3 shows the rates of sport/exercise participation in 2017 (pre-tournament) and
340	2022 (post-tournament) for the seven Euro 2020 host countries and the ten non-host countries
341	included in our sample. For the more inclusive measure of sport/exercise participation (any
342	frequency), in three out of the seven host countries – Germany, Italy and the Netherlands –
343	there was a statistically significant increase in participation between rates 2017 and 2022
344	(p<0.05). For three other co-hosts – Denmark, Romania and Spain the changes in country
345	participation rates at any frequency were not of a sufficient magnitude to be statistically
346	significant (p>0.10). There was a statistically significant decline in participation at any frequency
347	in Germany relative to the baseline year (p<0.01).

348	Using the narrower threshold of sport/exercise participation (weekly), Italy exhibited a
349	statistically significant increase between 2017 and 2022 (p<0.05), Germany and Hungary had a
350	significant decline in their post-tournament participation rates (p<0.01) and for the other four co-
351	hosts the changes observed were not significant (p>0.10).
352	< <insert 3="" about="" here="" table="">&gt;</insert>
353	Table 4 shows the extent to which participation rates changed for Euro 2020 co-hosts
354	and non-hosts during the time period under review. Among the sample of co-hosts, the
355	proportion of countries where participation at any frequency either increased (3/7) or remained
356	stable (3/7) in 2022 was 86%. The corresponding score for our sample of non-host countries
357	(n=10) was 80%. Therefore, at face value, participation at any frequency was less likely to
358	decline among co-hosts compared with non-hosts (1/7 co-hosts = 14% versus 2/10 non-hosts =
359	20%). Co-hosts were also less likely to exhibit a decline in weekly participation (2/7 co-hosts =
360	29% versus 4/10 non-hosts = 40%).
361	< <insert 4="" about="" here="" table="">&gt;</insert>
362	Analysis by performance (RQ2)
363	Among the sub-sample of eight countries that performed better at Euro 2020 relative to
364	their performance at Euro 2016, statistically significant increases in post-event participation at
365	any frequency were observed in six countries including two co-hosts – Italy (+5.3%) and the
366	Netherlands (+6.5%) – as well as Austria (+4.3%), Czech Republic (+15.2%), Finland (+4.7%)
367	and Sweden (+3.3%). For the two other countries that performed better at Euro 2020 – co-hosts
368	Denmark and Spain – the rate of sport/exercise participation at any frequency did not change
369	significantly between 2017 and 2002.
370	For the two countries which performed at the same level at Euro 2020 compared with
371	Euro 2016, participation at any frequency increased significantly in Croatia (+16.0%) but
372	remained stable in Belgium. Among the six countries for which performance at Euro 2020
373	deteriorated compared with Euro 2016: two experienced a statistically significant increase in

374 participation at any frequency including co-host Germany (+5.7%) and Slovakia (+5.5%); three others experienced a statistically significant decline, co-host Hungary (-6.5%) together with 375 Poland (-8.4%) and Portugal (-4.9%); and, no significant change was found for France. 376 When comparing the direction of change in the sport/exercise participation rates for the 377 378 cohort of countries that demonstrated an improved performance with the cohort for which 379 performance either deteriorated or stayed at the same level, positive changes in participation at any frequency were more prevalent within the former cohort. Conversely, for both thresholds of 380 381 participation examined (any frequency and weekly participation), negative changes were more 382 evident among countries for which performance did not improve. These findings are supported by the data presented in Table 5. 383 <<INSERT TABLE 5 ABOUT HERE>> 384 Hosting status and performance clusters (RQ3) 385 As an extension of the analysis presented above, the 16 qualifying countries can be 386 grouped into five distinct clusters based on a combination of their hosting status and 387 comparative level of performance at Euro 2020. These five clusters are outlined below, together 388 with the direction of changes in sport/exercise participation rates among countries within each 389 390 cluster. 391 Hosted and performed better – Denmark, Italy, Netherlands and Spain. Participation at any frequency and weekly participation among all countries in this cluster either 392 increased or remained stable. 393 Hosted and performed worse – Germany and Hungary. Participation at any 394 frequency increased in Germany but declined in Hungary. For both countries, the weekly 395 396 participation rate declined.

Non-host and performed better – Austria, Czech Republic, Finland and Sweden.
 Participation at any frequency increased among all countries in this cluster. Weekly
 participation increased in the Czech Republic, remained stable in Austria and Finland,

- and declined in Sweden.
- Non-host and maintained performance Belgium and Croatia. For Croatia there
   was an increase at both participation thresholds. For Belgium participation at any
   frequency remained stable but declined for weekly participation.
- Non-host and performed worse France, Poland, Portugal and Slovakia. For
   Poland and Portugal, there was a decline at both participation thresholds. No significant
   change was found for France at both participation thresholds. Participation increased for
   Slovakia at both thresholds.

The small sub-samples for each cluster make it difficult to draw any definitive conclusions. 408 However, as illustrated by the data in Table 6, at both participation thresholds examined, the 409 410 incidence of a statistically significant decline in sport/exercise participation over time was less likely to be seen to occur for countries in the 'hosted and performed better' cluster (none 411 experienced a decline in participation rates at either threshold) and with the 'non-host and 412 performed better' cluster (none experienced a decline in participation at any frequency and only 413 one out of four experienced a decline in weekly participation). By contrast, half of the 'non-host 414 415 and performed worse' cluster exhibited a significant decline in participation at both thresholds and for the two countries in the 'hosted and performed worse' cluster their weekly participation 416 417 rates declined significantly.

418

# <<INSERT TABLE 6 ABOUT HERE>>

419

#### Discussion

This paper sought to examine TDEs in relation to UEFA Euro 2020, which was staged across venues in 11 different host European countries to provide a more nuanced understanding of TDE mechanisms related to both hosting and experiencing success, which has not been examined previously through a co-hosting model. In doing so, we further interrogated data availability and applicability to evaluate TDEs.

## 425 **TDE Mechanisms**

426 Potwarka and Wicker (2021) identified three mechanisms through which TDEs might occur: 1) spectating/watching elite athletes, 2) hosting major sport events, and 3) success of a nation 427 at a major sport event. With the co-hosting of major sport event phenomena being fairly new, 428 429 there have yet to be many investigations to-date around TDE mechanisms in a co-hosted 430 format. The one exception examined adult male participation in football in response to hosting the FIFA World Cup in South Korea and Japan (Hahm et al., 2020). The results of that study 431 432 were supportive of the ability of the event to stimulate football participation among the specific 433 population of adult males in each host country. Other investigations (e.g., Craig & Bauman, 2014; Potwarka et al., 2016; Veal et al., 2012) into single host nations, however, have arrived at 434 435 mixed results. The findings from our study provide some tentative evidence in support of a TDE 436 in some Euro 2020 co-hosts, but a direct cause and effect relationship is difficult to establish. 437 Rather than explain the findings for each specific country, overall trends are reflected upon as they provide key implications for TDE wicked problems. 438

#### 439 Hosting a major sport event (RQ1)

Our results indicate that sport participation in some host countries increased post event,
 some countries saw no significant change, and some experienced a decrease. However, similar
 trends occurred for non-host countries. Host countries were less likely to experience a decrease
 in sport participation, for inclusive and restrictive participation thresholds, than non-host
 countries.

These findings contribute three key insights into TDEs. First, our findings reflect the overall trend of mixed evidence reported in the TDE literature: some population-level investigations have not supported the ability of major sport events to stimulate sport participation in host nations (e.g., Craig & Bauman, 2014), while others have found some support (e.g., Pappous et al., 2011; Potwarka et al., 2016; Veal et al., 2012). Our study indicates that even in a co-hosted context, evidence of TDEs and the mechanism by which they might be produced are varied.

451 Second, our study further supports the notion that simply gualifying to participate in major 452 sport events (without hosting them) can produce TDEs for non-host nations. As discussed below, the notion of success of non-host nations (Potwarka et al., 2023) has been previously 453 explored in the literature. However, our findings indicate that without factoring in nation success, 454 455 simply participating in a major sport event could have similar TDE characteristics to that of host 456 nations, albeit characterized by mixed findings. This finding suggests that perhaps in the context of the Euros, where the geographic proximity of host to non-host countries participating in the 457 458 event is relatively small, the investment of hosting is not a requirement to stimulate some types 459 of impacts of sport events, such as sport participation.

Lastly, our results indicate that host nations were less likely to report a decrease in regular 460 sport participation. This introduces the notion that rather than inspiring sport participation, TDEs 461 462 can be conceptualized in terms of their ability to "protect" against sport participation decreases. 463 This idea is an important reconceptualization of the phenomenon; as protecting against sedentary behaviours is an increasing public health issue in many western countries (Melvin et 464 al., 2020). An explanation for this finding is twofold. As live spectatorship has been found to be 465 an effective mechanism for inspiring sport participation (Potwarka et al., 2020; Ramchandani et 466 al., 2019; Teare et al., 2021), perhaps the access to live spectatorship opportunities is greater 467 for individuals in host countries than for those in non-host countries. Moreover, as many major 468 sport events, such as the Euros require public investment for hosting (Gammon, 2012), 469 470 additional resources are funnelled into host communities for staging the event of which sport 471 organizations can take advantage (Teare et al., 2024). Perhaps this influx of sport resources is 472 another explanation for the protective nature of hosting events.

# 473 Success at a major sport event (RQ 2)

Similar to the findings described above, the mechanism of national success at major sport
events presents mixed findings. In line with previous literature considering national team
success and TDEs (e.g., Frawley & Van den Hoven, 2015; Frick & Wicker, 2016; Haut & Gaum,

477 2018), our findings indicate that change in sport participation was inconsistent with regards to association with national team success. Our results indicate that countries whose performance 478 improved between Euro 2016 and Euro 2020 were more likely to experience an increase in 479 population-level sport participation frequency than countries whose performance worsened. 480 481 At the same time, countries whose performance worsened were more likely to experience a decrease in sport participation frequency than countries whose performance improved. Success 482 can serve as a protective measure against a decreasingly active population (Melvin et al., 483 484 2020), providing further support for the reconceptualization of TDEs. This could be explained by 485 successful teams often making it further along in tournaments like the Euros, thus there are more opportunities for spectatorship. 486

## 487 Intersection of hosting and performance (RQ3)

Host countries that performed better at Euro 2020 typically increased or maintained their 488 sport participation levels post-event, while host countries that performed worse than the 489 previous iteration of the event tended to have decreases in sport participation. Compared to 490 non-host nations that seemed to have more diverse sport participation patterns, our findings 491 suggest that the investment and anticipation associated with hosting could amplify the host 492 493 country residents' response to standings and success. As event organizers do not have control over match outcomes, this finding presents the potential for a high risk-high reward scenario. If 494 a country were to invest in hosting, our findings indicate that if the national team performs well, 495 496 there could be greater likelihood of there being an associated increase in, or at least a 497 protective effect around, sport participation levels. Conversely, an unfavourable performance 498 could potentially have the opposite effect. Indeed, findings of TDE research are consistently 499 inconsistent and can be challenging to decipher.

# 500 Wicked Problem: Best available data

501 Through this study, we sought to critically assess data availability and applicability to 502 evaluate TDEs. The Eurobarometer was deemed to be the best available data to assess TDEs for

the purpose of our study given the co-hosting model of Euro 2020. As the same questions are used to assess sport and physical activity participation over different time points and across EU countries, legitimate temporal and spatial comparisons could be made. With the benefit of hindsight, while the Eurobarometer is certainly the best *available* data, our findings are an exemplar of the most predominant wicked problem for TDE research: the best available data is not always sufficient to fully understand TDEs.

With regard to the Eurobarometer, sport participation data does not cover all countries 509 510 involved with Euro 2020. Thus, a fulsome comparison across all relevant countries could not be 511 achieved. Moreover, sport and exercise in organized and non-organized settings were captured in the items used. While a broad item is helpful to track general health trends, being able to 512 capture participation in the specific sport on display (i.e., soccer/football) is an important nuance 513 514 for TDE research. Similarly, only adult responses are included in the Eurobarometer. It is 515 suggested that TDEs could manifest in different ways for different age groups (Teare & Taks, 2021), thus youth participation data across jurisdictions would be helpful to further unpack 516 TDEs. It is also important to note that the Eurobarometer surveys take a repeat cross-sectional 517 design. While overall participation trends are captured, causal relationships between the event 518 519 and sport participation cannot be identified without a longitudinal approach to data collection from the same set of respondents. 520

521 Finally, the time series data points available for analysis were five years apart (2017 and 522 2022). While major events are thought to be significant, a wide rage of global, regional, and 523 local factors that take place within the five-year timeframe that can affect sport participation. Of 524 note, the COVID-19 pandemic took place during the timeframe under investigation, where there 525 were global effects on sport participation (Papaioannou et al., 2020). Largely, due to public 526 health measures, sport participation drastically declined in this timeframe (Papaioannou et al., 527 2020). Perhaps the decreases in sport participation identified in our study were amplified

528 because of the pandemic-related effects. On the other hand, the second time point of data

529 collection (2022) was around the time of health-related restrictions loosening, or even ending.

530 Perhaps the excitement to return to social activities, such as sport, could have amplified any

531 increases in sport participation in some countries.

532 We offer these critiques not to devalue the insights that the Eurobarometer can offer, but rather to support our calls for: (1) consistent and more robust sport participation surveillance 533 data across jurisdictions; and, (2) primary data to further interrogate the mechanisms by which 534 TDEs might occur. While these calls are not new (e.g., Annear et al., 2019; Potwarka & Wicker, 535 536 2021), it has become necessary to stress the importance of collective efforts between government-led population-level data collection and academic researchers. To justify hosting 537 major sport events and capture their impacts more accurately, credible data is needed to identify 538 areas where benefits can be derived for host populations. 539

Furthermore, there is a need for better sport-specific participation data at the population-540 level. General physical activity measures make it difficult to identify the role of sport events in 541 inspiring sport participation as a specific type of sport/physical activity. More specifically, one 542 measure for general sport participation amalgamates participation in all sports; we know TDEs 543 544 might not lead to participation in all sports, but rather the sport on display (e.g., Potwarka et al., 2020; Teare et al., 2021). Collecting better sport-specific data will allow for the population-level 545 investigation of sport-specific events on sport-specific participation. Moreover, consistent 546 547 measures for sport-specific participation across jurisdictions (i.e., countries) can aid in further 548 understanding the roles and intersections of TDE mechanisms.

Researchers are encouraged to collect primary, longitudinal data with specific populations. There is a lack of longitudinal research and research with sub-populations such as youth and equity-deserving populations that are traditionally excluded form sport participation opportunities such as individuals with a disability, and racialized individuals (Teare & Taks, 2021). By collecting

Iongitudinal data around sport events with these populations, more specific mechanisms toleverage TDEs can be developed.

#### 555 **Conclusion**

The findings from this investigation yield important practical, theoretical, and research 556 557 implications. In terms of practical implications, our findings highlight how co-hosting major sport events might be a vehicle for protecting against participation decline while sharing the staging 558 costs with other nations. This finding is tied to our theoretical implications: while TDEs have 559 560 been thought to inspire sport participation, our findings offer a reconceptualization of this notion 561 to suggest that TDEs could also serve to protect against declining rates of sport participation. This reconceptualization can have further implications where TDEs can be used as a tool for 562 public health interventions. Moreover, this study is the first (to our knowledge) to consider the 563 TDE mechanisms of major sport event hosting and success across multiple jurisdictions 564 565 simultaneously. While more nuanced data is needed to investigate this intersection further, our findings do offer theoretical implications that the mechanisms of TDEs offered by Potwarka and 566 Wicker (2021) might be amplified when considered together. 567

Finally, we have offered a research agenda to better understand mechanisms that underpin TDEs. In addition to the research agenda to address wicked problems of TDEs suggested above, the Eurobarometer data offered valuable insights across jurisdictions, thus we suggest a more comprehensive exploration of previous iterations of the Eurobarometer that capture data on sport and physical activity in European Union member states to examine TDEs in relation to a wider portfolio of major sports events.

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744

- 746 Table 1

# 748 Euro 2020 co-hosts

Host city	Host country	Number of matches staged	National team qualified?	
Amsterdam	Netherlands	4	Yes	
Baku	Azerbaijan	4	No	
Bucharest	Romania	4	No	
Budapest	Hungary	4	Yes	
Copenhagen	Denmark	4	Yes	
Glasgow	Scotland	4	Yes	
London	England	8	Yes	
Munich	Germany	4	Yes	
Rome	Italy	4	Yes	
Saint Petersburg	Russia	7	Yes	
Seville	Spain	4	Yes	

752	Table	2
		_

# 753

# Hosting status and comparative performance at Euro 2020

754 755

Country	Host	Euro 2016	Euro 2020	Performance 2020 v 2016	
Denmark	Yes	Did not qualify	Semi final	Improved	
Italy	Yes	Quarter final	Winner	Improved	
Netherlands	Yes	Did not qualify	Round of 16	Improved	
Spain	Yes	Round of 16	Semi final	Improved	
Austria	No	Group stage	Round of 16	Improved	
Czech Republic	No	Group stage	Quarter final	Improved	
Finland	No	Did not qualify	Round of 16	Improved	
Sweden	No	Group stage	Round of 16	Improved	
Belgium	No	Quarter final	Quarter final	No change	
Croatia	No	Round of 16	Round of 16	No change	
Germany	Yes	Semi final	Round of 16	Deteriorated	
Hungary	Yes	Group stage	Round of 16	Deteriorated	
France No Runn		Runners up	Round of 16	Deteriorated	
Poland	No	Quarter final	Round of 16	Deteriorated	
Portugal	No	Winner	Round of 16	Deteriorated	
Slovakia	No	Round of 16	Group stage	Deteriorated	

756 757

SI No

Note: Excludes Romania who co-hosted Euro 2020 but did not qualify for the tournament.

# 758 759 760 Table 3

Changes in sport/exercise participation rates among Euro 2020 co-hosts and non-hosts

761

	Any frequency of participation					Weekly participation			
Countries	2017	2022	Chang e	Sig. (p)	20	017	2022	Chang e	Sig. (p)
Co-hosts									
Denmark	79.9%	80.6%	+0.6%	0.728	62	.6%	59.2%	-3.4%	0.115
Germany	62.0%	67.7%	+5.7%	0.001	48	.4%	43.2%	-5.2%	0.004
Hungary	47.3%	40.8%	-6.5%	0.003	32	.8%	26.0%	-6.7%	0.001
Italy	38.5%	43.8%	+5.3%	0.015	28	.2%	33.5%	+5.3%	0.010
Netherlands	68.6%	75.1%	+6.5%	0.001	56	.3%	60.0%	+3.7%	0.085
Romania	36.5%	37.3%	+0.7%	0.731	18	.9%	19.7%	+0.8%	0.637
Spain	53.6%	53.1%	-0.5%	0.811	42	.9%	41.8%	-1.1%	0.610
Non-hosts									
Austria	60.6%	64.9%	+4.3%	0.045	38	.2%	41.6%	+3.4%	0.115
Belgium	71.0%	71.7%	+0.6%	0.750	48	.6%	42.5%	-6.0%	0.005
Croatia	43.7%	59.7%	+16.0%	0.000	23.5%		29.5%	+6.0%	0.002
Czech Republic	58.8%	74.0%	+15.2%	0.000	32	.1%	44.0%	+11.9%	0.000
Finland	87.3%	92.0%	+4.7%	0.000	69	.1%	71.2%	+2.1%	0.306
France	53.9%	55.2%	+1.3%	0.557	41	.9%	41.6%	-0.3%	0.880
Poland	43.8%	35.3%	-8.4%	0.000	28	.6%	22.8%	-5.8%	0.003
Portugal	31.9%	27.0%	-4.9%	0.015	26	.3%	22.2%	-4.1%	0.028
Slovakia	51.0%	56.6%	+5.5%	0.011	28	.2%	34.5%	+6.3%	0.002
Sweden	84.8%	88.1%	+3.3%	0.030	67	.3%	59.3%	-7.9%	0.000

# 764 Table 4

# 765

Changes in sport/exercise participation between 2017 and 2022 according to hosting status
 767

Heating status	Any frequ	lency of part	ticipation	Weekly participation		
	Increase	Stable	Decrease	Increase	Stable	Decrease
Co-bosts (n=7)	3/7	3/7	1/7	1/7	4/7	2/7
	43%	43%	14%	14%	57%	29%
Non-hosts	6/10	2/10	2/10	3/10	3/10	4/10
(n=10)	60%	20%	20%	30%	30%	40%
$O_{vorall}$ (n=17)	9/17	5/17	3/17	4/17	7/17	6/17
	53%	29%	18%	24%	41%	35%

771

772 Changes in sport/exercise participation between 2017 and 2022 according to Euro 2020

773 performance

774

Performance	Any frequency of participation			Weekly participation			
	Increase	Stable	Decrease	Increase	Stable	Decrease	
Improved	6/8	2/8	0/8	2/8	5/8	1/8	
(n=8)	75%	25%	0%	25%	62.5%	12.5%	
No change	1/2	1/2	0/2	1/2	0/2	1/2	
(n=2)	50%	50%	0%	50%	0%	50%	
Deteriorated	2/6	1/6	3/6	1/6	1/6	4/6	
(n=6)	33%	17%	50%	17%	17%	67%	

- Table 6
- 777 778 779 780
  - Changes in participation by hosting status and comparative performance

Cluster	Any frequ	ency of pa	rticipation	Weekly participation			
Clusiel	Increase	Stable	Decrease	Increase	Stable	Decrease	
Hosted and performed better (n=4)	2/4 50%	2/4 50%	0/4 0%	1/4 25%	3/4 75%	0/4 0%	
Hosted and performed worse (n=2)	1/2 50%	0/2 0%	1/2 50%	0/2 0%	0/2 0%	0/2 100%	
Non-host and performed better (n=4)	4/4 100%	0/4 0%	0/4 0%	1/4 25%	2/4 50%	1/4 25%	
Non-host and maintained performance (n=2)	1/2 50%	1/2 50%	0/2 0%	1/2 50%	0/2 0%	1/2 50%	
Non-host and performed worse (n=4)	1/4 25%	1/4 25%	2/4 50%	1/4 25%	1/4 25%	2/4 50%	