Does Local Sporting Success Affect Sport Participation? An Examination of Danish Professional Soccer's Effect on Club Membership

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Abstract

Research question

The body of literature examining potential trickle-down effects from elite sport success to mass sport participation has grown considerably over the years. The evidence is mixed but generally suggests that when a nation's athletes win medals at international tournaments – for example the Olympic Games or the FIFA World Cup – it cannot be expected to inspire amateurs to take up sport themselves. So far, existing research has primarily focused on international elite success. Effects from local elite clubs playing in national leagues have only been examined once.

Research methods

Since recent research indicates that national and cultural contexts can influence whether a potential trickle-down effect materialises, this paper aims to test these factors in another setting. By deploying panel data regression models on data from Danish top-tier professional soccer, we test whether local club performance affects local membership levels in Denmark.

Results and Findings

We do not find direct positive effects from sporting success. However, we do identify negative effects on membership figures due to club relegation indicating that sporting failure can affect mass participation.

Implications

A key recommendation drawn from this study is that politicians, sport managers and civil servants should be careful using the double pyramid/'virtuous circle of sport' metaphor as the basis of their decision-making because it is an imprecise theoretical

interpretation of reality. Instead, stakeholders should focus effort and resources on other

relevant factors that potentially can lead to higher – or even lower – levels of

participation in order to stimulate such factors (or prevent those that affects negatively).

Future studies should examine these implications further.

Introduction

Despite a great deal of evidence that international sporting success (Haut & Gaum, 2018), elite sport role models (Feddersen, Jacobsen, & Maennig, 2009; Mutter & Pawlowski, 2014) and hosting (major) sporting events (Storm, Nielsen, & Jakobsen, 2018) do not necessarily increase the average person's level of physical activity, it is still a common perception that they do. Politicians, public authorities and sport managers often claim that investment in elite sport and its events will 'trickle down' to inactive people, inspiring them to take up a given sport themselves (De Bosscher, Sotiriadou, & van Bottenburg, 2013; Grix & Carmichael, 2011). To give some examples, the 2012 London Olympics were strongly advertised as a means to 'inspire a nation' to take up physical activity (Carter & Lorenc, 2015) and the 2018 Munich Olympic and Paralympic bid "was based on the assumption that hosting the Olympic and Paralympic Games would lead to a strong impulse in sport development …" (Wicker & Frick, 2016b, p. 265). Further, in Denmark – where the study presented in this paper was conducted – ideas of trickle-down has existed for years (Nielsen, 2002). This has formed the background for public sport policies and various other initiatives regarding sport (Bøje & Eichberg, 1994).

Because the question of trickle-down effects is such a persistent issue in discussions on sport policy, it is relevant to the fields of sport management and policy research as well as for sport managers and politicians to understand whether the anticipated effects actually materialise (Dawson, 2019). One of the problems in the literature is that, hitherto, the assumption of a trickle-down effect has mainly been examined to gauge the impact of the performances of national teams or athletes in various international tournaments such as the Olympic Games or the FIFA World Cup (e.g. Frick & Wicker, 2016; Hindson, Gidlow, & Peebles, 1994; Nielsen, 2002). Effects

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from hosting international tournaments or major sporting events have also been studied (e.g. Ramchandani, Coleman, & Christy, 2019; Storm et al., 2018). However, to the best of our knowledge only one German study (Wicker & Frick, 2016b) has looked at the relationship between elite club success and local mass participation figures.

This paper aims to address this gap in the literature by conducting a study that tests professional soccer clubs' impact on local membership figures in Danish municipalities. Seen from the outset, it would be more likely that successive events in the form of national league games that take place over the course of the year affect (local) membership figures more than (distant) championships that are televised and attract attention for only a few weeks once every second or fourth year.

Professional soccer in Denmark is covered widely in national and local media (Frandsen, 2008; Hedal, 2006), as it is the number one national sport (Storm, Thomsen, & Jakobsen, 2017). Further, soccer has the highest membership figures of all sports in the country and is well organised at the grassroots level up to the elite (Grønkjær & Olsen, 2007). Due to its popularity in Danish society at large, soccer offers a rich opportunity by which to test whether trickle-down effects can be identified in local level professional (elite) soccer clubs.

The paper is structured as follows. First, we establish our theoretical approach to frame the paper followed by a brief review of the literature. Next, we present our data and the methods used in the study. We then present our results and discuss these in relation to existing research and the theoretical underpinning of the paper. In the concluding section, future research perspectives are suggested.

Theoretical Framework

Research on elite sport's trickle down-effect in relation to mass participation usually examines three factors: 1) The inspirational function of successful elite sport

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performances; 2) The inspirational function of elite athletes (sport stars as personalities/role models); and 3) The inspirational function of elite event legacies (Weed, 2009).

Each of the approaches is – in varying degrees – rooted in theoretical assumptions of human behaviour; for example, how participation in or watching elite sport events inspires people to participate in sport themselves to become healthier (Ramchandani, Kokolakakis, & Coleman, 2014), how role models can help people become more physically active (Lyle, 2009), or how the festival-like atmosphere surrounding major sporting events can encourage people into participating in fun-sport activities (Weed et al., 2012).

These assumptions can be summarised and subsequently illustrated as one side of the so-called 'double pyramid theory' of sport (Hogan & Norton, 2000; van Bottenburg, 2002). In the context of this conceptual understanding, elite sport and mass participation are seen as interrelated, dependent on, and mutually beneficial (De Bosscher et al., 2013). In fact, following Grix and Carmichael (2011), the majority of Western sport policies and elite sport development systems are founded on the assumption of a 'virtuous cycle of sport' where, on the one hand, elite sport benefits from a large base of mass participants due to the talent pool it creates (Green, 2005). From this pool, high performance athletes are gradually developed and recruited through a selection system following the dotted arrows as illustrated on the right-hand side of Figure 1.

On the other hand, the assumption is that mass participation levels increase when elite sport performances trickle down (or feedback) to stimulate growth in – for example – sport club memberships (Sotiriadou, Shilbury, & Quick, 2008) as also illustrated in Figure 1 by the circular arrows on the left-hand side of the figure.

Figure 1. The Double Pyramid/Virtuous Circle of Sport
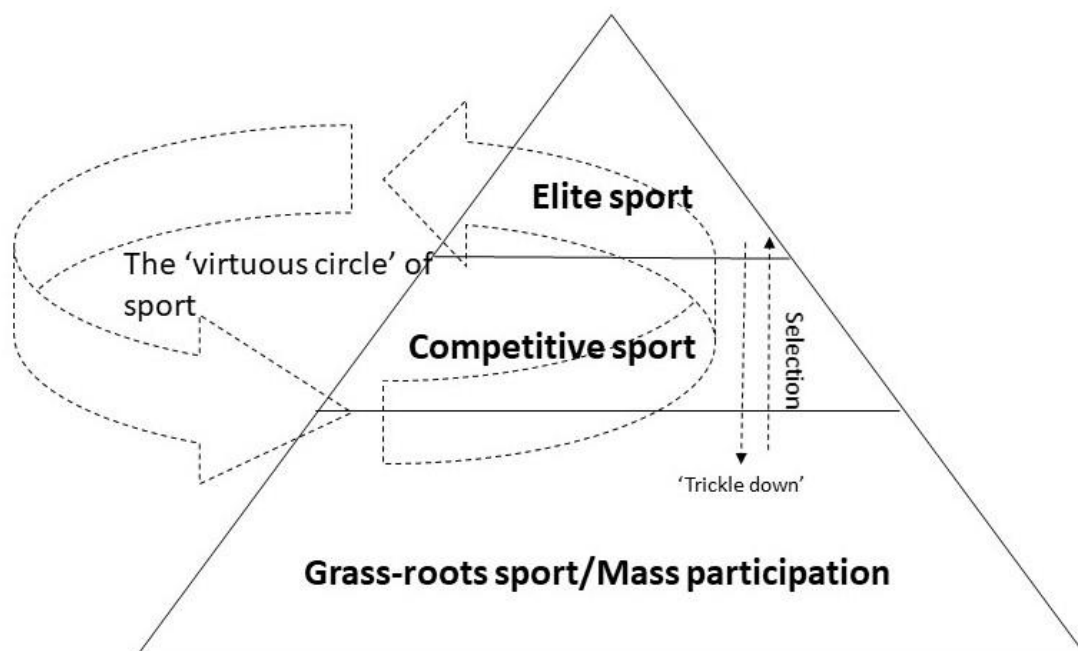
According to De Bosscher, Shibli, Westerbeek, & Van Bottenburg (2015) and De Bosscher et al. (2013), a critique of this double pyramid – or 'virtuous circle' of sport – theory has developed. As pointed out by Stewart, Nicholson, Smith, & Westerbeek (2004), the figure illustrating a mutual association between elite sport and mass participation is more of a metaphor which has somehow institutionalised itself and gained common acceptance among sport managers, politicians and civil servants, than an empirically-grounded understanding of reality.

Green (2005), for example, finds that international elite sport success can be achieved without a large pool of grassroots talent while De Bosscher et al. (2015) point out that "a broad sport participation base is neither a necessary nor sufficient condition for success …" (p. 181). Further, Storm et al. (2018) and Haut & Gaum (2018) find that trickle-down effects do not exist per se nor develop automatically – or in any causal way.

In the following section, we look further into the trickle-down aspect of the theoretical pyramid metaphor/'virtuous circle' by structuring our literature review according to the three categories presented. The aim is to identify relevant problems and gaps in the literature where we can add new knowledge through our empirical study.

In the review we exclude large (systematic) reviews (e.g. De Rycke & De Bosscher, 2019; Mahtani et al., 2013; McCartney et al., 2010; Reis, Frawley, Hodgetts, Thomson, & Hughes, 2017; Weed et al., 2015, 2012), because they repeat the same general conclusions made by the individual studies referenced.

Literature Review

The inspirational function of elite performances

The first category of studies dealing with the question of trickle-down effects usually entails whether a growth or decline in membership figures – or other data expressing physical activity patterns – is related to international sporting success. Correlation analysis or different regression approaches are used in these studies, and descriptive statistics are also deployed.

One of the classic studies that falls into the specific category of descriptive analysis was conducted by Hogan and Norton (2000) who found that Australian residents' sedentary behaviour increased between 1976 and 1995 despite the country's corresponding international sporting success during this period.

Hamer, Weiler, and Stamatakis (2014), using data from an English longitudinal survey on ageing, found no positive relationship between watching sport on television and physical activity rates. In fact, according to the study, elderly people who watched sport on television were at a greater risk of becoming obese.

Hanstad and Skille (2010) came to the same conclusion in their study of the Norwegian biathlon using analyses of qualitative interviews and documents and correlation analysis of international performance and memberships to arrive at their findings. They pointed out that income from elite sport success is more likely to help increase the number of members in a sport federation, but only *indirectly* if it is invested in initiatives that support local clubs in recruiting new members. This is an interesting conclusion because it underscores that although trickle-down effects may not exist automatically, they can be created as part of a targeted strategic approach.

De Bosscher et al. (2013), who examined 20 different elite sports in Flanders using correlation analysis on membership figures, did not find evidence of a general trickle-down effect from elite performance to participation, but their study does not rule out the possibility that such effects can materialise if they are "promoted through active programmes" (p. 334).

This conclusion is consistent with Haut and Guam (2018), who also conducted a correlation analysis on membership figures and international sporting success in table tennis in three countries (France, Germany and Austria). They argue that other factors seem to be more influential than trickle-down effects in terms of membership development.

Storm et al. (2018) used regression techniques to study the effects of elite team handball, finding that despite the Danish women's and men's handball teams having enjoyed international success since the mid-1990s, no obvious effects on membership figures can be identified. The regressions were deployed to control for relevant factors that theoretically could affect variations in membership figures, and to identify potential lagged effects of sporting success (which is not found either).

Frick and Wicker (2016), on the other hand, provide evidence of positive effects related to German soccer memberships using regression analyses on data from 1950 to 2014. However, the effect is limited to men's World Cup titles. No equivalent effects were found in relation to women's World Cup or European Championship titles (men's or women's).

Overall, the above studies do not deny that trickle-down effects can occur. However, only one study is conclusive; the others show that the positive relationship between sporting success and broader physical activity patterns does not exist without being leveraged to materialise. Further, the studies only focus on the effect from international sporting success, not local club success.

The inspirational function of elite athletes (sport stars as personalities)

The second main category into which a number of studies on trickle-down effects fall is the assumption that elite athletes inspire people to become active themselves. According to De Bosscher et al. (2013), this relates to the effect of role models. However, in the field of sport only a few studies on role models exist.

Carter and Lorenc (2015) conducted a qualitative analysis of a small sample of British people who were not meeting official government physical activity recommendations. The study is interesting because it focuses on inactive or very infrequently active people – a distinction not often made in quantitative studies using membership data. The findings suggest that watching elite athletes performing in the 2012 London Olympic Games did not inspire these physically inactive people to start exercising.

Vescio, Wilde and Crosswhite (2005) adopt a mixed methods design in their study, combining qualitative interviews with a survey of adolescent girls in Australian high schools. In particular, the study revealed that few girls in the sample saw

sportspeople as role models. On the other hand, Mutter and Pawlowski (2014), using survey data from amateur and professional triathletes in Germany deployed to OLS modelling and a 2SLS estimator, do identify effects from professional sport role models. However, as their study only focuses on people who are already active, it indicates that motivational effects are only evident among already (in this case very[1]) active people when it comes to increasing activity levels, a finding consistent with many of the above studies.

Wicker and Frick (2016a) found mixed results in their study of the inspirational effects of role models among football referees. They found that an increase in the number of new referees corresponded with an increase in referees promoted to the first Bundesliga. However, they did not observe a similar increase when referees were promoted to the FIFA level, suggesting that a trickle-down effect cannot necessarily be generalised, even in more specific cases.

In another study by the same authors (Wicker & Frick, 2016b) on national (i.e. the national team) and local (regional teams) success and their effect on club memberships and the number of regional teams, they – on the other hand – do find evidence of a trickle-down effect. Using regression-modelling aiming to isolate casual effects in a panel data design, the overall conclusion is that such effects do not come automatically because some of the models presented indicate negative relationships. Further, some models showed no effect at all and only some of the estimates resulted in a positive effect. In short, the results depend on the age and gender being observed. In fact, the study identifies more cases of significant negative correlations between the entered covariates than positive ones.

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[1] According to the study, the average German triathlete spends more than nine hours a week on triathlon participation.

Ischigami (2019) focuses on causal effects of role models showing that existing research has methodological problems by addressing the question of correlation versus the causality of trickle-down effects. The study examines the 2011 Women's World Football Cup in Japan and its impact on participation rates among junior high school girls who play extracurricular soccer. A counterfactual control group was constructed in order to compare it to the treated (real) group in an original synthetic control method-like design. The findings suggest that even though the Japanese women's team won the tournament, this result did not have any effect on mass participation patterns.

The overall impression from studies in this category is thus mixed. But there is sufficient evidence to suggest that positive effects do not occur as often as negative or absent effects. The focus is also limited to international sporting success and its relation to different measures of mass participation.

The inspirational function of elite event legacies

The final category into which existing literature on the subject falls is the inspirational function of elite event legacies. Deploying a dynamic regression approach, Weimar et al. (2015) studied 12 Olympic sports disciplines from 1970 to 2011, looking for effects from hosting a major sporting event and international sporting success on membership figures in sports included in the Games schedule. They found the effects to be relatively minor however, effects were found from hosting the Olympics.

Craig and Baumann (2014) performed a more focused study on the Vancouver Winter Olympics to see whether hosting the event raised sport participation among Canadian children. Surveillance of the children using primary data from pedometers showed no positive effects. This finding stands in contrast to Aizawa, Wu, Inoue, and Sato (2016), who followed the sport participation rate of a Japanese cohort over a 20-year period, finding that controlling for relevant covariates, individuals who

experienced the 1964 Olympic Games in Tokyo participated in sport more frequently than others.

Some effects were also found by Hodgetts and Duncan (2015) in a study of the Australian Surf Life-Saving Championship, which is both a mass participation and an elite event, in a sport development framework. Based on their data, the authors argue that hosting such a national event could be part of a plan to nurture opportunities for sports development. However, initiatives to leverage sport development and mass participation must be established to ensure that the trickle down-effect occurs.

A similar conclusion is made by Veal, Toohey, and Frawley (2012), who undertook a descriptive approach to national survey data, revealing mixed results. The authors argued that developments in participation are not solely associated with hosting events, a finding consistent with Frawley and Cush (2011), who examined the 2003 Rugby World Cup. Using a case study methodology with qualitative interviews and descriptive data analysis of membership figures (from 2000 to 2008), they noted some increases following the event. However, the authors suggested that a large part of the development was due to school programmes initiated by the Australian Rugby Union (ARU) and increased funding due to commercialisation of the sport, enabling the ARU to allow state federations to employ rugby development officers.

Girginov and Hills (2008) based their conclusions on a literature review and two case studies. They argued that if sustainable development in sport participation is to be gained from the Olympics, then significant changes must be made within the Olympic setup itself. These results are consistent with Ramchandani et al. (2019), who actually found positive effects on attendees' participation resulting from the UK hosting of single sporting events at the World and European levels in 2014. Their data were collected prior to and after the events, and analysed through the Transtheoretical Model

framework (TTM). Even though effects were found, they were minor and primarily among people who were already motivated to take up the sport, leading the authors to conclude that "any major sports event (of any magnitude) in isolation is not a magic bullet to raise participation in sport" (p. 92).

Summing up

The above review creates the overall impression that trickle-down effects do not exist per se. While some studies reveal positive effects (e.g. Frick & Wicker, 2016; Weimar et al., 2015), the same authors also acknowledge that trickle-down effects are uncommen and sometimes negative (e.g. Wicker & Frick, 2016b), and usually limited to specific segments or already-active people who shift to a new sport or increase their frequency patterns (Dawson, 2019). Most importantly, they do not come automatically. Some studies conclude that elite sport successes or legacies must be leveraged into specific programmes to help potential inspirational effects materialise (e.g. Frawley & Cush, 2011). There are many studies deploying simple designs such as descriptive data (e.g. Hogan & Norton, 2000) or correlation analysis (e.g. Hanstad & Skille, 2010), which cannot single out potential trickle-down effects, test for lagged effects (Frick & Wicker, 2016), or do not fully consider causality issues (Ishigami, 2019). The use of inappropriate designs in some studies could account for the mixed findings presented in the literature (Wicker & Frick, 2016b).

It is also clear that studies examining the relationship between elite sport and mass participation have almost exclusively focused on international sporting success and major or larger (international) sporting events. Further, there is a need for the research to be extended to "other countries and sports …" (Wicker & Frick, 2016b, p. 280).

In this study, we aimed to expand on existing research by explicitly studying local sporting success and its potential effect on memberships in a new context, while also taking the above-mentioned problems into consideration. Below, we present our data and the methodology used to address the problems highlighted in existing research, and to examine the potential of local trickle-down effects.

Presentation of Data and Methodology

When identifying trickle-down effects, several issues need to be taken into consideration. As indicated above, descriptive analysis, cross-sectional data and bivariate- or correlation analyses are not preferable because they cannot be used to identify longitudinal developments or control for other factors triggering trickle-down effects. Thus, we chose a multivariate dynamic panel data approach to single out potential effects and take the developmental/time perspective into consideration. Even though there are still some problems regarding causality from using panel data (Ishigami, 2019), if grounded in a sound theoretical framework, as presented above, questions of cause and effect can be dealt with in an appropriate way (Wicker & Frick, 2016b).

In short, we deploy municipal-level structured panel data on all (semi-) professional soccer clubs in the Danish first and second tiers, covering the period 2007–2017. The first year of the analysis (2007), was chosen because it corresponds with the start of a major Danish public municipal reform that reduced the number of municipalities in Denmark significantly (from 274 to 98). Data used on municipal covariates are thus structured according to the reform from 2007 onward, while pre-2007 data are not available in the same form. At the time of writing, 2017 is the most recent year in which membership data and other covariates are available. In total, there

are 32 municipalities with (semi-)professional clubs included in the analysis. Because of

the variation in the teams' presence in the first and second tiers, the panel is not

balanced. The average number of observations per municipality is 8.3.[2]

Dependent variable

Corresponding to most existing research, our dependent variable data are constructed

from membership data which we converted into membership rates per 1000 inhabitants

in the municipalities. The data were provided by the Sports Confederation of Denmark

and contain official annual total soccer membership figures from 2007 to 2017 broken

down by gender (male/female) and age (children/adults). See Table 1 for an overview of

the year and number of municipalities each year in the dataset.

Table 1. Overview of the year and number of municipalities included in the dataset

Year	Frequency, Municipalities
2007	23
2008	25
2009	25
2010	25
2011	26
2012	25
2013	22
2014	22
2015	23
2016	24
2017	25

We focus on local data because local clubs play in leagues or successive tournaments,

and their continuous coverage in local media and the frequency of their home games

raises the profile of the club which could potentially result in increased club

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[2] In the analysis we have led the dependent variable with one and two years resulting in the loss of one/two years of observations – the average number of observations per municipality in the final models is therefore 7.5/6.3.

membership. The positive public profile of the elite players, who often live in the same city as the club is situated, could inspire local residents to join a club in their neighbourhood.

Membership figures versus broader participation patterns

It is important to understand that by focusing on membership figures, we are not able to analyse broader activity patterns related to soccer. Studies usually focus on the trickle-down effect on membership figures or mass participation levels (Weed et al., 2015). We address membership figures only because we do not have detailed data on broader sport (football) participation patterns outside sports clubs. In Denmark, national surveys on sport participation have only been conducted for a few years of the period covered by the study, and the survey questions on sporting activities in which Danes take part are not detailed enough for the design deployed here. Further, no participation data exists at the municipal level.

Another problem connected to this issue is the fact that by studying membership figures, nothing can be said about whether identified trickle-down effects recruit members among already active persons (for example in other sports), or whether it activates inactive people. Thus, our study is limited to identifying the extent to which local club success attracts new members and not whether success raises broader participation patterns.

Finally, it is important to understand that membership data does not yield information on the frequency of participation among members. Some might even be passive and there is no available information on these issues that can be taken into account in the analysis. Development in membership figures is mainly a proxy for sport participation. Despite these limitations, soccer is an organised sport that is mainly

played in clubs in Denmark (Pilgaard & Rask, 2016) where the majority of the members are active to various degrees. Futher, it is reasonable to assume that people joining clubs as an effect of inspiration are (new) active members. Therefore, variations in the data are most likely the cause of real variations in (physical) activity due to variations in the independent variables studied, and studying membership figures in this way can reveal a comprehensive picture of the (potential) trickle-down effects from sporting success. It is also an approach that is consistent with many of the studies reviewed above.[3]

Independent variables

Our main independent variable is sporting success (*Points*) among professional soccer clubs in the two best Danish male tiers. It is deployed to test whether local club success has an impact on membership figures (Storm et al., 2018). Different measures of success have been used in previous studies, for example dummies for championships (e.g. Weimar et al., 2015; Wicker & Frick, 2016b), top 8 points (e.g. Storm et al., 2018) or medal indexes (e.g. De Bosscher et al., 2013). In this paper, we choose to rank all clubs 1:1 based on their final position in the two best tiers. The Danish champion is given 26 (28[4]) points for each season; the second-ranked team 25 points; the third 24 points and so on. The top team in the second-best tier is given 12 (14) points, the second-ranked team 11 points and so on.[5] This use of a points-based approach is a straightforward – and in our opinion the best – way to operationalise the teams' successes. However, because elite sport is a winner-takes-all-phenomenon (Frick &

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[3] We anticipate that there is some kind of correlation between membership levels and broader participation patterns.

[4] In some years in the period covered, the Danish first tier had 14 teams; inmost years it had 12.

[5] In Copenhagen Municipality, in some years of the period covered, there were two to three teams in the first and second tiers. In these cases, point values have been aggregated into a single data point for Copenhagen. Nine data points – representing four municipalities in total – in the *Point* variable therefore have values above 26 (28).

Wicker, 2016), we also include dummy variables for participation in the European competitions (Champions League [*Champions League*] and UEFA Euro Cup [*UEFA Cup*]) to test whether these specific competitions give rise to positive or negative trickle-down effects. Dummies for *Promotion* and *Relegation* are also included.

For controls, and to single out potential effects from sporting success, we have added objective data comprising the following six variables: *Average income*, *Age*, public *Expenses*, *Population density*, *Non-Western inhabitants* and *Tax level*. These data were gathered from the official Danish database on municipalities compiled by Statistics Denmark, the Danish authority on public statistics and data. It is anticipated that these independent variables affect the dependent variable to various degrees.

With regard to income, it is known from other studies (e.g. Humphreys & Ruseski, 2015; Wicker, Hallmann, & Breuer, 2012) that increasing levels of wealth are associated with increased sport participation. Growth in average income could therefore affect membership figures positively.[6] However, income can also work in the other direction because persons in senior positions and higher levels of income have less time to train (Wicker, Breuer, & Pawlowski, 2009). This could be the case especially for football clubs, where time-slots allocated for training are usually inflexible and sometimes incompatible with long working hours (Bøje & Eichberg, 1994). The *Age* variable is entered in expectation that municipalities with an elderly population affect the dependent variable negatively because people gradually become less active as they grow older (Downward, 2007).

Expenses covers municipal expenses related to sport. The Danish Leisure Act[7]

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[6] We did not include a measure for education because we anticipated problems related to multicollinearity due to the correlation between education and income.
[7] This law is called 'The Act on Non-formal Education and Democratic Voluntary Activity' (Danish: *Folkeoplysningsloven*). https://ec.europa.eu/epale/en/resource-centre/content/act-non-formal-education-and-democratic-voluntary-activity

of 1968 requires that municipalities provide sports clubs and voluntary associations with facilities and pay subsides for children and youth club members in particular (but also adults). This is done to promote physical activity, and we thus expect *Expenses* to be positively correlated with our dependent variable because such public sport programmes have proven to affect sport participation positively (Hallmann, Feiler, & Breuer, 2015). It should be noted that the measure does not include construction costs for facilities, only club subsidies and operating costs associated with sporting facilities.[8]

In Denmark, there is a clear tendency for lower participation rates in traditional sports clubs in cities compared to rural areas (Storm & Rask, 2017). We control for this by deploying a measure of population density in our models. We expect to see lower membership rates in municipalities with higher levels of *Population density*, i.e. urban areas. Further, we include a variable measuring the absolute number of *Non-Western* immigrants (per 10,000 inhabitants) in the municipalities studied. This is because there is a lower level of sports participation among immigrants than the rest of the Danish population (Pilgaard & Rask, 2016). This would have a negative effect on membership levels in the municipalities.

Finally, the municipal *Tax level* is included with the expectation of seeing this affect membership participation negatively. This is because higher tax rates result in a lower net income and tighter budgetary constraints (Deaton & Muellbauer, 1980). However, since football club membership fees in Denmark are relatively low, this may not have a significant effect.

The variables *Population density* and *Expenses* have been log-transformed to reduce skewness and kurtosis. Descriptive statistics for all our deployed variables are

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[8] It should also be noted that the 'Leisure law' does not determine the proportion of a budget municipalities should allocate for sport; this varies across the country. Each municipality can determine the level of expenditure allocated to sport.

displayed in Table 2.

Table 2. Descriptive statistics, dependent and independent variables

Name	Mean	SD	Minimum	Maximum	N
Membership rate:					
Overall	69.931	19.152	37.537	136.668	265
Male children	255.394	53.707	134.236	409.833	265
Female children	81.355	42.226	19.762	222.159	265
Male adults	43.842	15.411	17.218	105.599	265
Female adults	8.350	8.088	0.557	52.272	265
Points	14.687	7.995	1	41	265
Champions League	0.056	0.231	0	1	267
UEFA Cup	0.161	0.368	0	1	267
Promotion	0.176	0.382	0	1	267
Relegation	0.169	0.375	0	1	267
Population density†	5.582	1.329	3.714	8.901	265
Non-western	353.193	156.783	129	1002	265
Expenses†	10.742	0.613	9.419	12.867	265
Income	202.899	29.153	160.043	321.890	265
Age	40.469	1.629	35.9	45.8	265
Tax-level	24.880	0.801	21.81	26.6	265

Notes: *Membership rate* is given in members per 1000 of the respective population, *Income* in units of 1000. †*Population density* and *Expenses* are log transformed.

Specifications and regression approach

As we have repeated observations (an average of eight) per municipality, we can

employ fixed effects (FE) models. The fixed effects estimator analyses the changes

within groups over time in relation to the fixed group means. A major advantage of FE

models is the possibility to control for time invariant variables. Thus, we can analyse

the variation in membership rates within the municipality during the period covered.

According to the Hausman (1978) test, we might have some omitted time-invariant

effects correlated with the regressors. Therefore, FE models are preferred, for example,

to the random effects estimator which could also be applied.

Because we expect effects to occur after the 'treatment' (i.e. the inspiration from

sporting success), we have led the dependent variable one year. In this way we can base

the estimates in our theoretical framework which "facilitates the identification of causal

relationships… [because] amateur participation is measured… after the sporting achievements" (Wicker & Frick, 2016b, p. 271). In addition, we have chosen a dynamic panel data approach where membership rates for the year before are included among the explanatory variables. This allows control of any time-variant effects that are not explained by the other controls. Based on this, the following overall dynamic FE model is presented:

[1]   *Membership figures$_{it+1}$ = β_0 + Membership figures$_{it}$ β_1 + Points $_{it}$ β_2 + Champions League$_{i\,t}$ β_3 + UEFA Cup$_{i\,t}$ β_4 + Promotion$_{i\,t}$ β_5 + Relegation$_{i\,t}$ β_6 + log(Population density)$_{it}$ β_7 + Non-Western$_{it}$ β_8 + log(Expenses)$_{it}$ β_9 + Income$_{it}$ β_{10} + Age$_{it}$ β_{11} + Tax level$_{it}$ β_{12} + f$_i$ + ε_{it}*

Since dynamic panel data models may suffer from Nickell (1981) bias we have also included models applying the Arellano-Bond (AR-B) (1991) estimator to account for the potential issues related to the lagged dependent variable being correlated with the idiosyncratic error. We run two sets of five models (five with the FE-estimator and five with the AR-B-estimator), splitting the figures into male and female adults (15+ years), male and female children (7 to 15 years), and total aggregated figures for all four categories to test effects across these categories. The AR-B models have the same general form as our FE models expressed in Equation 1.[9]

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[9] This being said, the initial AR-B estimate with the first lag of *Membership rate* showed signs of second order serial correlation. To avoid this problem, also a second lag of the dependent variable was included in the model in addition to the variables described above.

Results and discussion

The outputs from our estimates are presented in Tables 3 and 4 and indicate that no effects from sporting success measured by the *Points* variable can be found on membership rates. The coefficient is positive in all estimates (both FE and AR-B), but non-significant in all models. One exeption is the AR-B Childrens Female model [3] showing an effect, however only at the 10 percent level.

Table 3. Fixed effects estimation of *Membership rates$_{t+1}$, Danish Soccer Clubs*

Independent variable	(1) Overall	(2) Children male	(3) Children female	(4) Adults male	(5) Adults female
Membership rate	0.598***	0.620***	0.604***	0.585***	0.482***
	(0.0781)	(0.0736)	(0.110)	(0.0452)	(0.104)
Points	0.0555	0.00683	0.279	-0.0242	0.0532
	(0.210)	(0.573)	(0.386)	(0.192)	(0.120)
Champions League	0.398	0.567	-0.0143	1.011	0.0503
	(1.887)	(5.352)	(3.564)	(1.128)	(0.859)
UEFA Cup	1.483	7.106*	-0.498	1.500	-0.210
	(1.360)	(3.845)	(2.068)	(1.391)	(0.629)
Promotion	0.00267	3.670	-2.547	-0.873	-0.0373
	(1.645)	(4.848)	(2.732)	(1.295)	(0.834)
Relegation	-2.487	-5.493	-1.773	-2.206	-1.438*
	(1.557)	(4.821)	(2.780)	(1.320)	(0.756)
Population density	-36.65	-95.16	-35.88	-27.59	-23.88
	(30.31)	(62.82)	(62.03)	(24.16)	(21.51)
Non-western	0.0411***	0.0525	0.0693***	0.0398***	0.0240**
	(0.0128)	(0.0407)	(0.0242)	(0.0101)	(0.00934)
Expenses	-6.285	-6.363	-8.405	-8.511	-2.515
	(8.264)	(25.33)	(13.47)	(6.644)	(3.470)
Income	-0.154**	-0.341	-0.198	-0.153**	-0.0619*
	(0.0681)	(0.207)	(0.123)	(0.0558)	(0.0359)
Age	-3.064	-5.895	-5.222	-0.841	-1.801
	(2.302)	(6.148)	(4.370)	(1.682)	(1.160)
Tax-level	-4.175**	-4.983	-6.013	-4.377	-2.763***
	(1.567)	(6.205)	(4.792)	(2.942)	(0.907)
Constant	542.4**	1,105***	693.2*	422.8**	309.1**
	(204.2)	(361.2)	(380.7)	(180.8)	(138.2)
Observations	233	233	233	233	233
R-squared	0.614	0.540	0.603	0.584	0.475
Groups	31	31	31	31	31

Table 4. Arrelano-Bond estimation of *Membership rates, Danish Soccer Clubs*

Independent variable	(1) Overall	(2) Children male	(3) Children female	(4) Adults male	(5) Adults female
Membership rate$_{t-1}$	0.176*	0.257**	0.140	0.154	0.154
	(0.103)	(0.116)	(0.130)	(0.123)	(0.151)
Membership rate$_{t-2}$	-0.421**	-0.468***	-0.325**	-0.221	-0.140
	(0.181)	(0.173)	(0.153)	(0.148)	(0.190)
Points$_{t-1}$	0.687	1.102	1.054*	0.386	0.221
	(0.473)	(0.762)	(0.577)	(0.357)	(0.233)
Champions League$_{t-1}$	-0.864	2.339	-1.030	-1.770	-1.960
	(5.881)	(8.947)	(8.837)	(4.512)	(3.088)
UEFA Cup$_{t-1}$	-1.592	-0.539	0.255	-0.803	-1.754
	(2.689)	(7.235)	(2.993)	(1.564)	(1.439)
Promotion$_{t-1}$	0.886	5.508	-2.035	-0.541	-0.0629
	(3.246)	(5.128)	(4.600)	(2.553)	(1.579)
Relegation$_{t-1}$	-11.74***	-19.78***	-11.52*	-10.30***	-4.789**
	(4.025)	(6.534)	(6.852)	(3.071)	(2.155)
Population density$_{t-1}$	-926.1*	-1,334	-1,274	-763.6	-471.7
	(537.7)	(956.7)	(870.6)	(473.4)	(362.5)
Non-western$_{t-1}$	0.190	0.161	0.590***	0.206	0.111
	(0.123)	(0.240)	(0.226)	(0.151)	(0.0951)
Expenses$_{t-1}$	88.99**	200.5***	60.75	55.14***	18.98
	(38.45)	(67.13)	(59.71)	(19.59)	(12.76)
Income$_{t-1}$	0.251	0.279	0.564	0.0675	0.163
	(0.461)	(1.029)	(0.758)	(0.433)	(0.323)
Age$_{t-1}$	-23.47	-35.58	-76.69***	-13.23	-8.744
	(14.95)	(36.55)	(27.46)	(18.93)	(13.33)
Tax-level$_{t-1}$	-23.47	-27.09	-48.00	-32.27***	-16.22*
	(17.98)	(28.43)	(70.32)	(12.31)	(9.699)
Constant	5,719*	7,599	10,526*	4,974	3,127
	(3,287)	(6,219)	(5,973)	(3,176)	(2,299)
Observations	192	192	192	192	192
Groups	26	26	26	26	26
AR(1)	-1.07	-1.35	-0.88	-1.08	-1.59
	(0.284)	(0.177)	(0.380)	(0.279)	(0.112)
AR(2)	-0.94	-0.87	-0.22	-1.05	-0.94
	(0.349)	(0.384)	(0.828)	(0.295)	(0.349)
Wald test	71.43***	191.04***	62.36***	46.33***	28.28***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)
Hansen test	13.56	13.86	9.75	11.26	11.83
	(0.939)	(0.988)	(0.972)	(1.000)	(1.000)
Sargan test	17.12	26.89	26.73	18.16	40.90
	(0.946)	(0.524)	(0.143)	(0.994)	(0.264)

Robust standard errors in parentheses. For diagnostic tests, p-value in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Further, no effects are found from *Champions League*, *UEFA Cup*[10] or *Promotion* indicating no trickle-down effects. However, in our AR-B models results in all models related to *Relegation* are significant (although only at the 10% level in the children and, female models). This indicates that sporting failure expressed as relegation can be associated with negative effects. Even though the trickle-down effect metaphor is usually formulated in the positive sense – where success is followed by an increase in participation – this inverse effect is in correspondence with the theory because if the trickle-down effect is causal, logically negative success should also be followed by a decrease in membership.

The lagged dependent variable is significant with a positive sign in all FE models and in two AR-B estimates (Model 1 & 2) – indicating a network effect as also identified by Weimer et al. (2015). The substantial meaning of this is that the rate of membership in one year has a positive effect on the membership rate in the next year. Taking this at face value, there is more to gain by recruiting new members (by various means) than relying on trickle-down effects.

As expected, there is a negative sign from higher population *Density* on the membership rate across all models. However, it is only significant at the 10% level in one of our AR-B models (Model 1). The indication of a negative relationship could illustrate a general trend of urbanisation. Urban dwellers who participate in self-organised sport and physical activity, such as commercial fitness, running and skateboarding, seem to affect overall membership figures (Pilgaard & Rask, 2016; Storm & Rask, 2017) due to substitution effects (Hallmann et al., 2015). Other types of

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[10] An effect is found only at the 10 percent level due to participation in the UEFA Cup in FE Model 2.

urban street sports may also crowd out participation in local clubs, but we have no further evidence to support this.

In contrast to what we had anticipated, there is a positive and significant effect of the number of *Non-Western* inhabitants on the membership rate except for one model in our FE estimates (children, male). In our AR-B models there is a significant effect in Model 3 (children, females). This indicates that people from Non-Western countries are, in fact, joining Danish football clubs. This is a positive message because it could have a broader effect on how Non-Western immigrants are perceived as integrated in Danish society overall, even though social challenges related to prejudice persist (Engh, Settler, & Agergaard, 2017).

Another disparity is that the output from all our FE estimates suggest that *Expenses* do not seem to have an effect on football club membership rates. It is difficult to say why this is the case, but could be related to the fact that increasing expenses can be linked to raising taxes.[11] In our FE models this seems to have a negative effect on membership rates. On the other hand, our AR-B models changes the sign and is significant in three models indicating a positive effect and which is in corerespondance with our expectations.

As pointed out in the Data and Methods section, *Income* can work in both directions. Our estimations suggest that there is a negative effect from (higher) income on membership with significant results for adult models (Models 4 and 5 (at the 10% level)) and overall (Model 1). This is consistent with the hypothesis that higher levels of income displace time available for training. However, Finally, *Age* seems to be

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[11] Although they are related, they are not so closely correlated that multicollinearity was found to be an issue in the models.

negatively correlated (negative sign across all estimators) with membership rates – as expected – but it is only significant in Model 3 in the AR-B estimates.

Conclusion, Implications and Future Research

Summary

This paper has aimed at filling a gap in the literature by examining potential trickle-down effects of local elite sport successes to club-level sport participation. Existing research on this subject has only focused on the effect of international sporting success, omitting the equally important question of how local elite club success can affect membership figures.

Our findings from the models tested suggest that direct trickle-down effects from sporting success are not present. Sporting success achieved by the local (semi-)professional elite soccer clubs does not seem to trickle-down to mass participation in a direct or causal way. However, we do find effects of relegation indicating that failure can lead to a decline in membership levels, implying that failure has a stronger effect than success. Related to the usual claims – where sporting success stimulates sport participation – our findings cannot support the double pyramid/'virtuous circle of sport' metaphor. This is consistent with some research findings (e.g. Haut & Gaum, 2018; Storm et al., 2018; Weed et al., 2015).

Implications

A key implication of this study is that criticism of the double pyramid/'virtuous circle of sport' metaphor should continue. The well-established understanding in many political and sport managerial circles that elite sport leads to growth in mass participation should be challenged.

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While it cannot be denied that trickle-down effects can occur under specific circumstances, as indicated by some studies, it is far from true that this occurs as a direct causal effect when local professional football teams are doing well. Instead, politicians, sport managers, and civil servants should direct their attention and resources towards factors that really affect membership rates. While this study can point to some factors – such as the creation of a network effect, which, according to our models, seems to attract more members (when the membership rate in one year affects the rate in the next year positively, for example due to social bonding in the clubs attracting more members, or when members enrol their friends) – other factors not addressed here should also be considered. Future studies should delve deeper into factors believed to have a positive effect on membership rates so that sports organisations and other stakeholders can understand where to focus resources in order to enhance membership and learn how the bottom of the sport pyramid is formed more specifically.

Closely associated with this is the the importance of understanding the 'inverse' trickle-down effect identified in this study in more depth. Politicians, sport managers and researchers should consider the negative effect of relegation and address its underlying causes. It is likely that the effect stems from a more general crisis in those clubs facing relegation than just the negative success of the club flagship. Frequently, relegation reflects more general problems facing the clubs, and it is likely that poor management resulting in relegation also has a say in relation to the recruitment and retainment processes related to the whole club membership base. Such issues should be explored in more depth in order to better understand this inverse kind of trickle down.

Limitations and Future research

The research presented above is the first study on the effects of local (professional)

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sporting success on mass participation. Consequently, more needs to be done in this area. First and foremost, is it necessary to conduct studies in other nations because it is impossible to asses from a single study on professional soccer clubs in a small European nation whether the findings can be generalised to apply to other contexts. Larger European countries (e.g. Spain or Germany) or the US (Major League Soccer) could provide more comprehensive statistics on the relation between soccer and other league results and local club participation.

Second, other types of sports should be studied. From a theoretical perspective, trickle-down effects could potentially exist at a local level in other sports. However, this has to be examined more specifically whether this is so. Third, and finally, better data on broader participation patterns should be deployed. In this study, we use membership figures in the anticipation that membership and participation outside clubs and associations are equally affected by elite sport success. However, this might not be true and future studies should aim to compile and analyse broader sport participation panel data with better coverage so that potential trickle-down effects in unorganised sports – for example football – can be analysed. This would improve our understanding of the double pyramid/'virtuous circle' of sport idea to the benefit of sport managers, politicians and other stakeholders alike.

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