Commercial Fitness Centres in Denmark:

A Study on Development, Determinants of Provision and Substitution Effects

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ABSTRACT

The commercial fitness sector in Denmark has boomed over the last two decades. The number of for-profit fitness centres has risen from around 350 in the 2000s to more than 800 in 2018. This development indicates that significantly more Danes are now customers of commercial sport for all fitness programmes. In response to this growth, the non-profit sector in Denmark has started its own fitness activities, giving rise to debates about fair competition. In this paper, we aim to identify the determinants for the provision of for-profit fitness and potential substitution effects between non-profit and for-profit providers of sport for all leisure activities. By deploying regression modelling on cross-sectional data, we find that the presence of non-profit fitness centres does not seem to affect the provision of commercial ones. This indicates that, so far, non-profit and commercial sport for all leisure organisations in Denmark have supplemented each other to the benefit of overall sport participation.

Key words: Fitness centres, Substitution effects, Leisure, Denmark

INTRODUCTION

The worldwide growth of the fitness industry has been significant over the years (Avourdiadou and Theodorakis 2014; Crossley 2006). According to EuropaActive, which represents the European Health and Fitness Sector, there are 56.4 million consumers and 54,710 facilities in the European fitness sector today (EuropaActive 2018).[1] Borgers and Scheerder (2018) count the total number of centres in Europe as 51,300, but this is still a significant number. Seen from a broader perspective, the health and fitness club industry in 2012 "generated an estimated $75.7 billion in revenue … serving 131.7 million members [globally]" (Andreasson and Johansson 2014, 92).

In Denmark, commercial for-profit fitness centres have experienced significant growth over the years (Kirkegaard 2007b; Storm, Toft, and Bang 2015). The first commercial fitness centres opened in the late 1950s and early 1960s (Kirkegaard 2007a), and the number of centres and members has since grown at a fast pace. According to Bang (2018), the number of commercial fitness centres rose sharply from 334 to 803 between 2006 and 2018. This development is seen in Figure 1. In addition, the Danish branch organisation, Dansk Fitness & Helse Organisation, which oversees the Danish fitness industry, estimates that the number of full-time equivalent jobs in the fitness sector has risen from 1127 in 2008 to 1729 in 2017 (Brustad 2018) – another clear sign of significant growth.

--- Insert Figure 1 around here---

[1] In the context of this paper, commercial fitness centres are providers of a broad set of leisure physical activities. However, the activities are mainly related to weight training, spinning, aerobics and CrossFit. Some offer running as well.

The biggest Danish fitness chain today is Fitness World, which had 158 centres in 2018. LOOP, a chain that recently entered the Danish market, has opened 30 centres since 2016, whereas Fitness dk – which was acquired by SATS Fitness in 2018 – operates the same number of centres as it did in 2016 (45). Together, these three chains account for close to a third of all commercial centres in Denmark today. However, many commercial fitness centres are also being established independently from these major chains.

The significant growth in the number of commercial sport for all fitness centres suggests that the Danes are now seeking new ways of being physically active in their leisure time. Instead of joining traditional non-profit sports clubs or associations, more Danes are becoming customers of for-profit centres (Kirkegaard 2009). While many are still members of voluntary sports clubs and associations, the primary growth related to physical activity has been in the informal and commercial part of the sport for all leisure sector in Denmark (Kirkegaard 2007a; Bøje and Eichberg 1994).

During the expansion of the commercial fitness sector, the non-profit sector also started to open fitness centres, developing new fitness programmes and activities to meet the demand that is currently being absorbed by the commercial sector thus aiming to make people take other leisure choices by joining their associations (Ibsen and Seippel 2010). This is a phenomenon that has also been seen in other European countries (Hallmann, Feiler, and Breuer 2015; Breuer and Feiler 2013). In Denmark, the growth of non-profit centres and gyms has prompted a debate on organisational provision and competition, with the for-profit centres arguing that their business is being undermined by the non-profit sector, which receives public subsidies (Riiskjær 2019).[2]

[2] This will be discussed further in the following section.

In this paper, we aim to answer two main, interconnected research questions: 1) What are the prime determinants behind the provision of commercial centres in Denmark? 2) Has the current number of centres given rise to substitution effects, with the provision of non-profit fitness centres having a negative effect on the commercial ones? In connection to this, we discuss to what extent commercial for-profit and non-profit centres can supplement each other to meet demands of leisure sport for all activities among the broader population.

To the best of our knowledge, no systematic analysis of the expansion of commercial fitness centres and the potential substitution effects has been done to date.[3] This is a problem as it hinders an evidence based discussion on how – and to what extent – different providers of sport for all leisure programmes can supplement each other. By deploying unique secondary cross-sectional data to regression modelling, we aim to enrich the discussion to the benefit of the sports managers and politicians that are involved in the planning of programmes, establishing new centres, and so on, with the aim of enhancing physical activity levels among the general population. From a broader perspective, the analysis adds to the existing literature on leisure by discussing the pros and cons of what happens when sport for all – which essentially is a leisure pursuit – is being commercialised, thus breaking down old patterns of organisational provision. Further, and more specifically, our examination delivers insights into people's leisure choices and demands, in light of the development of the commercial leisure industry (Roberts 2004), with the for-profit fitness sector as a case.

The paper is structured as follows. First, we build the theoretical underpinning of the paper by providing a brief literature review on the provision of sport for all leisure

[3] Some studies (e.g. Hallmann, Feiler, and Breuer 2015) have looked at substitution effects at the individual level, but not at the organisational level as is done here.

programmes, with a particular focus on commercial fitness centres. Second, this leads to our presentation of the data used in the study together with an examination of methodological issues associated with our regression estimation strategy. Third, the results are presented and discussed, after which we conclude by focusing on the implications and limitations of our findings and suggestions for future research on the subject. The final section of the paper contains a list of the literature referenced.

THEORETICAL FRAMEWORK

THE PROVISION OF SPORT FOR ALL THROUGH STATE, MARKET, AND CIVIL SOCIETY

It is well known that physical activity (PA) has positive health effects that can increase life expectancy, physical fitness and wellbeing (Reiner et al. 2013; Humphreys, Mcleod, and Ruseski 2014; Wicker, Hallmann, and Breuer 2012), and lower the risk of chronic disease (Sherwood and Jeffery 2000; Wicker and Downward 2017). Therefore, the provision of sport for all facilities can potentially help people become more active and, consequently, become healthier (Wicker, Breuer, and Pawlowski 2009). In combination with recreational programmes and activities provided by voluntary sports clubs or the public sector, these facilities can help improve general PA levels. Commercial fitness centres are essentially part of their country's sporting infrastructure, so they can therefore assist in increasing national participation figures – at least as a supplement to public or other private sport facilities and programmes (Thibault and Harvey 1997).

In Denmark, sport for all or leisure programmes aimed at raising PA levels have traditionally been provided by the non-profit sector with significant subsidies from the public sector (the state and municipalities) (Ibsen and Seippel 2010; Ibsen and Eichberg 2006). In relation to physical education (PE), the school system has also been a significant provider of PA for children and adolescents.

As mentioned in the introduction, the recent development of the fitness sector has prompted debate on how and where people should use their leisure time on PA. Is it the market, civil society or the state that should play the dominant role? Or, put differently: Which organisational entities are the best suited to provide facilities and programmes related to sport leisure activities? Are they voluntary associations or sport clubs,

commercial providers, like the fitness centres, or the school system (the state)?

From a theoretical perspective, the question of sport for all provision is linked to welfare and failure theory (Hallmann, Feiler, and Breuer 2015). The notion of all three sectors being providers of sport for all leisure activities is connected to the idea that each sector alone is incapable of satisfying all types of consumer demand or political goals related to the subject in question. The general welfare of the population – in this case related to PA and sport for all – must be met by deploying a mix of all providers (Hylton and Totten 2008; Roberts 2004).

The dominance of a particular sector is dependent on the context (Esping-Andersen 1990), but the general economic/welfare rationale for public intervention through, for example, the state or municipalities is the occurrence of 'market failure' (Bator 1958). This is a situation where the market, on the one hand, is capable of meeting a high level of demand on specific goods or services, thus serving the majority but, on the other hand, is unable to fulfil broader (public) welfare goals (Weisbrod 1997) – for example, integrating socially deprived people or other low income groups in sport for all leisure programmes.

There can also be other kinds of market failure, such as those found by Ulseth (2004), who argues that non-profit sports clubs are better at fostering social bonding and new friendships than commercial fitness centres – a positive externality effect also found by Downward and Rasciute (2011). In such cases, the public sector can intervene to amend the failure by, for example, setting up specific programmes, building facilities or subsidising non-profit organisations to meet broader social goals.

However, it is not only markets that can fail. Theoretically, 'government failure'

also exists (Datta-Chaudhuri 1990). Usually government failure comes in three forms (Dollery and Wallis 1997): 1) *allocative inefficiency* due to politicians "buying" votes with the promise of increasing welfare services; 2) *inefficient* implementation of policies due to a lack of incentives among civil servants, and 3); *rent seeking behaviour*, where stakeholders who benefit from welfare schemes devote time, which could have been used to enhance welfare in general or for others, to directing the redistribution of welfare to themselves. In essence, the problem of all three variants of government failure represents a loss of societal welfare, which could have been provided better by the market.

Government failure is sometimes also corrected by the civil society-based voluntary sector (Pestoff 1992), which is able to meet the demands of specific groups without the problems associated with system colonisation (Jütten 2011; Habermas 1987), or at a very low price, thus overcoming the problems of inefficiency mentioned above (Weisbrod 1986).

'Non-profit failure' exists, for example, in the sense that voluntary organisations have limited resources (Gratton and Taylor 2000). This puts the non-profit sector at risk of failing to meet new demands due to a lack of staff or time. In turn, such difficulties often force the voluntary organisations to become commercial (to varying degrees) in order to raise funds. This gives rise to tension between non-profit and public organisations (Weisbrod 1997), as well as the market, as in Denmark's case, because firms providing similar services feel that the non-profit organisations are operating unfairly on public subsidies (Riiskjær 2019). In short, the for-profit sector accuses the non-profit sector of directing people's leisure choices to non-profit programmes and, due to the growth in the number of commercial fitness centres in Denmark, "competition between non-profits and [the market] has [thus] increased (Weisbrod 1997, 543). However, has this development

reached a point where for-profit centres are being undermined by non-profit centres?

The answer is complex because the provision of sport for all in Denmark has traditionally – as mentioned above – been assigned to non-profit associations and sports clubs with subsidies from the public sector at the state and municipal levels (Ibsen and Eichberg 2006). In fact, tensions did not arise until the commercial fitness sector expanded into the area of provision usually dominated by non-profit providers. From a theoretical point of view, collaboration between the two sectors should be the most desirable because each is capable of providing services and meeting demands that the other is not (Hallmann, Feiler, and Breuer 2015). However, what is the right balance?

This problem can be studied empirically by looking into the question of substitution effects. For example, Hallmann et al. (2015) show that there are trade-offs between profit and non-profit organised sport for all leisure programmes in Germany. Their study shows that "(…) the number of commercial programmes has a negative impact on sport participation in a non-profit club, meaning that the more the commercial offers exist, the smaller the participation rate in non-profit sport clubs" (p. 579). This is consistent with the findings of Weimar et al. (2015) and Wicker et al. (2012), which indicate that there is growing competition between them.

From a broader perspective, such growth in the commercial fitness sector could, at least theoretically, result in less political support for the non-profit sector because the commercial fitness centres seem to increase sport for all participation. This results in spending cuts and, therefore, an unmet demand among certain population groups. As pointed out by Ibsen and Seippel (2010), "(…) politicians will perhaps think that if so many people are willing to pay three to four times as much to exercise in a fitness centre than as a member in a sports association, then there are good reasons to let adults pay for their own use of local-authority sports facilities" (p. 605). Such policies would risk

excluding low income groups from sport for all leisure participation as a result of the substitution effect. While these developments would be beneficial to the for-profit centres, they might affect overall participation rates negatively and especially among unprivileged groups.

In this paper we aim to test the question of substitution effects, but in an opposite way to that seen in existing literature, which has so far looked into whether commercial fitness crowds out non-profit activities (e.g. Wicker, Hallmann, and Breuer 2012; Hallmann, Feiler, and Breuer 2015). Due to the growth of non-commercial fitness centres and tensions over increased competition in Denmark, we examine whether non-commercial centres affect commercial ones negatively. By doing this we analyse a problem that, according to Weisbrod (1997), has been seen in other forms across the globe – but has never been empirically tested: for-profit firms entering into a sector previously dominated by non-profits.

We perform our analysis by a deploying a study design that identifies the determinants of provision of fitness centres in Denmark and tests whether the presence of non-profit facilities affects the provision of commercial centres negatively. In doing so, we aim to take the first steps to understand how one sport for all facility organisational type is affected by the presence of other similar forms.[4]

[4] It is important to stress that as we only have cross-sectional data at hand, and no panel data (derived from repeated observations over time), we are only able to identify some relationships that can be further tested when relevant time series data become available.

Literature Review: Determinants of for-profit fitness centre provision and the question of substitution effects

Determinants

There are many determinants that can potentially affect the provision of commercial fitness centres in Denmark. It should be noted that our analysis is mainly driven by the available data (as elaborated upon in the Data and Methods section). However, first – and at the individual level – we anticipate that income is connected to the inclination to participate in sports (Berger et al. 2008; Hallmann, Feiler, and Breuer 2015; Wicker, Hallmann, and Breuer 2012). This means that we would expect a greater provision of fitness provision in higher income regions of Denmark. This being said, the income factor can work in two ways. On the one hand, higher levels of household income can indicate longer working hours among household members, which can affect general activity levels negatively because time spent on work displaces available time for PA (Weimar, Wicker, and Prinz 2015; Wicker, Breuer, and Pawlowski 2009; Downward 2007).[5]

On the other hand, fitness activities can appeal to people with long weekly working hours because they can gain access to gyms outside of ordinary working hours, thus providing them with flexible options to train. Such flexibility is not always possible to obtain in sports clubs or associations where space for physical activity is usually limited to publicly allocated and inflexible timeslots (Bøje and Eichberg 1994). This is due to the 'non-profit failure' problems touched upon earlier. Therefore, Hallmann et al. (2015) and Wicker et al. (2012) find that commercial fitness centres that are able to cater for the flexibility needed by high income groups are at a significant advantage over non-profit

[5] It should be noted that some studies (e.g. Meltzer and Jena 2010) find that higher income groups increase the intensity of their training to compensate for the reduced amount of time they have to exercise.

sport for all leisure programmes.

Second, current research shows that PA is positively associated with (higher) levels of education (Pilgaard and Rask 2016; Farrell and Shields 2002; Ruseski et al. 2011; García, Lera-López, and Suárez 2011). Even though this applies to sport in general, and not necessarily to participation in for-profit leisure activities specifically, we would still expect that the educational level in a given Danish municipality – for example – would affect the provision of commercial fitness centres positively there.

Age variation could also be expected to have an impact on commercial fitness centre provision. Firstly, sport participation decrease with age (Downward 2007) and secondly, fitness appeals to younger people (Asserhøj 2017). Even though some studies find evidence that elderly people are becoming more physically active (Kokolakakis, Lera-lópez, and Castellanos 2014; Humphreys and Ruseski 2006), we would thus expect to find a better provision of fitness centres in areas where the average age is lower or where the proportion of young people is higher than in parishes with a lower share of young people/higher average age (Wicker, Breuer, and Pawlowski 2009). Again, because existing research is mainly focused on individual level participation and not commercial fitness centres (organisational level) specifically, this might not be so, however, given the available evidence this is what we expect.

Fourth, gender – or the share of men versus women in a given geographical area – can influence the provision of commercial fitness because it is generally found that men participate in PA more than women (Humphreys and Ruseski 2006). On the other hand, some studies (e.g. Ulseth 2004; 2008) find that fitness centres appeal more to women than men. It is difficult to be specific on what one would expect theoretically regarding gender. Some Danish centres, such as the for-profit LOOP chain, might appeal more to women,

while other types of centre appeal more to men. As our data is not categorised according to potential gender preference relevant strata, or on different types of centre, we only use our gender variable to look for overall trends. We will consider this again in our results section. However, leaning towards the evidence provided by Van Tuyckum, Scheerder and Bracke (2010) that women in Denmark report to be more regularly active than men, we expect a high proportion of women to affect the amount of centres positively. Put differently, a large proportion of women who play sport in a specific geographical area could potentially mean more women also choosing a commercial fitness centre as their facility for doing their physical leisure activities, thus raising demand and (potentially) provision.

Urbanism is also expected to influence the provision of fitness centres, a finding potentially supported by Garcia et al. (2011), who report the probability of doing sport as being higher in medium or large cities than in smaller ones. If more people are doing sport in larger cities it could be expected that some would choose commercial fitness instead of non-profit programmes, thus affecting the provision of for-profit centres positively. Further, in more densely populated areas in Denmark, the number of public sports facilities per capita is lower than in less populated areas. This could affect the provision of commercial fitness centres positively if a demand for sport is present.

According to Storm and Rask (2017), this seems to be the case in the Copenhagen and Frederiksberg municipalities, which together form the central parts of the larger Copenhagen urban area. In essence, for-profit fitness centres rely on a basic population level within their neighbourhood in order to recruit a sufficient number of customers to make a viable business, and thus establish robust revenue streams. As pointed out by the median voter theory (Black 1948; Congleton 2004), public institutions – and the state –

tend to cater for large population groups, which, when applied to commercial organisations, means that in order to gain a profit, geographical areas with a higher number of inhabitants have a greater chance of being profitable. Thus, we anticipate that higher levels of population – which are found in the big Danish cities – could affect the provision of for-profit fitness centres in each parish positively. This is consistent with the findings of Hovemann and Wicker (2009), but is in opposition to Garcia, Lera-Lopez, and Suraz (2011) who argue that in some European countries sport participation rates are higher in rural areas than in urban ones.

The question of substitution effects

Our aim with entering the above factors in our analysis is to understand which overall factors determine the provision of commercial centres in different Danish geographical areas, which thus answers *our first research question*. This is primarily done by deploying the factors on average household income, age, gender, and population density. Deploying of the factor public spending on sport includes a test to see whether the provision of public facilities and subsidies for sports activities in itself affects commercial fitness centres negatively (Dallmeyer, Wicker, and Breuer 2017).

In Denmark, The Leisure Act[6] of 1968 required municipalities to provide voluntary sports clubs and associations with facilities and subsides for children and youth in particular (but also adults) in order to promote physical activity to their inhabitants. In theory, such spending – which varies across municipalities depending on political priorities – could affect the commercial fitness centre provision at the local level. The presence of a public swimming pool or an outdoor football training ground could, for

[6] Today this law is called 'The Act on Non-formal Education and Democratic Voluntary Activity' (In Danish: 'Folkeoplysningsloven'). https://ec.europa.eu/epale/en/resource-centre/content/act-non-formal-education-and-democratic-voluntary-activity

example, theoretically prompt people to use such facilities instead of commercial fitness centres because public facilities are free to use or accessible at a very low fee, thus creating substitution effects because of municipal facilities.

To test potential substitution effects of the emergence of non-profit fitness centres, as mentioned in our *second research question*, we include data on three other types of centres in our analysis: fitness centres administrated by municipalities, fitness centres run by non-profit associations, and the centres organised as self-regulated trusts.

Each type of non-profit centre is entered as a separate factor in our analysis to test whether the presence of any of these types affects the provision of commercial fitness centres. However, municipal-administrated centres and trusts are mainly added as controls (more on this below) in our approach because they are not part of the ongoing debate on competition even though they – theoretically – could have an effect on the provision of commercial fitness centres.

Municipal-administered centres are usually used by municipalities as health-enhancing tools to help inactive or overweight inhabitants start being active or exercise to recover from surgery or other ailments. Fitness centres run by associations are centres that offer activities that are usually supplementary to the main activities (for example soccer, handball or rowing) the association offers to its members. Finally, trusts are a typical Danish organisational form whereby non-profit organisations offer specific public welfare or even-state determined tasks. Trusts are independent entities with their own boards. They operate at 'arm's length' from public authorities and are, in this sense, self-regulated. However, they are frequently subjected to regulations and agreements with public authorities (here the municipal authorities). Further, in some cases the board members are appointed by the municipal authorities, or by local associations and municipal authorities' jointly.

In the following sections, we describe the data, methods and empirical regression models used to examine the Danish case in more depth.

DATA, METHODS, AND EMPIRICAL MODELS

Data Collection

Our analysis of the determinants of commercial fitness centre provision is driven by data available from Statistics Denmark at the parish (*sogn*) level, which is a church-related geographical unit (Danmarks Nationalleksikon 2000). Parishes were originally established by the Danish church, in corporation with the Danish state, to perform various administrative public tasks.[7] Today, the registration of newborn babies is done by the parishes and this is why there are official statistics available at this level. The benefit of focusing on the parish level is that we are able to obtain a significant number of observations to substantiate our regression approach.

The deployed data includes demographics such as average household income, education, age, gender, population and population density, and municipal expenditure on sports facilities and subsidies for sports associations (per capita).[8] Even though the choice of explanatory factors is driven by data availability, from a theoretical perspective it is likely that all of the included factors can affect the provision of for-profit fitness centres in the Danish parishes.

Variables

Dependent variable

To determine whether the presence of non-profit fitness centres affects commercial ones negatively, we studied a unique database on Danish fitness centres. We used a regression approach, forming our dependent variable with data gathered on the presence of

[7] Priests were employed as civil servants because they were capable of reading and writing.

[8] Statistics Denmark is the official public Danish statistics organisation. We thank Henrik Husoom from Statistics Denmark for providing us with the parish level database used in this study.

commercial fitness centres *[ComFit]* at the parish level. The variable is constructed from a thorough mapping of for-profit centres conducted by the Danish Institute for Sports Studies in 2017. This data is publicly available on the website www.facilitetsdatabasen.dk, which covers the majority of public sports facilities in Denmark. All 803 commercial fitness centres in Denmark are plotted by municipality in Figure 2. The grey tones display population density in the respective Danish municipalities.

---Insert Figure 2 around here---

As the total number of Danish municipalities is small (98), the data has – as mentioned earlier – been further broken down by parish (*sogn*). By reducing municipal data to the parish level, we get a substantially greater number of observations (+2,000) than we would have at the municipal level. This helps us attain the best possible estimations in our regression approach. However, because we aim to control for size effects (the anticipation that size determines size – or, in this context, the assumption that larger and heavily populated city areas would have a greater number of fitness centres, see Figure 2), we run our regressions with the dependent variable transformed into densities of the parishes (number of *ComFit*/Pop*10,000). The variable has further been log-transformed because it is skewed. The log-transformation procedure reduces the number of observations significantly (to around 400) because parishes with zero centres cannot be log-transformed and have therefore been removed from the dataset. Because of this 'zero-inflation' problem, we have further chosen to take on a two-part model regression approach where one set of models is run on all cases to identify determinants of the presence of (at least) one centre (dependent variable: 1=centre(s) present; 0=no centres present). A second set of models is run on the sub-sample (around 400 cases) to identify

the determinants of the *density* of centres in the parishes. By doing this we also assume that the determinants of the presence of (at least one) centre(s) are different from the determinants of density (Wicker et al. 2016) [more on this in the Statistical Analysis section].

It is important to stress that our data on fitness centres does not contain information on the specific number of members in the centres, nor their size. Only a limited number of centres wanted to provide the membership data we requested, and no central database on the size of the centres exists. This is a limitation of the study, and means that we can only estimate determinants and substitution effects in relation to the provision of centres (as our unit of observation), and not the number of members in the centres – or members per square metre.

This can be a potential problem because higher demand for fitness memberships can theoretically be absorbed by existing facilities – or, when looking at potential substitution effects, results in decreasing memberships in the centres (instead of affecting the amount of centres). This makes the estimation of determinants of provision and substitution imprecise.

However, it is still reasonable to assume that the market for fitness adapts to variation in demand (which again is determined by our explanatory factors), and the providers open new centres – as has been the case over last ten years (Bang 2018) – or close them down. In any case, our estimates are the best possible of the demand for commercial fitness centres given the available data.

Independent variables

The types of parish-level data that are publicly available as potentially explanatory determinants (independent variables) for the provision of centres within them are, average household income (*AvHInc*) (listed in Danish kroner), educational level of population

(*Edu, which consists of five categories (variables) including one reference group*[9]), age (*Age*), and gender (*Gender*). Further, we have calculated a variable of population density (*PopDen*) (persons per square kilometre (km^2)) since the total area and population of each parish is available.

Finally, municipal expenditure on sports facilities and subsidies for sports associations per capita (*PubSpend*) (in Danish kroner) are included (together with the above variables) in our *first model* aimed at answering our first research question. *PubSpend* (listed in Danish kroner per capita) has been calculated from publicly available data on the costs of running these leisure facilities and the provision of related subsidies, and assists in providing an insight into potential problems of placing new centres in areas with (a large provision of) public or publically supported sporting facilities.

In addition to these (main) variables, we include three more variables in a *second model.* These variables cover three other types of centres: the amount of per capita municipality administrated fitness centres (*MunFit per capita*[10]) at parish level, the amount of per capita fitness centres run by non-profit associations (*AssoFit per capita*) at parish level, and the amount of per capita centres organised as trusts (*SelfregFit per capita*), also at parish level.

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[9] Statistics Denmark has data representing five levels of education. We have therefore structured our education variable into five categories, with each being entered into our models as independent variables: Post-doc. & PhD (18-20 years of education), Master (15-17 years of education), Bachelor (13-15 years of education), High school (10-1 of education), and Primary school (9-10 years of education (left out as reference). Each category measures the share of people in the respective parishes based on the individual's highest level of degree (e.g. if a person has a Master as her highest level of education, then she is part of the share (variable) calculated Master. If a person has a Bachelor as her highest degree, then she is part of the share (variable) calculated for bachelors and so on). The equation for each variable reads: Share=number of inhabitants with the given (highest) degree in the parish/total amount of inhabitants in the parish. The share is calculated in percentages.

[10] All per capita values related to centres have been multiplied with 10,000 in order not to get very small coefficient values in the regressions.

The variables on these three types of centres are included to test our *second research question* because of the ongoing tension in Denmark over competition related specifically to these types of centre. As mentioned above, the debate has so far been centred on the question of whether non-profit centres are displacing commercial centres because they supply some services that are similar to the leisure services provided by the commercial fitness centres.[11] However, centres run by public authorities could – as mentioned earlier – also produce substitution effect in relation to commercial fitness centres and are entered to control for this.

The share of commercial centres versus the three other types of centres in our sample can be gauged from Figure 3. In total, commercial fitness centres (N=803) account for 58.9% of all centres in the sample, whereas Association Fitness Centres (*AssoFit*; N=335), Self-Regulated Fitness Centres organised as trusts (*SelfRegFit;* N=162), and Municipal Fitness Centres (*MunFit*; N=53) account for 24.6%, 11.9%, and 3.9% of the sample respectively.

--- Insert Figure 3 around here ---

Statistical Analysis and Specifications

As mentioned above, we apply a two-part estimation strategy to our data. First, we deploy a probit model to identify determinants of for-profit centre presence in the parishes using all cases (+2000). Next, we estimate determinants of centre density ("ln(number of *ComFit*/Pop*10,000)") on the sub-sample of parishes with at least one for-profit centre

[11] Such debates are not present in relation to other types of public facilities or services. The fitness sector in Denmark is young and primarily concerned with what is argued to be publicly subsidised activities that the commercial centres see as similar, and thus in direct competition with their own services and products.

using Ordinary Least Squares (OLS) (Mehmetoglu and Jakobsen 2017). As pointed out by Wicker et al. (2016) and Castellanos, García, and Sánchez (2011), this is an appropriate approach to deal with 'zero-inflation', as in this case where many parishes do not have a for-profit centre and determinants of centre presence and the determinants of (the amount of centre or) centre density can be assumed to differ from each other.

We have access to updated data on our independent variables *Age*, *Gender*, and *PopDen* from 2017, while our data on variables *AvHinc* and *Pubspend* are from 2016, and *Edu* from 2015. Our data on fitness centres (dependent variable and independent *MunFit*, *AssoFit*, and *SelfregFit*) are from 2017. This means that we are forced to combine 2015, 2016 and 2017 data when running our estimations. However, as we expect to see only a small variation in the variables over these years, this is considered a minor problem. Put differently, as this paper is trying to take the first steps towards understanding the determinants of the provision of commercial fitness centres in Danish parishes, we believe that this problem is not a significant shortcoming for the study. We will return to this in the limitations section at the end of the paper.

Our overall specifications regarding our regression modelling in both the first (probit) and second part (OLS) are displayed in the two below equations, where the first equation is a means to answer research number 1 and the second equation is used to answer research question number 2:

$$(1)\ ComFit = \beta_0 + \beta_1 \log(AvHInc) + \beta_2 Edu(1-4) + \beta_3 Age + \beta_4\, Gender + \beta_5 \log(PopDen) + \beta_6 PubSpend + \epsilon,$$

$$(2)\ ComFit = \beta_0 + \beta_1 \log(AvHInc) + \beta_2 Edu(1-4) + \beta_3 Age + \beta_4\, Gender + \beta_5 \log(PopDen) + \beta_6 PubSpend + \beta_7 MunFit + \beta_8 AssoFit + \beta_9 SelfregFit + \epsilon,$$

where $\beta_1 - \beta_9$ represent the estimated regression coefficients on our deployed independent variables, and β_0 and ϵ are the equation's constant and error terms. Variables *AvHInc,* and *PopDen* have been log transformed in both specifications in order to reduce kurtosis and skewness. Due to our two-part estimation approach, we present the output from in total four models (two for each part).

Descriptive statistics are reported in Tables 1 and 2, with Table 1 displaying descriptive statistics for all deployed variable data and Table 2 splitting the data between parishes with (commercial) fitness centres and parishes without.

--- Insert Table 1 around here ---

--- Insert Table 2 around here ---

In the next section, our results from our estimations are presented and discussed in relation to the theoretical framework outlined above.

RESULTS AND DISCUSSION

In order to answer questions about the determinants of provision of for-profit fitness centres and potential substitution effects, Table 3 presents the output from our four regression model estimations.

--- Insert Table 3 around here ---

Determinants of the provision of commercial for-profit fitness centres

As discussed in the literature review, increases in income can have conflicting implications when it comes to demand for fitness facilities (Weimar, Wicker, and Prinz 2015; Wicker, Breuer, and Pawlowski 2009; Downward 2007). Our results support the view that increased income means a greater number of working hours, which in turn leaves few remaining hours to spend on leisure and fitness activities. As can be read from Table 3, an increasing average household income appears to have a negative relationship to the provision of fitness centres (model 1 and 2) and densities (significant in model 3 & 4). This is consistent with the findings of Weimar et al. (2015), which show a 'crowding out' effect when working hours encroach on time that could be spent on physical activity. This indicates that the market has been unable to provide enough flexibility or relevant programmes to compensate for demands on high income earners' time.

As mentioned above, our education variable *Edu* (3) is split into five independent categories, with the lowest left out as a reference. We see different results across models, with Master and Bachelor being significantly negative related to centre provision in our probit models and positive related in models 3 and 4 on centre density except for the highest level (Post-doc and PhD). In these models, *Master* and *High School* are significant. The overall impression gleaned from the *Edu* models is that commercial fitness centres do not appeal to educated people, while the sub-sample regressions

(models 3 and 4) give the impression that in parishes with at least one for-profit centre, centre density is determined by higher levels of education – a finding consistent with earlier studies on educational levels and PA participation (Pilgaard and Rask 2016; Ruseski et al. 2011). This finding is further underpinned by taking the distribution of the educational level in parishes with and without for-profit centres into account. From Table 2, it can be read that the share of higher educated people (Bachelor, Master and Postdocs and PhDs) is higher in parishes with for-profit centre presence than in parishes without.

Further, and seen in connection with the negative effect of income, the positive effect of education on for-profit centre density – found in our subsample – only seems to be applicable to a certain degree. Normally, a high level of education is followed by higher levels of income. Therefore, there could be a point where this results in negative effects in relation to our dependent variable (due to the increased number of working hours that come with a Post-doc or PhD position). However, we were not able to document more specific results on this from the data available.

With regard to *Age,* we only find a significant relationship in models 3 and 4, however, all models reveal positive signs. Theoretically, this finding somewhat supports scholars who find that elderly people are becoming more physically active (e.g. Kokolakakis, Lera-lópez, and Castellanos 2014; Humphreys and Ruseski 2006), even in commercial gyms. However, it is important to remember that the average age in parishes that have for-profit centres is relatively low: 41.3 years (SD=3.96). Thus, our findings can only suggest, overall, that per capita provision of commercial fitness centres seems to be determined by (higher) average age in the parishes (with for-profit centres), not specifically that it is caused by elderly people exercising more in for-profit centres.

In regard to *Gender* (male share) we find different results across models. In our full sample (models 1 and 2) our probit model reveals that in parishes with a higher

proportion of males, the probability of finding a for-profit centre is lower than in parishes with a lower proportion of male. On the other hand, in our sub-sample (parishes with at least one for-profit centre), the per capita provision is shaped by men, because a higher proportion of males in these parishes is correlated to a higher density of centres. We have not been able to further determine why this is the case as there are no Danish studies that examine such gender related patterns.

Consistent with our expectations, influenced by Storm and Rask (2017) and Hovemann and Wicker (2009), there is generally a positive effect of *Popden* on the provision of (at least one) centre(s) in Danish parishes (models 1 and 2). However, related to the density of centres in our sub-sample, (models 3 and 4) there is a negative relationship between population density and per capita provision. Taken together, this indicates, on the one hand, that urbanisation does affect the provision of fitness centres positively. On the other hand, it also indicates that even though there are more centres in urban environments than in smaller towns, it does not mean that the *density of centres* is higher in urban environments than in more rural ones. What this finding potentially tells us is that there could be room for even more for-profit centres in parishes with higher population density because the provision of centres per capita is lower there than in less populated parishes with higher per capita provision (indicating room for higher fitness centre density). This is an interesting finding that we will touch upon again in the concluding section.

The question of substitution effects

In regard to the second research question on substitution effects, we find that close to none of our variables representing public expenditure[12] or non-profit centres seem to be

[12] In Model 3 *PupSpend* is significant at the 10 %-level.

significantly negative related to the provision of commercial centres (models 1 and 2) – nor the density of them (models 3 and 4). However, we find a significant negative effect in the probit estimations related to *AssoFit* (model 2). While this indicates a kind of substitution effect, there are important modifications to such a conclusion.

The substantial meaning of the regression output from model 2 is that the probability of observing a for-profit centre in parishes with higher density non-profit centres is lesser than in parishes with lower density levels of non-profit centres. This can be due to for-profit centres placing themselves in parishes without many non-profit centres – a finding that is underpinned by looking at Table 2, which shows that there is a significantly higher average of non-profit centres in parishes without for-profit centres. It cannot be singled out that some for-profit centres have been forced to close in parishes where new non-profit centres have opened (and the total amount of non-profit centres have increased). However, as the general development in the number of for-profits has been increasing over the years this may not have occurred in many cases.

This being said, it is important to stress that our cross-sectional data structure cannot answer questions of causation of this kind. Lack of time series observations and lower level data could prevent further potential correlations between our co-variates from being revealed. If data on different points in time and membership strata had been available, we might have been able to identify potential substitution effects more clearly – also in our sub-sample (models 3 & 4). Theoretically, the existence of non-profit centres in the same parishes could have a negative effect on demand for the commercial fitness activities, thus making it harder for them to make a profitable business.

However, such negative effects do not necessarily force commercial centres to close down, but they could potentially reduce their financial surpluses (profits) and/or numbers of customers. Given that we only have data on centre-related strata, it is not possible to

test this further. Based on our output (and as mentioned above) it seems that the market for centres – and the additional demand – is still open to the provision of more centres of various types, including commercial and non-profit ones. Tested this way around, it seems that the presence of non-profit centres does not affect for-profit commercial centres negatively per se – at least in parishes where for-profit centres are present.

Seen in relation to the failure theory underpinning this paper and the connected discussion on the commercialisation of leisure activities, it can be argued that our findings offer some evidence as to how all three sectors can play a part in providing facilities for physical activity – even without being significant (or threatening) competitors to one another.

As pointed out above, it seems clear that the rapid increase in the number of for-profit fitness centres has stimulated an underlying demand for facilities that cater for specific segments of the population and in parishes where the demand has not been met by the public and voluntary sectors, i.e. where voluntary failure is present (Hallmann, Feiler, and Breuer 2015). While this, in turn, has forced the non-profit sector to develop new activities that are similar to the ones provided by the commercial centres, based on the evidence provided in this article, it has not resulted in the voluntary sector's activities negatively affecting the commercial ones. It cannot be ruled out that this could happen in the future, but the current mix of providers currently seems to meet different leisure demands that benefit the population as a whole.

From a broader perspective, it seems that people's leisure choices are affected positively by the availability of for-profit centres. Leisure and mass sport participation has been on the rise in Denmark for several years (Pilgaard 2009; Pilgaard and Rask 2016) with the some of the increases being found in participation patterns outside the traditional voluntary sports clubs and associations, for example, in commercial sport for all, leisure

or fitness centres. As long as this development supplements existing non-profit leisure programmes in raising over all participation rates, the presence of both types of centres will benefit the Danish population. The failures of each sector in the (welfare) economy is thus – at this point – supplemented by the other sectors advantages in a fruitful mix.

In Denmark, it is part of the current government's plans to raise its citizens' physical activity levels, and having all three sectors providing activities should help meet this target. There is a risk, though. Both the market and the public sector tend to cater for the majority. As the voluntary sector becomes more professional and commercially oriented, it is also starting to appeal to the majority because its funding is fundamentally provided by decision makers who also strive to cater for the median voter. If all three sectors end up providing for the same majority (usually the middle class), then socially disadvantaged people will be left behind when it comes to sport and leisure activities.

In the following section, we sum up our findings and touch upon the implications, limitations and suggestions for future research.

CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH

Summary

This paper has aimed at answering two interconnected research questions: 1) What are the prime determinants behind the provision of commercial centres in Denmark? 2) Has the current number of centres given rise to substitution effects, with the provision of non-profit fitness centres having a negative effect on the commercial ones?

By means of regression techniques, we find that several of the variables included have an influence on the provision of centres and the density of them (our first research question) depending on the models and sample deployed. Concerning our second research question, we find no clear proof of substitution effects related to the recent developments where associations and sport clubs have taken up fitness activities and established new centres.

This is an interesting finding and adds to existing leisure research by providing evidence underpinning the ongoing discussion about the sectors of the economy that can and should provide leisure physical activities to local citizens. Even though it cannot be ruled out that non-profit centres in some cases have a negative effect commercial centres, based upon the available data, it seems that significant competition does not exist.

Implications

The findings presented here provide commercial fitness directors and managers with relevant insights on where to locate new centres, if they take the determinants of provision into consideration. Our findings related to population density and centre provision per capita are particularly interesting in this regard. Taking the total output from all our four models into consideration, the substantial meaning of our findings is that there could be

room for more for-profit centres in higher populated areas because centre per capita provision is lower there than in less populated parishes (where centre density is higher). When higher density is not related to higher per capita provision and centres exist in less urbanised parishes with higher per capita provision, it is a straightforward conclusion that more centres can be established in parishes with lower per capita provision of for-profit centres.

However, some caution should be exercised when managers consider where to open new centres. Our regression analyses do not reflect the effect of specific market conditions at play in any of the studied areas. As mentioned above, we could not access data on membership levels, so it is impossible to predict more precisely whether the provision of a new fitness centre would be a commercial success. It would therefore be advisable to conduct feasibility studies in relevant parishes before making decisions on opening new centres.

Further, and somewhat connected to this, our models do not say much about the financial aspects of operating a centre because no systematic financial data on the centres exist. Consequently, our findings can only provide a preliminary assessment of where a potential market for a (new) fitness centre could be located. More detailed market and financial analyses should therefore be deployed prior to deciding on new facilities.

Limitations and future research

As this is the first study aiming to understand socio-economic determinants of the provision of fitness centres in Denmark and potential substitution effects between for profit and non-profit providers of sport for all leisure activities, there are many limitations of our work that point towards new areas of research.

First, it is not possible to identify the determinants of successful centres in terms of

profitability when critical financial data are missing. At present, this information is not publically available as many of the fitness chains only report their accounts at the aggregated level of the chain to which they belong. This makes it difficult to understand in more detail what the differences between profitable centres and non-profitable are. If financial issues are linked to competition from non-profit centres, as theoretically could be the case, then what are the causes? Future studies should aim to look into this.

Another problem we have mentioned is the lack of information on the specific numbers of members who are using the fitness centres. If membership data can be deployed in future regressions, more precise estimations can be made.

Regarding substitution effects, the presented cross-sectional study has mainly analysed one side of the problem: whether non-profit fitness activities affect for-profit ones negatively. It has not been thoroughly assessed whether market shares have dropped among the non-profits due to the development of the for-profit sector – as is shown to have happened in other nations (Weimar, Wicker, and Prinz 2015; Hallmann, Feiler, and Breuer 2015). Further, it must be stressed that the structure of our data can only indicate the relationship between the for-profit and non-profit sector in terms of substitution effects. In order to analyse this properly, an extended data structure comparing observations over time is needed to identify how the developments in commercial and non-profit fitness affect each other. This means that so far the findings presented here are only a first step towards obtaining a deeper understanding of the consequences of this specific mix of for- and non-profit fitness providers.

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ACKNOWLEDGEMENTS

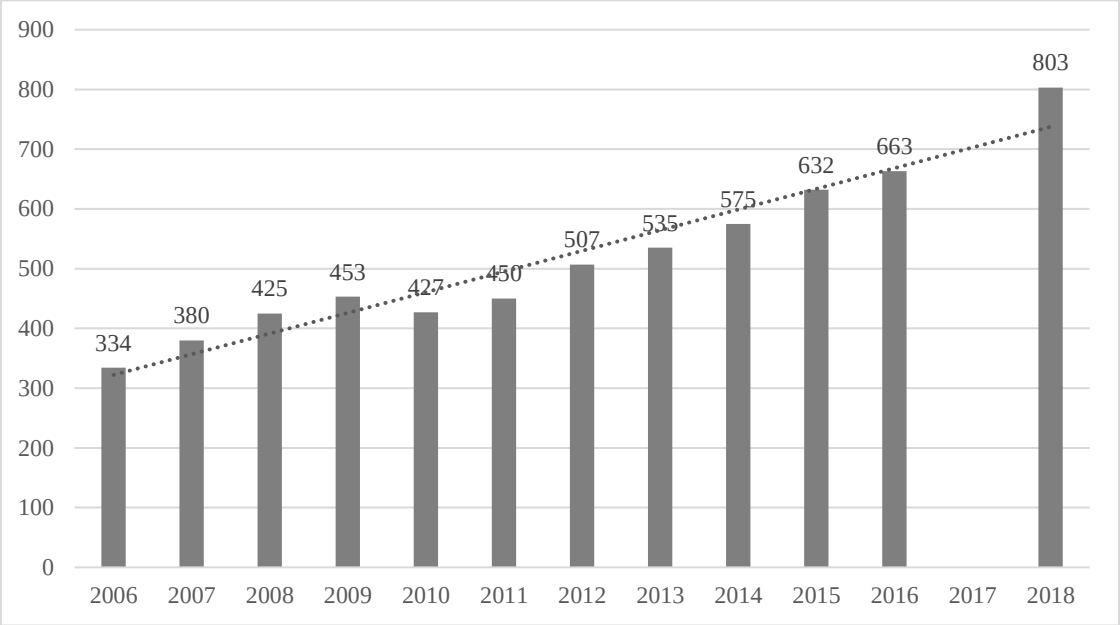
The authors would like to thank the anonymous reviewers and the associate editor for their constructive comments on earlier drafts of this paper.

APPENDIX

Table A1: Collinearity Statistics

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Log population density	0.158	6.340
Gender (male share)	0.505	1.982
Age	0.729	1.372
AvHinc	0.530	1.886
PubSpend	0.955	1.047
Post-doc & PhD	0.198	5.042
Master	0.389	2.570
Bachelor	0.485	2.062
High School	0.445	2.246
Munfit.	0.937	1.067
SelfregFit.	0.918	1.090
AssoFit.	0.875	1.142

Figure 1: The development in fitness centres in Denmark, 2006-2018[13]



[13] Reproduced with permission from Bang (2018).

Figure 2: Commercial fitness centres in Denmark by municipality

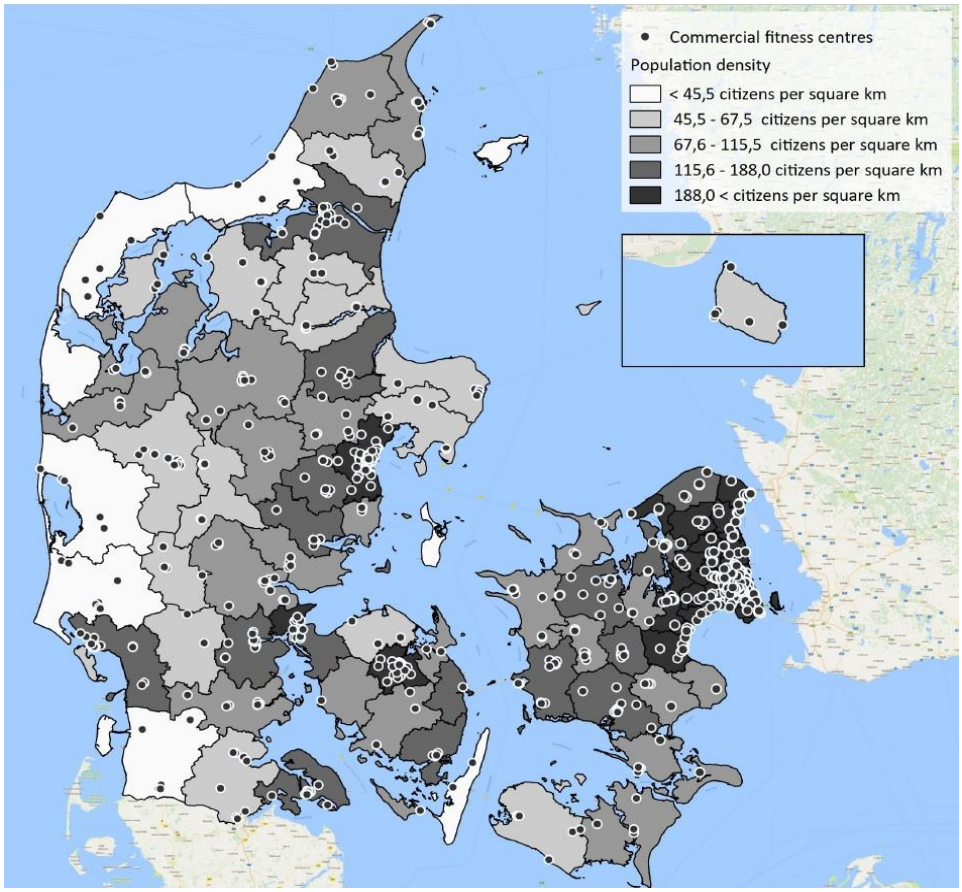


Figure 3: Types of centres in the sample

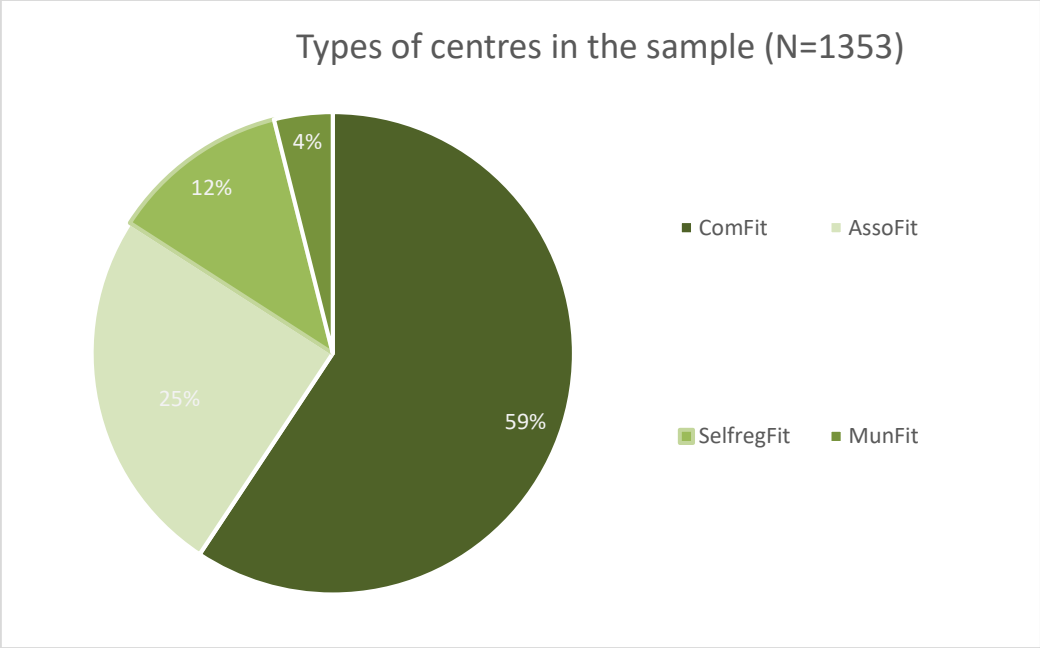


Table 1: Summarised statistics for all deployed variables

Variable	Mean	SD.	Min.	Max.
Commercial Fitness Centres (dependent)	0.37	0.98	0.00	9.00
Commercial Fitness Centres per 10,000 people	0.70	2.94	0	81.30
Log of Commercial Fitness Centres per 10,000 people (N=408)	0.96	0.74	-0.78	4.40
Population (*Pop*) (*1000)	2,653	3,674	3	44,631
Average Household Income (*AvHinc*) (In Danish kroner)	565,622	119,714	254,830	1,688,115
Log Average Income	13	0	12	14
Post-doc. & PhD (share in %) (Edu)	0.32	0.01	0%	4.55%
Master (share in %) (Edu)	4.86	0.10	0%	30.80%
Bachelor (share in %) (Edu)	18.41	0.10	0%	35.48%
High School (share in %) (Edu)	44.78	0.10	24.04%	66.67%
Average Age (*Age*)	42.22	4.13	30.58	67.89
Gender (Male Share) (*Gender*)	51%	2%	43%	67%
Population density (*PopDen*)	673.87	2613.33	0.13	37,706.25
Log Population Density	4.40	1.72	-2.02	10.54
Municipal Expenditure (*Pubspend/capita*)	0.73	0.22	0.21	1.66
Municipal Administrated Fitness Centres per Capita (*MunFit*)	0.02	0.17	0.00	2.00
Association Fitness Centres per Capita (*AssoFit*)	0.16	0.38	0.00	2.00
Self-regulated Fitness Centres per Capita (*SelfregFit*)	0.07	0.26	0.00	2.00
Number of observations	2160			

Table 2: Summarised statistics for parishes with and without commercial fitness centres

	Parishes with commercial fitness centres (N=408)				Parishes without commercial fitness centres (N=1752)			
Variable	**Mean**	**SD.**	**Min.**	**Max.**	**Mean**	**SD.**	**Min.**	**Max.**
Pop	7,740	4,686	153	44,631	1,468	2,026	3	19,123
PopDen	2,265.20	4,223.35	14.66	32,192.31	303.29	1883.47	0.13	37,706.25
Gender	49%	1%	43%	56%	52%	2%	45%	67%
Age	41.34	3.96	30.58	57.01	42.42	4.15	31.01	67.89
AvHInc	539,607	144,786	333,720	1,520,255	571,680	112,266	254,830	1,688,115
Post-doc. & PhD (*Edu*)	0.51	0.60	0	3.76	0.27	0.47	0	4.55
Master (share in %) (*Edu*)	7.51	6.37	0.69	30.8	4.24	3.86	0	28.95
Bachelor (share in %) (*Edu*)	20.39	4.72	9.58	31.53	17.95	4.99	0	35.48
High School (share in %) (*Edu*)	42.24	5.04	25.53	52.75	45.37	4.65	24.04	66.67
Pubspend/capita	0.76	0.23	0.21	1.66	0.72	0.21	0.21	1.66
MunFit	0.08	0.33	0	2.35	0.04	0.51	0	13.19
AssoFit	0.37	1.07	0	10.94	1.02	3.40	0	49.75
SelfregFit	0.28	1.33	0	21.88	0.47	2.33	0	44.05
Dependent	1.97	1.40	1.0	9.00				
Dependent pr. 10,000 people	3.71	5.90	0.46	81.30				
Log of Dependent pr. 10,000 people	0.96	0.74	-0.78	4.40				

Table 3: Regression Output, Model 1-4 with Fitness Centre Density as Dependent Variable

	Probit model		*Log-linear OLS*	
Variables	**Determinants of at least one Commercial centre (1)**	**Substitution effects (2)**	**Determinants of Density of Commercial centres (3)**	**Substitution effects (4)**
Intercept	9.617	9.968	13.302	13.303
	(4.155)**	(4.168)**	(3.111)***	(3.122)***
AvHInc	-0.252	-0.258	-1.258	-1.268
	(0.269)	(0.270)	(0.197)***	(0.199)***
Post-doc & PhD *(Edu)*	-0.112	-0.103	-0.286	-0.283
	(0.153)	(0.153)	(0.114)**	(0.114)**
Master *(Edu)*	-0.039	-0.042	0.086	0.087
	(0.021)*	(0.021)**	(0.014)***	(0.015)***
Bachelor *(Edu)*	-0.032	-0.034	0.010	0.010
	(0.012)***	(0.012)***	(0.010)	(0.010)
High School *(Edu)*	-0.024	-0.025	0.020	0.021
	(0.013)*	(0.013)*	(0.010)*	(0.011)**
Age	0.008	0.009	0.047	0.048
	(0.012)	(0.012)	(0.011)***	(0.011)***
Gender	-16.401	-16.768	5.410	5.549
	(2.954)***	(2.946)***	(2.577)**	(2.599)**
PopDen	0.546	0.543	-0.273	-0.274
	(0.041)***	(0.041)***	(0.033)***	(0.033)***
PubSpend	-0.091	-0.087	-0.228	-0.208
	(0.191)	(0.193)	(0.138)*	(0.142)
AssoFit per Capita		-0.064		0.018
		(0.024)***		(0.030)
MunFit per Capita		-0.093		-0.028
		(0.112)		(0.093)
SelfregFit per Capita		0.007		-0.019
		(0.020)		(0.025)
N	2160	2160	408	408
R^2	0.414	0.419	0.353	0.355

Note: Standard errors in parentheses. *significance at .10 level; **Significance at .05 level; ***Significance at .01 level