

Unemployment Duration and sport participation*

Charlotte Cabane[†]

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Abstract

In this study I use the German Socio-Economic Panel to evaluate the impact of leisure sport participation on the unemployment duration. The empirical literature on sport participation has focused on labour market outcomes and job quality while the impact of this activity on job search has not been studied. However, sports participation fosters socialization which, through the networking effect, accelerates the exit from unemployment to employment. Furthermore, sporty people are expected to have valuable non-cognitive skills (self-confidence, persistence, team spirit). Last, they are healthier. These hypotheses are tested using survival analysis, taking into account unobservable heterogeneity. Because other activities could lead to similar positive effects I compare them to sporting activities and still find relevant results.

JEL Codes: J24, J64, L83

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[†]CES - Université Paris 1 Panthéon Sorbonne - Maison des Sciences Economiques, 106-112, boulevard de l'Hôpital, 75013 Paris. charlotte.cabane@univ-paris1.fr

1 Introduction

The usual returns of sport participation studied in the literature are : health, education, labour market outcomes (especially wages), and schooling. The effects highlighted are: signalling effect, reputation effect and increase in human capital (health and non-cognitive skills¹). One specific situation on the labour market which is highly concerned by these channels has been left behind: unemployment. Indeed, for the same reasons that sporty people fare better on the labour market, they should experience shorter unemployment spells.

Sporty people have more non-cognitive skills –such as tenacity, self-confidence, competitive spirit, discipline– and thus their job search is more efficient which lead them to find a job quicker (and/or even a better job). Furthermore, many non-cognitive skills are a priori associated to people who declare practising one kind of sport. Therefore, even if they do not have these specific personal traits, people assume they have it. And then whether it is true or not it represents an additional information that can be use by the firm for the hiring process (selection of the candidate). Sporty people have larger and more diversified social networks and thus, they have relatively more opportunities than non-sporty people. They have access to more information and benefit from more contacts and connections. This way, their unemployment spell can be reduced and/or they can find better jobs. Last, sporty people are healthier which is great in terms of productivity but also often noticeable (visually speaking).

The literature outlines positive results of sports participation on education and labour-market outcomes. Therefore, it is less likely that sporty people are unemployed. So, the relevant question is to know whether non-sporty people can by practising sport while they are unemployed benefit from this positive impact. For the aforementioned reasons, I venture the hypothesis that being involved in sports decreases unemployment duration.

The analysis of unemployment spell duration involves three periods: the first one $t_{(u-1)}$ during which the individual is employed or in education, the

¹Non-cognitive skills are personal preferences and personality traits which are valued in society but which do not involve technical or professional knowledge. Unlike cognitive skills, there is no school nor diploma which allows to learn and evaluate them.

second one t_u which begins once she declares to be unemployed and the third one $t_{(u+1)}$ which begins when she exits from unemployment to another situation.² Obviously, practising sports in $t_{(u+1)}$ will not have any impact on the length of t_u . Conversely, sport participation during t_u signals to firms that the individual is still physically active and thus healthy which is relevant with respect to her unobservable productivity at work. Moreover, it sends out a positive signal with respect to mental form too. A sporty unemployed individual is someone who does not give up -she is still socially active- once she is out of the labour market. And, for unemployed as well as for employed people, it sends out information linked to the specific sport practised. A rugby player is seen as someone which has a great team spirit whereas a dancer is considered as very rigorous and well-disciplined, for example. To sum up, sporting activity in t_u may reduce human capital depreciation and signal skills, and thus make the sporty unemployed individual more attractive.

However, an over-investment in sport participation reduces the time available for job search and, moreover, may signal a loss of interest in the job market. Bougard *et al.* (2011) demonstrate -in a recent experimental study performed on the French labour market- that job applicants who are involved in associations are significantly less often called than those who are not. Plus, sporting practice requires usually some financial investment that unemployed people are less able to afford. Even if they receive benefits and enjoy discounted access to sports facilities, their options in terms of sports can be limited (i.e. some sports are more expensive).

The efficiency of the networking effect depends on the reliability of the social network (Rees, 1966). Employed people are socially more attractive than unemployed ones and they are in interaction with many more people, therefore, sporting activity as a socialization process is more effective for employed people. Furthermore, employed people can afford a broader range and more expensive sports than unemployed ones. This leads to more opportunities, to more interesting contacts (in terms of labour market opportunities) or even to meet people in a privileged environment (such as private clubs or facilities). Once the network is built, people have to maintain it by going on with sport participation even once they become unemployed.

²The individual can exit from unemployment to employment but also to retirement or to training or even leave the labour force.

However, as I already outlined sports participation might impact individual's labour-market position through various mediators. And individual's labour market position influences in turn sports participation. This reinforces my choice to focus my analysis on the impact of a change in sports participation rather than a continuous sports participation on unemployment duration. Furthermore, since sporty people are known to be better off on the labour market it is relevant to know whether by being sporty –newly– people also get rewarded.

I use survival models to estimate the impact of newly sports participation on unemployment duration. They allow to add shared frailty which correspond to random effects. And, since I have more than one unemployment spell by individual, by using this additional information I believe I can get rid of a significant part of the endogeneity.

Sporting activities influence the individual's health and adding/removing the health status variable give an intuition about the importance of this channel. Results show that the impact of sports cannot be imputed to an improvement of the individual's health. In order to know if sports participation is seen as a signal of non-cognitive skills which are specifically and exclusively associated to *sporting* activities I test the impact of other activities which would also provide information on the individual. Other activities may play a role but they do not affect the one played by sports participation. The additional information –given by the sports participation, for example– is used by firms when they cannot directly measure individual's productivity. This means that sports participation should have a higher impact for young and unexperienced individuals while it should be less rewarded for workers for whom labour-market history is available. The results confirm this channel. It is also relevant to look at the type of transition. The impact of sporting activities might be different with respect to the destination. For this purpose I use a competing risk model and define different types of destination.

The article is organized as follows: in the next section I review the literature. The strategy of identification and the model used are presented in the third section. The fourth section is dedicated to the description of the data and the fifth section contains the results. I conclude in the last section.

2 Literature review

Most of the literature on the relationship between sport participation and labour market outcomes use US databases which consist of information on sporting practice during college and labour market outcomes several years (10 to 13) later. Therefore, the methodology is often the same: the authors study the impact of being sporty in college on labour market outcomes.

In this article I am interested in the contemporary impact of sporting practice on individuals' unemployment duration. Thereby, I put the emphasis here on articles which study the immediate returns of sport participation.

Are sporty people more motivated?

Cornelißen & Pfeifer (2010) use the German Socio-Economic Panel (GSOEP) and demonstrate that sporty students are more successful than others. They explain the positive relationship they found by an increase in students' productivity at school. This increase is a result of an improvement of individuals' health and / or the acquisition of soft skills which are either rewarded at school or useful in the learning process. The soft skills credited to sporty people are: self-esteem, competitive spirit, tenacity, motivation, discipline and responsibility. Traditionally, it is assumed that boys and girls do not have the same character, that is, non-cognitive skills endowment. As a matter of fact, the authors find a larger effect of sport participation on girls. They are supposed to be less competitive and to have less self-esteem initially. Therefore, they have relatively more to learn from sports practice (i.e. sporty schoolgirls catch up with their male peers).

Lechner (2009) also uses the GSOEP and points out the positive relationship between sports participation and labour market outcomes. According to his study, being sporty is equal to an additional year of schooling in terms of labour market long-term outcomes. He clearly identifies three channels: health, "mental health" and individuals' unobservable characteristics. Sporty people are mentally and physically healthier thanks to sport participation.³ Therefore they are more productive. Furthermore, they have unobservable specific characteristics which match with unobservable characteristics held

³Labour market outcomes depend on individuals' productivity at work and a part of this productivity depends on health status. A healthy individual is less absent, more dynamic and more concentrated. By practising sports as an extracurricular activity, people maintain or increase their health status.

by people who earn more.

Beyond their specific socio-eco-demographic profile, Celse (2011) and Eber (2002) argue that sporty people behave differently. Both use experimental economics procedures to highlight traits specific to sporty people. Celse (2011) finds out that sporty people suffer more from envy. His experiment includes various steps and people are organized in pairs (they do not know their partner). First, individuals have to execute a simple task in order to get paid relatively to their results. Second, they are informed of their own gain and have to rank their satisfaction. In a third step, they learn about their partner's gain and are asked to rank again their satisfaction. Last, they have to decide if they want to lower the other one's payoff. The result from this experiment is that sporty people are very sensitive to social comparisons and tend to reduce others income in order to feel better. Another interesting result is that there is no differences between men and women when most studies outline gender specific results.

Eber (2002) confronts sports science students (STAPS) and average students to various hypothetical / fictive situations⁴ and compares the results. He finds out that behaviours differ by gender and studying sports science exacerbate the differences. In each situation, girls look more for equality and boys look more for competition and these results are sharpened within sports science students. Since he does not control for the type of sports practised, one cannot know if the differences between boys and girls are pre-existing or due to the specific sport they do.⁵ Both articles state that sporty people behave in a different way but they do not provide information on the reason of these differences.

Networking effect

Networks are essential in job-search because they ease the circulation of the information and multiply the sources of information.

Rees (1966) highlights the relevance of networks and more precisely of informal networks in the hiring process. He argues that useful networks are reliable rather than large and diversified. The reason being that employers

⁴The dictator game and a situation involving competition and gains comparison.

⁵Independently to their preferences, sports supply differs by gender, which means even if they had the same preferences, the distribution of men and women by type of sports would not be equal.

can more rely on recommendations of people they personally know⁶ and who directly and personally commit themselves (like employees). Furthermore, it is costless for the firm and the future employee is more able to sell herself because she personally knows people who are working in the same area / firm.

Various models have been built in order to explain why and how networks influence labour market integration and outcomes but I focus on the one developed by Bramoullé & Saint-Paul (2010). Their model integrates the dynamism of the process which characterise labour market transition and social networks. Job status *and* social ties are interdependent and evolve through time. Bramoullé & Saint-Paul (2010) argue that the lower is the labour market turnover, the higher is the social segregation between employed and unemployed people. Therefore, individuals who have suffer from unemployment for a long time before being unemployed again experience lower exit rates from unemployment. And, people who stayed a long time employed before being unemployed experience higher exit rates from unemployment. These results are extremely interesting since they point out the fact that any activity which could connect unemployed people to employed people –such as sport practice– would partly break this time dependance / vicious circle.

Capperalli & Tatsiramos (2010) study the impact of friends networks on job finding rate, wages and employment stability using data from the British Household Panel Survey (BHPS). Focusing on friends position on the labour market, they find out that having best friends employed increases the probability to find a job.

By taking part in a team sport or by practising sport in a club, people socialize and get to know people who are not necessarily part of their original environment. Also, when people practise sports with their colleagues, it changes their usual professional relationship into a more personal relationship, which is stronger because it does not necessarily reproduce the hierarchy of the relationship set by the company's organization. Sport participation contributes to create other types of relationships between people who know each other and even to develop new relationships (with people who are not already part of the individual's social environment).

Sports participation as an indicator of unobservables

⁶In the sense that people recommend people of their kind, friends.

Rooth (2011) demonstrated that indicating practising sports in the curriculum vitae does positively influence firms' hiring process and decision to interview the candidate. A part of his analysis is based on an experimentation on the Swedish labour market. This kind of study is called testing or correspondence study and allows to measure the impact of individuals' specific characteristics during the hiring process. Rooth (2011) found that people who declare practising sport as a leisure in their curriculum vitae have a higher probability of getting an interview. And, being sporty is equal to 1.5 additional years of work experience. He also estimates the impact of a variation of the physical fitness on earnings and finds a positive effect (4%). For this last impact it is harder to precise which effect is at work. Unlike the previous cited studies, Rooth (2011) is able to differentiate types of sports (football, fitness etc.). This is very important in order to pinpoint impacts.

Evidence from Germany, previous studies

Most of the studies which demonstrate a positive relationship between sport participation and labour market outcomes (or education returns) are done using American data. Knowing the role sports has in the USA (social promoter, integrator, etc.), one can fairly question the relevance of such type of analysis with respect to European countries such as Germany. As a matter of fact, Germany (mainly because of the availability of the data) has already been at least twice investigated on the subject. The two studies - Lechner (2009) and Cornelißen & Pfeifer (2010)- have been realized on the GSOEP (German Socio-Economic Panel) and both outlined a positive impact of sport participation on labour market outcomes and school returns.

3 Empirical framework

3.1 Identification strategy

The hypothesis tested here is that getting newly involved in sports participation while being unemployed shorter unemployment duration. The observed population consists of non sporty people who experience unemployment during a specific time-window. I consider sports participation during unemployment as a treatment. Therefore, the control group consists of people who remain not sporty during the period of observation and the treated group is

formed by people who begin to be sporty while they are unemployed. The treatment is binary: practising sport or not. Unlike the ordinary/traditional treatment (such as unemployment benefits, formation/training) the exit from the original state (unemployment here) does not lead to the cessation of the treatment. Indeed, the individual decides to keep being treated (to practise sport) or not as she also decided to be treated in the first place. There are no third part involved in the choice of being treated. Therefore, by construction the treatment is not randomly assigned. I take into account the issue due to the potential presence of unobservable confounders by including shared frailty.⁷

One can signal specific non-cognitive skills and enlarge social networks by being involved in volunteering for example. In order to check the specificity of *sporting* activities, I build different treatment associated to the following activities: taking part in voluntary work, participating in local politics and being a churchgoer.⁸ The comparison of these different treatments in terms of activities allows to define more precisely the kind of observed relationship and the channels at work. These three activities are related to socialization and networks. If being sporty is about being well-integrated, socially active and having friends, thus, its impact should be lower or even disappear once these activities are included in the estimates. They all are composed of a substantial cultural part: religion, political views or hobby. Therefore, besides the social aspect of being with friends (or at least within a network), they also relates to a specific kind of culture. They are all practised weekly but being a volunteer or participating in local politics denote an important investment in the activity whereas being churchgoer do not necessarily require such time investment. Furthermore, both activities can be specified in one's CV and thus be used by the firm as additional information on the individual's personal traits. The culture and personal traits conveyed by sporting activities are different in a sense that they do not involved personal political view and believes. Therefore, it is interesting to compare the impact of these three activities on unemployment duration in order to precise the role played by sporting activities.

⁷A more detailed explanation is provided later on

⁸The strategy remains the same thus the control group consist in people who were not involved in the specific activity before and who still do not practise it once they are unemployed.

In order to find out if part or whole of the effect is due to the signal sent out by being sporty on the labour market, I test this effect on two different subsamples. Signals are used when firms cannot directly measure individuals' productivity. This means that the relevance of the signal depends on the availability of other information such as work experience. Therefore, the importance of sport participation impact on the exit rate should be greater for unexperienced/young people.⁹ And, since I introduce a measure of the health status, I control for this part of individuals' productivity which also vary with age. Since the models used are not linear, the use and then the interpretation of interaction terms is complicated. Therefore, I test the relationship on various sub-samples built with respect to a specific number of years of work experience.

3.2 Survival models

I study unemployment duration and thus use survival analysis.¹⁰ Since the information on labour-market situation is monthly recorded I have intervals rather than continuous time therefore, I use a discrete time survival model.¹¹

My sample is not large enough to allow me to use non-parametric models which requires a huge number of observations in order to be estimated. Therefore, I use a parametric model. The most common parametric models in survival analysis assumes a proportional relationship between the baseline hazard and the influence of individuals' characteristics. For the proportional hazard model, the hazard rate at time t for the subject i is written as follows:

$$h(t|x_i) = h_0(t)\varphi(X_i, \beta_x) \quad (1)$$

with the systemic part of the hazard rate for the subject i

$$\varphi(X_i, \beta_x) = \exp(X_i\beta_x)$$

The probability of transiting from unemployment to employment in t for the individual i (1) is the product of the baseline hazard $h_0(t)$ and her individual

⁹They have spent less time on the labour market thus, the amount of information available with respect to their level of productivity is relatively low.

¹⁰In order to get to know this type of model I read Van den Berg (2001) and Jenkins (2004) which are very comprehensive writings on that topic.

¹¹In the models used in this article, the unemployment spell are allowed to be right censored in order to be considered.

characteristics X_i . The baseline hazard is the probability for everyone in the sample to exit at the time t , knowing they survived (they stayed unemployed) until time $t - 1$. The sample is assumed to be homogeneous with respect to this baseline hazard. The proportionality of the hazard means that, for every individuals, the impact of x years of schooling is $\beta_{\text{years of schooling}} * h_0(t)$, for example. Individuals who have an x twice bigger automatically have a probability of exit twice bigger (*ceteris paribus*). In other words, the shape of the survival function remains the same and only its level changes.

A large part of my sample experiences more than one unemployment spell over the period (25 years). Unobservable characteristics which influence the risk of getting unemployed must be taken into account. In fact, forgetting to consider it leads to overestimate (underestimate) the degree of negative (positive) duration dependence. Individuals (observations) with a high level of frailty -which means unobservable characteristics which increase their chances to find a job- get out faster from unemployment. Therefore, there are within the survivors more individuals with a low level of frailty and this proportion increases with time. Because the level of frailty is unobserved, the impact of this selection is directly imputed to time. In other words, the influence of t being over-estimated, the impact of the covariates is mechanically under-estimated.

A way to adress this problem is to introduce individual frailty modeled as a parameter α which is normally¹² distributed.¹³ The belonging of a duration to a group is estimated and not specified ex-ante. The unobserved characteristics are assumed to be independent from the covariates which comes to add individuals' random effect in the model. The hazard ratio is thus written as follows:

$$h(t|x_{ij}) = h_0(t)\alpha_j\varphi(X_i, \beta_x) \quad (2)$$

α_j being the group-level frailty (here a group j is an individual and i is an observation),

¹²Popular distribution of the frailty in survival analysis.

¹³It would have been interested to use also Heckman and Singer semi-parametric frailty (Heckman & Singer, 1984) which allows to take into account heterogeneity without giving any functional form to the distribution of unobservables. However, as mentioned before my sample is too small to run successfully non-parametric estimation.

$\alpha_j > 0$ and $\alpha_j \sim \mathcal{N}(m, \sigma^2)$.

For $\nu_j = \log \alpha_j$, the hazard can be written as follows:

$$h(t|x_{ij}) = h_0(t) \exp(X_i \beta_x + \nu_j)$$

Shared frailty can be introduced for the whole sample, however, in presence of within cluster correlation, the standard errors are incorrect. Therefore, in order to avoid this risk I run the estimates on a restricted sub-sample (but I also present results obtained for the whole sample in order to get an idea of the selection and more information on the mechanisms).

Complementary log-log

The complementary log log specification allows for a discrete representation of a continuous time proportional hazards model. The idea being that we do not know the exact survival time but we know the interval of time in which it occurs (a month in my data).

The interval hazard rate $h(a_j)$ (also called discrete hazard rate $(a_{j-1}, a_j]$) can be expressed as follow:

$$h(a_j) = Pr(a_{j-1} < T \leq a_j | T > a_j - 1) = 1 - (S(a_j)/S(a_{j-1}))$$

Once taken into account the specific form of the survival function we can rewrite $h(a_j)$ the interval hazard rate / discrete hazard rate $(a_{j-1}, a_j]$ as follow:

$$h(a_j, X) = 1 - \exp[-\exp(\beta' X + \gamma_j)]$$

with $\gamma_j = \log[-\log(1 - h_{0j})]$

$$cloglog[h(j, X)] = D(j) + \beta' X$$

with $D(j)$ the baseline hazard function. Which, including shared frailty ν leads to this expression:

$$cloglog[h(j, X)] = D(j) + \beta' X + \nu_j$$

with $\nu_j = \log \alpha_j$.

Competing risk

Until now I only considered one unique type of transition: unemployment to employment transition. However, individuals exit from unemployment to diverse situations and it is worth to consider the fact that the “destination choices” are not independent. Risks are correlated and this can be taken into account by using a competing risk model. Therefore, I use this model and define two competing destinations: employment and out of the labour force.

4 Data

I use the German Socio Economic Panel (GSOEP). The panel runs from 1984 until nowadays and contains around 20 000 individuals by wave. There are various yearly questionnaires which enable to have a great definition of the individuals’ current and past situation. Labour market information is recorded monthly which allows me to use survival models. However, individuals’ characteristics are recorded yearly and information about sports is actually asked even less frequently.

4.1 Construction of the sample

First of all I define the two groups I compare: the control group and the treated. The sample is restricted to people who: i) become unemployed for at least a month between 1984 and 2009, ii) were not sporty during the two years preceding their unemployment spell and iii) are between 17 and 45 years old when they become unemployed. The age is limited to 45 years old since older people that are closer to the retirement age might have very different strategies in terms of job search and exiting unemployment.

Individuals are questioned about their sport practice frequency every two years except between 1994 and 1999. In this interval the information is available each year. The question is the following:

How frequently do you do sports?

- once per week,*
- once per month,*
- less than once per month,*
- never.*

There is no formal definition of what the interviewer understands by *doing sports*¹⁴ thus, there is a risk of measurement error. Actually, 17% of the population sampled declares to practice a physical activity at least once a week. This figure is below national statistics about sport participation in Germany but it is thus coherent knowing that it concerns only people who experience unemployment (sample in which sporty people are under-represented). Besides, since it is self-declared and being sporty is positively looked upon, people have incitations to lie about their sporting activity. But the figures size being reasonable, it leads to be more confident with respect to this information.

In order to construct my sample, I select people who are not sporty during the two years preceeding their unemployment experience. I consider a person to be non-sporty if she declares having no physical activity or less often than once a week (definition coherent with the European standard). Since the question is not asked every year I impute the value of the variable considering that the sports behaviour is equivalent to the sports participation the year before and the year after the missing observation. If the participation is different I use the level of participation of the preceeding year. Since I define the profile of an individual by relying on the information over the two last years preceeding unemployment I have at least one observation which is really observed (ie. not imputed).

Then, people who start being sporty while they are unemployed are in the treated group (15% of the sample), the others (the never-sporty individuals) are in the control group.

Unemployment duration can last less than a year and exit can occur *before* the survey interview for the current year. And labour-market position highly impacts sports participation (budget constrains, time constraints). Therefore, it is relevant to deal with the potential time inconsistency issue due to timing event and data collection. I choose to keep only the observations that have been collected the same month when unemployment begins or in between entry and exit from unemployment.

Example: individual i is unemployed between January and March 93, individual j is unemployed between March and June 93 and individual k is unemployed since May 93. If the interview have

¹⁴Some years, the expression is *physical activity* instead of *sports*.

been conducted in April 93 I use only the observations of individual j . Indeed, i has given information on his personal situation after her exit from unemployment thus it is not relevant and k answer to the survey while she was employed (or at least not unemployed) so I cannot infer that she did not change her behaviour/activity participation once she enters unemployment on month later in 1993.

I proceed the same way with respect to the other activities that I test. The formulation of the question is the following: *How frequently do you volunteer work in clubs, associations, or social services?*, *How frequently do you go to church or religious institutions?*, *How frequently do you participate in politics, citizens' action groups?*. As for sporting activities I consider an individual as treated (ie. an individual who is newly frequently involved) in such activities if he answers participating at least weekly in it. And in the sample consists of people who were not weekly involved in these activities during the two years preceeding their entry in unemployment.

4.2 Descriptive statistics

The covariates used in the estimation are: the level and type of education (using the casmin classification), the familial status and the number of hours daily dedicated to child care, the age, the nationality (German or not), the sex, the number of years of work experience, the level of health satisfaction¹⁵, the total number of the individual's unemployment spells and the number of the current one and the labour income from the last year (I use the logarithm of its value). Individuals' characteristics which can change over time and influence the exit from unemployment are taken 12 months before the entry in unemployment. Then, in order to take into account the individual specific economic environment in terms of time and location I add the seasons, the years and the Land of residence. The time is added as the log of the month number.

¹⁵The variable *health satisfaction* is a discrete variable equal to 1 if the individual is extremely satisfied by her health and equal to 5 if she is extremely dissatisfied. The information is much more often given by the respondent than the one concerning the health status.

The comparison of the control and the treated group with respect to the covariates is informative in terms of potential selection effect and confirm the literature prediction. Some descriptive statistics are reported in Tables 1, the number of observations is here the number of spells.¹⁶ The treated (the newly sporty people) are unemployed for significantly shorter periods (six months less). They are significantly more likely to be men and to be German, they are almost two years younger in average. They have in average a higher level of education and are more often involved in volunteering. And, as expected, they are healthier. In terms of labour-market situation, treated people are better off than the control group. Indeed, they experience less unemployment spells and exit more often from unemployment to employment.

In terms of bias due to endogeneity treatment, more rigorous results are expected from estimates on the sub-sample containing individuals who are at least twice unemployed over the period. It is worth noticing that this sub-sample might have different characteristics with respect to the original larger one. Therefore, the results are expected to be different and not only because of the size of the potential endogeneity bias. I study the difference of selection into being at least twice unemployed and having suffered less from unemployment over the period. Figures are reported in Table 2, 38.5% of the individuals experience only one unemployment spell. For the sake of clarity, I called people who experienced at least two unemployment spells: type $i_{U>1}$ and the others type $i_{U=1}$ (which have suffered only once from unemployment over the period).

The two sub-samples differ in terms of labour-market characteristics which is not surprising since these characteristics are highly correlated to the number of unemployment spells. As expected people of type $i_{U>1}$ have shorter unemployment spells in average (almost two months less). In terms of type of transition they exit from unemployment to out of the labour force less often than people of the type $i_{U=1}$ (9% versus 17% of the exits) but they make more often unemployment to employment transitions (72% versus 61%). They are slightly less active in terms of sports and religious activities and thus they will be less likely to be treated. People of type $i_{U>1}$ are older in average (1 year), slightly less satisfied by their health. There is a larger share of men among them (50% versus 42%) and they spend a little bit less time taking

¹⁶There are 1805 individuals.

care of the children. Last, people who are at least twice unemployed over the period have a lower level of education and hold mostly an intermediate vocational degree.

5 Results

5.1 Baseline results

The necessity of including shared frailty

The Table 3 shows the results of the estimation of the exit rate from unemployment to employment using the complementary log log model. In the first two columns I use the whole sample while in the last two columns I reduced the sample to people who experience at least two unemployment spell over the period. This way one can see the differences in both sub-samples. I also present the results obtained with and without including shared frailty. As expected the coefficient associated to the time dependency (which corresponds to the variable *logmonth*) dramatically decrease when unobservable heterogeneity is taken into account. Therefore, the introduction of the frailty is necessary for the reasons presented before and since heterogeneity is observed significantly (the likelihood-ratio test indicates that θ -the frailty variance- is significantly different from 0). Also, the results of the estimates including shared frailty have to be interpreted knowing that each individual has a fixed ν_i (i.e. individuals' level of frailty).¹⁷ The coefficient associated to the treatment – practising sports at least weekly– is positive and significantly different from zero which means that it is positively correlated to the exit from unemployment to employment in t . This result hold only for people who experience at least two unemployment spells over the period. But as outlined before, the most rigorous results are obtained using this specific sub-sample and from now on I only use this sub-sample.

Gender differences

Table 4 presents results obtained by running the estimation by gender. As one can see the correlation between the treatment and the exit rate from unemployment in t is significantly different from zero only for men.

¹⁷Results are conditional on this level.

5.2 Deepening the relationship

Sports participation is known to affect a lot of intermediate outcomes – such as education, work experience, marital status, health– which also affect labour-market outcomes. However, since I consider sports participation as a treatment for people who were actually non-sporty until being unemployed (at least 2 years before over the period) I do not expect the treatment to affect most of the covariates except the health satisfaction. Therefore, within the covariates I use, the only one being affected by sports participation is the health satisfaction. Since I use the health satisfaction reported one year before the unemployment spell (and thus the treatment) I should not have issues of simultaneous impact of both on the exit from unemployment. But health satisfaction could still be a proxy for some unobservables that is why I run the model excluding this variable and compare the results with and without it.

As shown in Table 5, the treatment seems not to be related to the health satisfaction. Coefficients do not change and the one associated to the treatment is still significantly different from zero.

A specificity of the signalling effect is that it is more effective for people who do not have much work experience. I test the relationship on various sub-samples built with respect to a specific number of years of work experience. The threshold is three years of work experience; one third of my sample reaches this level, the rest have more work experience. The results are presented in the Table 6 and support the hypothesis that sports participation is used by the firms as an indicator of unobservable personal traits (non-cognitive skills). Indeed, the correlation is much more sizeable for the part of the sample that has the lower amount of work experience. Since the coefficient associated to sports participation is still positive and significant for the more experienced part of the sample it outlines the fact that we cannot interpret the coefficient only as a signal. The positive correlation can also be attributed to the networking effect.

5.3 Sporting practice versus other activities

Because other activities could have similar advantages to sporting activities, it is relevant to look at the impact of our variable of interest once controlling for the participation in other activities. For these estimations the sample

is slightly different since the individuals are not involved in any of the four activities (weekly) during the two years that precedes their unemployment spell. In other words they are "inactive" and any activity is expected to have a positive effect on the exit rate from unemployment.

First, I run a "beauty contest" in order to find out which activity is the most efficient (the reference being the sporting activity) with respect to transitions from unemployment to employment (see Table 7¹⁸). Using the complementary log log model including shared frailty, I compare the log likelihood among each estimation but differences are negligible. However it is worth to notice that volunteering and being a churchgoer are both significantly strongly and negatively correlated to the probability of exiting from unemployment in t . Sports participation is positively strongly and significantly correlated with an increase in the probability of leaving unemployment for employment in t for people who experience more than one unemployment-spell over the period.

Since the impact of sporting activities on unemployment duration is not affected by a participation in other activities it confirms the specificity of sports in terms of returns.

5.4 Competing risk model

Forthcoming

6 Conclusion

Practising sports during unemployment is highly and positively correlated to the probability of finding a job in t for people who experience at least two unemployment spells over the period (25 years) and who were not involved in sports participation, in volunteering, in politics or in religious practice weekly when they were employed (in the last 2 years). The estimations which lead to these results take into account a part of the endogeneity due to unobservables confounders (by including shared frailty).

Controlling for the health satisfaction does not affect the coefficients thus the health is less likely to be a channel at work. Since the impact is greater for

¹⁸The activity related to political involvement is dropped during the estimation which is not really surprising given that very few people "practise" it.

people who have three years or less of work experience it leads to attribute part of the effect to the additional information sent out by this practice. Other activities have a negative impact on the transition from unemployment to employment. This means that somehow –in terms of networks and non-cognitive skills– sporting activities are different, they are rewarded on the labour-market. Results from the competing risk model should help to precise the relationship.

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7 Tables

Table 1: Stat des sample non-sporty.

	CONTROL			TREATED			Min	Max
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.		
Labour-market var								
u-spell tot	1804	2.94	2.45	318	2.78	2.11	1	20/11
duration	1804	13.49	14.33	318	10.34	10.30	2	145/76
transition work	1804	0.68	0.47	318	0.71	0.46	0	1
transition OLF	1804	0.13	0.34	318	0.06	0.24	0	1
transition retirement	1804	0.01	0.11	318	0.01	0.08	0	1
transition temp	1804	0.13	0.34	318	0.19	0.39	0	1
Activities								
sport freq	1640	3.53	0.64	318	1.00	0.00	2/1	4/1
public freq	1639	3.94	0.29	315	3.89	0.39	1	4
religion freq	1443	3.55	0.79	312	3.51	0.80	1	4
volunteer freq	1636	3.74	0.69	316	3.44	1.00	1	4
Treatment sport	1804	0.00	0.00	318	1.00	0.00	1	0/1
Treatment politics	1804	0.00	0.05	318	0.00	0.06	0	1
Treatment volunteer	1804	0.03	0.18	318	0.10	0.31	0	1
Treatment religion	1636	3.74	0.69	316	3.44	1.00	1	4
sample/politics	1804	1.00	0.05	318	1.00	0.00	0/1	1
sample/volunteering	1804	0.98	0.14	318	0.99	0.10	0	1
sample/religion	1804	0.98	0.15	318	0.98	0.14	0	1
sample/nothing	1804	0.96	0.19	318	0.97	0.16	0	1
Individual's characteristics								
Prev. LM net income	1046	804.59	523.36	190	929.86	814.66	0	4346/8700
expft	1797	7.61	7.04	317	4.94	5.71	0	29.5/24
exppt	1797	0.93	2.34	317	1.14	2.49	0	24/18
age	1804	31.64	7.75	318	29.46	7.52	17	45
german	1804	0.82	0.39	318	0.89	0.32	0	1
health sat	1802	6.93	2.25	317	7.25	2.09	0	10
care child (hours per weekday)	1804	2.70	4.38	318	2.15	4.37	0	24
health satisfaction ($t - 12$)	1421	2.40	0.93	307	2.25	0.90	1	5
male	1804	0.47	0.50	318	0.53	0.50	0	1
educ inadequately completed	1745	0.06		300	0.02		0	1
Gal elementary school	1745	0.15		300	0.11		0	1
Basic voc qualification	1745	0.26		300	0.15		0	1
Intermediate Gal Qualification	1745	0.07		300	0.07		0	1
Intermediate Voc	1745	0.32		300	0.39		0	1
Gal Maturity Certificate	1745	0.01		300	0.04		0	1
Voc Maturity Certificate	1745	0.05		300	0.07		0	1
Lower Tertiary Education	1745	0.02		300	0.04		0	1
Higher Tertiary Education	1745	0.06		300	0.11		0	1

Table 2: Stat des sample non-sporty 1 u-spell versus more.

Variable	1 u-spell			> 1 u-spell			Min	Max
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.		
Labour-market var								
u-spell tot	695	1.00	0.00	1427	3.85	2.43	1/2	1/20
duration	695	14.27	15.79	1427	12.40	12.76	2	145/97
transition to work	695	0.61	0.49	1427	0.72	0.45	0	1
transition to OLF	695	0.17	0.38	1427	0.09	0.29	0	1
transition retirement	695	0.02	0.14	1427	0.01	0.10	0	1
transition temporary	695	0.14	0.35	1427	0.14	0.35	0	1
Activities								
sport freq	617	3.03	1.14	1341	3.16	1.09	1	4
public freq	615	3.91	0.36	1339	3.94	0.29	1	4
religion freq	526	3.46	0.83	1229	3.58	0.77	1	4
volunteer freq	613	3.69	0.76	1339	3.70	0.76	1	4
Treatment sport	695	0.16	0.37	1427	0.14	0.35	0	1
Treatment politics	695	0.01	0.08	1427	0.00	0.04	0	1
Treatment volunteer	695	0.05	0.21	1427	0.04	0.21	0	1
Treatment religion	695	0.04	0.20	1427	0.03	0.18	0	1
sample/politics	695	1.00	0.04	1427	1.00	0.05	0	1
sample/volunteering	695	0.98	0.13	1427	0.98	0.13	0	1
sample/religion	695	0.98	0.15	1427	0.98	0.14	0	1
sample/nothing	695	0.96	0.19	1427	0.96	0.19	0	1
Individual's characteristics								
Prev. LM net income	400	823.58	612.28	836	823.97	562.94	0	4346/8700
expft	692	6.56	7.12	1422	7.52	6.81	0	28/29.2
exppt	692	1.06	2.59	1422	0.91	2.24	0	24/23
age	695	30.55	8.18	1427	31.69	7.52	17	45
german	695	0.81	0.39	1427	0.84	0.37	0	1
health sat	694	7.18	2.18	1425	6.88	2.24	0	10
care child (hours per weekday)	695	2.80	4.77	1427	2.53	4.17	0	24
health satisfaction ($t - 12$)	545	2.32	0.93	1183	2.39	0.92	1	5
male	695	0.42	0.49	1427	0.50	0.50	0	1
educ inadequately completed	664	0.05	0.21	1381	0.05	0.22	0	1
Gal elementary school	664	0.15	0.36	1381	0.14	0.35	0	1
Basic vocational qualification	664	0.24	0.43	1381	0.25	0.43	0	1
Intermediate Gal Qualification	664	0.09	0.29	1381	0.05	0.22	0	1
Intermediate Voc	664	0.27	0.44	1381	0.37	0.48	0	1
Gal Maturity Certificate	664	0.02	0.15	1381	0.01	0.11	0	1
Voc Maturity Certificate	664	0.07	0.25	1381	0.04	0.21	0	1
Lower Tertiary Education	664	0.04	0.19	1381	0.01	0.10	0	1
Higher Tertiary Education	664	0.08	0.27	1381	0.06	0.25	0	1

Table 3: Baseline results: transition to work.

	ALL		More than 1 u-spell	
	frailty	no frailty	frailty	no frailty
Treatment: sport	0.12	0.2	0.797*	0.748***
	-0.57	-0.155	-0.425	-0.179
Health satisfaction ($t - 12$)	0.153*	0.034**	0.071	0.054**
	-0.0832	-0.0163	-0.0594	-0.023
logmonth	106.8***	8.219***	59.65***	21.23***
	-11.78	-1.542	-8.269	-4.296
educ inadequately completed	-7.201**	-1.333*	-3.751**	-0.979
	-3.469	-0.794	-1.655	-0.782
Gal elementary school	-5.665*	-1.096	-3.935**	-1.843**
	-3.397	-0.782	-1.651	-0.779
Basic vocational qualification	-4.65	-0.913	-3.870**	-2.007**
	-3.4	-0.784	-1.662	-0.785
Intermediate General Qualification	-4.716	-1.215	-3.909**	-2.115**
	-3.544	-0.8	-1.815	-0.825
Intermediate Vocational	-5.947*	-1.012	-4.260**	-1.811**
	-3.434	-0.788	-1.682	-0.788
General Maturity Certificate	-33.15		-22.39	
	(12,164)		(3,232)	
Vocational Maturity Certificate	-5.704	-0.907	-3.695**	-1.358*
	-3.504	-0.791	-1.755	-0.793
Lower Tertiary Education	-3.731	-0.183	-3.308	-2.059**
	-3.833	-0.815	-2.151	-1.035
Higher Tertiary Education	-4.915	-0.963	-4.200**	-2.361***
	-3.511	-0.796	-1.75	-0.817
age	-0.00884	-0.0577***	0.0136	-0.02
	-0.0825	-0.0118	-0.0538	-0.0186
log LM net income ($t - 12$)	0.264	0.206***	0.006	0.16
	-0.317	-0.067	-0.219	-0.098
care child (hours per weekday)	-0.106**	-0.078***	-0.0341	-0.085***
	-0.053	-0.012	-0.040	-0.021
expft	-0.039	0.044***	-0.006	0.019
	-0.077	-0.010	-0.051	-0.017
exppt	0.037	0.0546***	-0.014	0.038
	-0.118	-0.015	-0.086	-0.028
u-spell tot	0.0712	-0.506***	0.0125	-0.260***
	-0.103	-0.032	-0.068	-0.036
u-spell numero	-0.351**	0.136***	-0.251**	0.022
	-0.163	-0.051	-0.114	-0.055
winter	-1.006**	-0.609***	-0.406	0.507*
	-0.448	-0.161	-0.427	-0.292
spring	0.687**	0.259**	0.813***	1.047***
	-0.322	-0.121	-0.31	-0.22
summer	0.763***	0.302***	0.823***	0.855***
	-0.202	-0.0962	-0.213	-0.165
male	0.771	-0.047	0.335	0.014
	-0.533	-0.0738	-0.344	-0.118
married-separated	-2.060*	0.746***	-1.507**	-0.197
	-1.102	-0.173	-0.767	-0.305
Constant	-369.5***	-27.94***	-205.6***	-74.23***
	-41.01	-5.454	-29.07	-15.05
Shared frailty	YES	NO	YES	NO
Observations	5064	5021	3697	3675
Number of persnr	407		323	
Log likelihood	-1493	-2229	-1087	-1307

Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
All the covariates are included.

Table 4: Baseline results: by gender.

	MEN	WOMEN
Treatment: sport	1.568**	-0.096
	-0.682	-0.696
Health satisfaction ($t - 12$)	0.13	0.0797
	-0.0868	-0.102
Inadequately completed	-5.484***	2.824*
	-2.029	-1.643
Gal elementary school	-5.242***	0.545
	-1.933	-1.124
Basic vocational qualification	-4.617**	0.935
	-1.948	-1.075
Intermediate General Qualification	-3.916*	-1.752
	-2.21	-1.796
Intermediate Vocational	-4.714**	-0.228
	-2.009	-0.965
Gal Maturity Certificate		-21.52
		(7,689)
Vocational Maturity Certificate	-3.042	-0.299
	-2.113	-1.286
Lower Tertiary Education	-4.485*	
	-2.58	
Higher Tertiary Education	-4.117*	
	-2.169	
married-separated	-3.399**	-0.619
	-1.494	-1.242
Shared frailty	yes	yes
Observations	1892	1805
Number of persnr	175	148
Log likelihood	-562	-470

Standard errors in parentheses ,*** p<0.01, ** p<0.05, * p<0.1
All the covariates are included.

Table 5: Results: health.

	More than one u-spell		
	w/o D	w/o health	all
Treatment (D): sport		0.794*	0.797*
		-0.425	-0.425
Health satisfaction ($t - 1$)	0.072		0.071
	-0.06		-0.059
Shared frailty	yes	yes	yes
Observations	3697	3703	3697
Number of persnr	323	324	323
Log likelihood	-1088	-1090	-1087

Standard errors in parentheses ,*** p<0.01, ** p<0.05, * p<0.1
All the covariates are included.

Table 6: Signalling effect for people with less than 3 years of work experience?

	3 years or less	more than 3 years
Treatment: sport	2.717*** (0.676)	1.139** (0.57)
Treatment: volunteer	1.85 (1.86)	-2.539** (1.058)
Treatment: religion	-17.4 (340.379)	-2.396 (1.777)
Log likelihood	-169	-853
Observations	700	2997
Number of persnr	78	254

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
All the covariates are included.

Table 7: Comparing to other activities

	More than 1 u-spell					
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment: sport		0.797* -0.425				0.911** -0.427
Treatment: politics			dropped			dropped
Treatment: volunteer				-1.729* -0.948		-1.941** -0.943
Treatment: religion					-2.323 -1.441	-2.442* -1.442
Health satisfaction ($t - 1$)	0.0722 -0.06	0.0713 -0.0594	0.0722 -0.06	0.0645 -0.0607	0.0721 -0.0601	0.0633 -0.0601
Observations	3697	3697	3697	3697	3697	3697
Number of persnr	323	323	323	323	323	323

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1
All the covariates are included.