

A Work Project, presented as part of the requirements for the Award of a Master Degree in
Management from the NOVA – School of Business and Economics

SPORTS AND ITS IMPACT ON ACADEMIC ACHIEVEMENT

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Abstract

The objective of this work project is to study the relationship between the regular practice of sports in higher education and students' success. More and more, the practice of sports is seen as a vehicle to enhance the quality of life. However, it may be the case that the time spent practicing sports harms the academic life of a student, particularly on highly demanding degrees. In order to analyze this issue, a survey was made to Nova School of Business and Economics students and three regression models were estimated, to study what influences three variables: GPA, the number of semesters that a student takes to finish its undergraduate program and GPA for students who already finished its undergraduate program.

Keywords: sports; students' success; higher education; NovaSBE

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Table of contents

- 1. Introduction..... 4**
- 2. Literature review 5**
- 3. Research proposal..... 9**
- 4. Methodology 11**
 - 4.1 Participants and procedure 11**
 - 4.2 Variables..... 12**
 - 4.3 Results..... 15**
- 5. Discussion..... 20**
- 6. Limitations and suggestions for future research..... 22**
- 7. Conclusion 23**
- 8. References..... 24**

1. Introduction

Sports have always been part of human life and regard everyone: males and females, youth and elders. As it is known, many benefits can be derived from sports, not only physical as the most obvious but also social and mental benefits. Sports are a way of enhancing the people's mental growth (The New Times 2015) and to develop a sense of friendliness and team spirit. More than the "visible" benefits (i.e. weight), the ones that interest more for this working paper are the "non-visible" (i.e. social and mental skills).

People that practice individual sports are able to develop a sense of responsibility that others may not have. In individual sports, the athlete depends on himself and so he has to find ways to overcome challenges that are innate to his sport. A research from the Economic and Social Research Institute (ESRI) also shows that students with the opportunity to participate in individual sports have a higher probability to incorporate physical activity throughout their lives as well as continuing in education upon leaving secondary school (Stratford College 2015).

Apart from individual sports, also team ones play an important role in athletes' skills. It helps people to develop a team spirit since they are not alone and depend on others to be successful. Working with teammates teaches athletes important life skills such as to respect people, be kind to others and make good decisions to the best of the team (Edutopia 2015). Moreover, it improves communication skills, since these skills are key to maintaining functioning sports team. In a team sport, athletes are constantly working with a slate of other people, many of whom can become positive role models along the way.

In conclusion, and more than the physical benefits that team and individual sports have, sports in general help people to take important and snap decisions: because sports plays happen fast, athletes develop the skills needed to make effective fast decisions; sports practice also helps in time management, since apart from sports, people also have their personal life and so

they have to manage a way to reach everything they want to do. However, despite all the benefits, the practice of sports also has disadvantages. This practice, when too long, may be a cost of practicing sports. That is why it is interesting to look at the relationship with students' achievement: the final impact either may be positive or negative. All these consequences of the practice of sports can be relevant to university life.

In respect to higher education, a research conducted by Gurin et al. (2002), discusses the critical importance of higher education. The authors pointed that, in previous essays, the psychologist Erik Erikson (1902-1994) introduced the idea of identity and that, in his opinion, the exclusive times when a sense of identity is formed is in late adolescence and early adulthood. Erikson argued that identity develops better if an environment where individuals can interact with different social roles is provided.

Universities are able to provide this environment and to give support through this identity development step to young adults. Moreover, higher education has a higher influence if its environment is different from students' home and neighborhood atmosphere and, more than that, it is distinct and sophisticated enough to stimulate experimentation awareness of mixed future possibilities.

Given the benefits of both sports and higher education, how do these two concepts relate? Do sports have a positive relation with students' success in university? Or is that the case that sports relate negatively with academic performance?

2. Literature review

Although many people believe that the practice of sports activities has negative effects on a student's performance, the most commonly accepted belief is that the impact of sports is far from being negative and is, in fact, remarkably positive.

A study conducted by Muñoz-Bullón et al. (2016) shows that participation in sports activity positively affects the academic performance of UC3M (Universidad Carlos III de Madrid) students. The authors of the study collected a sample of 3.671 students from the university in question who started and finished their programs between 2008 and 2015. The data used for the study comes from databases on academic performance and students' sports activities of UC3M.

This project considered many variables when the relationship between sports activities and academic performance was being studied, such as gender, time taken to complete the degree, age when beginning the degree, the area of the degree, whether or not the student received a grant or came from a large family, among others. The study concluded that those students who participated in sports activities had grade point averages that were 9.3% higher than the students who completed their degrees but did not take part in any sports activities (Muñoz-Bullón).

However, the researchers pointed certain differences in the relationship between academic performance and the type of sports activity practiced. Summing up, the authors concluded that sports activities, apart from the health benefits for those who take part in them, also enable the athletes to get the results that educational institutions are seeking (UC3M, 2016).

In a second study, Robst and Keil (2000) examined athletes' grades and graduation rates at an institution from the National Collegiate Athletic Association (NCAA) Division III, United States. The data collected for the project derived from student files at Binghamton University, which is part of the State University of New York system. The research question was understand the reason why grades were different between athletes and non-athletes. The two possible justifications are by individual characteristics or by the reason that one practice sports and the other does not. A regression was estimated considering two variables: athlete, a categorical

variable denoting whether the individual practice sports, and a vector of control variables including categorical variables for race/ethnic group. One of the main conclusions in this study is that student-athletes at a Division III university have lower average GPAs than non-athletes. However, athletic participation in nonrevenue sports does not harm students academically. Regarding the graduation rates, researchers found that athletes are more likely to graduate and more likely to graduate sooner than non-athletes (Robst and Keil 2000).

According to the authors, there are two reasons that support the capacity of athletes to participate in sports and maintain high GPAs, take difficult courses and still graduate in larger proportion than non-athletes: one is the benefits that sports bring to athletes by boosting self-confidence and reinforcing the self-discipline necessary for academic success; the other reason relates to the services that universities provide: many universities offer support services to its athletes such as tutoring and mentoring programs which are probably large factors in student success.

In conclusion, the researchers believe that athletics can be a powerful and positive factor in a students' success, and reinforce the idea saying that previous studies show that athletes have a higher income after graduation (Long and Caudill, 1991).

In a third study, Barron et al. (2000) studies the effects that high school athletic participation have on education and labor market outcomes. An allocation of time model was used to justify the high school athletic participation decision and the outcomes of this choice for educational and labor market outcomes. Tests of the model were done using two data sets, the National Longitudinal Survey of Youth (NLSY) and the National Longitudinal Study of the High School Class of 1972 (NLS-72).

Regarding the academic attainment, the authors conclude that men who participate in athletics get an achievement in education after high school which is 25% higher in the NLS-72

and 35% in the NLSY. Furthermore, in both samples, this positive relationship between athletic participation and consequent educational success is even stronger if the scope are the individuals whose athletic involvement is intensive.

With respect to labor market outcomes, the results of the study suggest that men do not have a higher probability of being employed if they participated in high school athletics. However, the participation in high school athletics is positively related with wage for those who have a job. The compensation of males that had participation in athletic activities in high school is 12% higher in the NLS-72 and 32% higher in the NLSY. Moreover, wages are higher in about 4.2% in the NLS-72 and in about 14.8% in the NLSY if the participation in athletic activities is preferred rather than other extracurricular activities.

This study found no evidence regarding negative effects of participation in athletic activities in terms of educational attainment or labor market outcomes. Instead, there is evidence that this athletic participation is positively related with academic success and wages. However, much of this effect appears to result from differences between individuals in ability or value of leisure that each person has.

In a fourth study Long and Caudill (1991) analyze the impact of participation in intercollegiate athletics on income and graduation. The data used includes 4.394 males and 5.393 females from the more than the 10.000 people that in 1971 entered 487 American colleges and universities and were interviewed in 1980 to discover some aspects of the college training they received and some economic aspects.

Regarding income, an equation was estimated with the variable “athlete”, which denotes an individual who participated in college athletics, and numerous exogenous variables measuring the socio-economic background of the individual. The results suggest that, for males, early in the labor market career, the participation in college athletics allows the individual to

get about more 4% of annual income advantage over individuals that did not participate in college athletics. In respect to females, the participation in college athletics is not significant.

About graduation, also an equation was estimated, where the dependent variable was categorical where it assumed a value of one if the individual had graduated by the time of 1980 and zero if not. The exogenous variables included athletic participation and variables related with the socio-economic background of the individual. The results state that, holding everything constant, participation in athletics raises the probability of graduation of males by around 4%. Regarding females, athletic participation also raises the probability of graduation.

Overall, this research shows that, due the fact that the models used to study income and graduation included many measurable determinants of education and labor market outcomes, the results propose that athletic participation may improve the development of certain skills, such as discipline and confidence, which encourage success.

3. Research proposal

The purpose of this research is to see whether the results obtained from previous studies apply in a Portuguese environment. The studies analyzed before are from different countries (Spain and United States), with different cultures. Although not measurable, this difference in environment has an impact on the student's success not only in sports but also in university. Given the example of United States, this country is known to be good in almost every sport, winning many championships. On another perspective, USA is also known for its great high school education level. Schools such as Stanford or Harvard University are part of the best universities in the world and many students, from the United States but also from the rest of the world, want to take their degree in those schools. The conclusion is that probably the environment of a country influences how successful a student is in academic life and in sports.

Governments of each country have the power to decide how much effort they want to put in each sector. One may want to invest more in sports and put aside high school education, while the opposite may also happen.

To study the relationship between sports and academic achievement in the Portuguese environment, a survey addressed to Nova School of Business and Economics students was implemented.

The survey is composed of the following questions:

- Gender?
- Age?
- Course?
- In which year did you enter NovaSBE?
- Did you have to move away from home to go to NovaSBE?
- Did you practice sports before NovaSBE?
- If so, how many hours per week did you practice your sport?
- In your first year in NovaSBE, did you practice sports regularly?
- If so, how many hours per week did you practice your sport?
- Currently, do you play sports regularly?
- If so, how many hours per week do you practice your sport?
- Are you paid to play your sport?
- Which sport do you play?
- Did you enter NovaSBE through high competition athlete regime?
- What was your GPA before NovaSBE?
- How many ECTS have you done in your first year?
- How many ECTS do you have?

- Did you already finish your Licenciatura?
- If so, how many semesters did you take?
- What is your current GPA?

The characterization of this sample of students that answered the survey is present in the next sections.

4. Methodology

4.1 Participants and procedure

A survey¹ with 19 questions was sent by e-mail to students from NovaSBE that are currently doing their undergraduate program or that have already finished their program, either in Management or Economics. All the answers were anonymous. 205 answers were given, and the respondents showed the following characteristics: 45% male, 55% female, an age average of 22.0 years with a standard deviation of 1.4. 47% of the students are taking/took Economics, while 53% chose Management. Only 22% of the respondents had to move away from home to study at NovaSBE, in opposition to the 78% that did not have to move away from home.

Out of the 205 students that answered the survey, 144 played sports before they entered in NovaSBE, corresponding to 70%. Out of these 144 students, only 32% practiced for more than six hours per week, while the remaining 68% practiced for less than six hours. When considering the first year at NovaSBE, the number of people that practices sports decreases to 86, a percentage of 42%, where only 21%, out of these 86 students, practice for more than six hours per week. It is interesting to note that not only the number of practitioners has decreased but also the time spent in the sports activity was less. This might be a result of adaptation to the

¹ The survey did not take longer than five minutes and was done through the platform Qualtrics, with an account provided by NovaSBE.

academic life, where most of the time has to go to activities related to university (homework, group works, study for exams, among others) and so less time is available for leisure, where sports are included. When asked if students currently practice sports, the number has almost no variation, comparing with the results of the practice of sports in the first year at NovaSBE, going to 84 (41%), but there is a slight increase in the time spent in sports, having 27% of respondents said that they practice for more than six hours per week. This non variation can be explained, in part, by the number of students that entered at NovaSBE in 2016/2017 and so were in their first year at NovaSBE, since the survey was done in August and for that reason the academic year 2017/2018 had not yet begun. These students are 84, which corresponds to 41% of overall students than answered, and for them, the answers for the period of time “first year” and “currently” are the same, which may have influenced the answers for the period of time “currently”.

Regarding the grade of entry at NovaSBE, it had an average of 17.6 (on a scale from 0 to 20) with a standard deviation of 1.0. 56 students already finished their undergraduate program, in an average of 6.3 semesters. The average of current GPA of the respondents is 14.5, with a standard deviation of 1.67.

4.2 Variables

In order to analyze the productive power of the practice of sports on academic success, a set of regressions were estimated. Academic success is measured by two variables, current GPA² and time taken to graduate. Exogenous variables include gender, GPA at entry to the university, degree, plus a set of categorical variables related to the length of time dedicated to

² This means that for some students it is the GPA at the end of the first year (students that entered in 2016/2017) and for others the final GPA (students that already finished their degree).

the practice of sports, both before entry and while at the university. These variables are described in detail below. Variables taken from the survey are: **male**: categorical variable denoting the student is male; **age**: age of the student in years; **economics**: categorical variable denoting participation in economics' degree (versus management degree); **2016/2017**: categorical variable denoting the student entered in NovaSBE in year 2016/2017 (versus year 2011/2012 to 2015/2016, the remaining years analyzed); **move away**: categorical variable denoting the student had to move from home to study in NovaSBE; **are you paid**: categorical variable denoting the student is paid to practice his/her sport; **which sport**: sport the student practices; **athlete regime**: categorical variable denoting the student entered in NovaSBE through high competition athlete regime; **GPA before NovaSBE**: GPA of the student before the entry in NovaSBE; **ECTS first year**: number of ECTS of student in the first year in NovaSBE; **ECTS now**: number of ECTS of student currently; **finish undergraduate**: categorical variable denoting the student has finished its undergraduate program; **how many semesters**: number of semesters student took to finish the undergraduate program; **current GPA**: current GPA of the student.

Regarding the practice of sports, students had to answer if they practiced sports in the period of time in question (before, first year or currently) and, if so, for how long (zero to four hours per week, four to six, six to eight or more than eight). So, the variables related with sports are: **practice sports before**: categorical variable denoting the student practiced sports before the entry in NovaSBE; **more than 6h before**: categorical variable denoting the student practiced sports and more than 6 hours per week before the entry in NovaSBE (the default is a student that practiced sports less than 6 hours per week before the entry in university); **more than 8h before**: categorical variable denoting the student practiced sports more than 8 hours per week before the entry in NovaSBE (the default is a student that practice sports less than 8 hours per week before the entry in university);

Practice sports first year: categorical variable denoting the student practiced sports during the first year in NovaSBE; **less than 4h first year:** categorical variable denoting the student practiced sports less than 4 hours per week during the first year in NovaSBE (the default is a student that practiced sports more than 4 hours per week during the first year at NovaSBE); **more than 4h first year:** categorical variable denoting the student practiced sports more than 4 hours per week in the first year in NovaSBE (the default is a student that practice sports less than 4 hours per week during the first year in NovaSBE); **more than 6h first year:** categorical variable denoting the student practiced sports more than 6 hours per week in the first year in NovaSBE (the default is a student that practiced less than 6 hours per week during the first year in NovaSBE);

Practice sports currently: categorical variable denoting the student practice sports currently; **less than 4h currently:** categorical variable denoting the student practice sports less than 4 hours per week currently (the default is a student that practice sports more than 4 hours per week currently); **more than 6h currently:** categorical variable denoting the student practice sports more than 6 hours per week currently (the default is a student that practice sports less than 6 hours per week currently);

Note that not all of the variables described above were used in the regressions estimated. Variables like “age” and “move away” were never used due to the lack of significance they had in regressions of test did initially and so were not taken into account in the estimations presented below. Moreover, regarding the variables related with the practice of sports, some aggregations were made to have less divisions in the time spent practicing sports and for the default variable to be clear. Also, the aggregations were not the same for the three estimations, in order to have significant variables.

4.3 Results

Table 1. GPA

	1	2	3	4
Intercept	9,775** (2,001)	8,379** (1,942)	8,346** (1,926)	8,623** (1,920)
Male	0,408* (0,239)	0,316 (0,229)	0,315 (0,229)	- -
2016/2017	- -	-1,011** (0,230)	-1,012** (0,230)	-1,040** (0,229)
More than 6h before	0,503 (0,324)	0,411 (0,311)	0,417 (0,308)	0,463 (0,307)
More than 4h first year	-0,718* (0,386)	-0,665* (0,370)	-0,64* (0,329)	-0,575* (0,326)
Less than 4h currently	-0,078 (0,334)	-0,050 (0,320)	- -	- -
GPA before NovaSBE	0,263** (0,112)	0,367** (0,110)	0,367** (0,109)	0,358** (0,109)
Obs	205	205	205	205
R-squared	0,0591	0,1424	0,1423	0,1341

Note: Standard errors are in parentheses. ** denotes significance at the 5% level; * 10% level.

As said previously, the first regression tries to study the relationship between the length of time spent in the practice of sports and the GPA of a student. All the regressions have 205 observations since there is no restriction.

In the first regression, the exogenous variables chosen were “male”, “GPA before NovaSBE” (these two more “general”), “more than 6h before”, “more than 4h first year” and “less than 4h currently” (these related with the practice of sports). Regarding variables related with the practice of sports, was chosen one for each period of time (before, first year and currently), to understand the relationship that each period of time has with the GPA of a student. The other two more “general” variables were chosen taking into account previous regression tests done, where these two variables were the only significant variables. In this situation three

variables are significant: “male” and “more than 4h first year” with a significance level of 10% and “GPA before NovaSBE” with a significance level of 5%.

In the second regression, a categorical variable was added, “2016/2017”, which corresponds to students that entered NovaSBE in 2016/2017. This aims to control for the fact that for these students their first year is also the current year. As shown in table 1, this variable is significant at the significance level of 5%. From this regression, the variables that had the highest p-value were took off one by one (the less significant variables).

In the fourth and last regression, we end up with four variables, where two of them are significant with a significance level of 5% (“2016/2017” and “GPA before NovaSBE”) and one significant with a significance level of 10% (“more than 4h first year”). The variable that is not significant is “more than 6h before” and has a p-value 0,133. The decision was to keep this variable in the final regression because even if it is not significant, it has to deal with sports, the main purpose of this project, and has a value close to the critical p-value with a significance value of 10% (0,10). Summing up, the equation regarding the GPA regression is $y = 8,623 - 1,040 * "2016/2017" + 0,463 * "more\ than\ 6h\ before" - 0,575 * more\ than\ 4h\ first\ year" + 0,358 * "GPA\ before\ NovaSBE"$.

Table 2. Number of semesters

	1	2	3	4	5
Intercept	10,454** (1,791)	10,64** (1,770)	10,664** (1,768)	11,065** (1,720)	11,081** (1,734)
Male	0,236 (0,183)	0,189 (0,182)	0,178 (0,181)	- -	- -
Economics	0,339* (0,180)	0,328* (0,177)	0,317* (0,176)	0,347* (0,174)	0,344* (0,175)
Practice sports before	-0,703** (0,223)	-0,603** (0,199)	-0,629** (0,197)	-0,621** (0,196)	-0,586** (0,196)
Practice sports first year	0,232 (0,211)	- -	- -	- -	- -
More than 4h first year	-	0,456	0,293	0,340	-

	-	(0,308)	(0,253)	(0,248)	-
More than 6h currently	-0,154	-0,356	-	-	-
	(0,333)	(0,380)	-	-	-
GPA before NovaSBE	-0,231**	-0,24**	-0,241**	-0,26**	-0,26**
	(0,102)	(0,100)	(0,100)	(0,098)	(0,009)
Obs	56	56	56	56	56
R-squared	0,3014	0,3149	0,3026	0,2892	0,2630

Note: Standard errors are in parentheses. ** denotes significance at the 5% level; * 10% level.

The second set of regressions deals with the number of semesters that a student takes to finish his/her undergraduate program. In this case there is a restriction since only data from students that already finished their program can be used. So, the number of observations decreases to 56³. The process was close to the one used in the first regression. Firstly, some general independent variables were chosen (“male”, “economics” and “GPA before NovaSBE”) and independent variables related with the practice of sports (“practice sports before”, “practice sports first year” and “more than 6h currently”). In this model there were three significant variables: two with a significance level of 5%, “practice sports before” and “GPA before NovaSBE”, and one with a significance level of 10%, “economics”.

After this regression, the steps were to take off the variables that were not significant, one by one, starting with the less significant one. In the end, the conclusion came at the fifth regression where there are three independent variables, two significant at a significance level of 5%, “practiced sports before” and “GPA before NovaSBE”, and one significant at a significance level of 10%, “economics”. The equation for the number of semesters a student takes to finish his/her program regression is $y = 11,081 + 0,344 * \text{“economics”} - 0,586 * \text{“practice sports before”} - 0,260 * \text{“GPA before NovaSBE”}$.

³ The decrease in the sample size reduces the degree of confidence in the results.

Table 3. GPA graduated

	1	2	3	4	5	6	7	8
Intercept	8,098** (3,792)	7,314* (3,734)	9,268** (3,783)	9,292** (3,751)	9,22** (3,721)	9,849** (3,587)	10,043** (3,582)	15,396** (0,191)
Male	0,314 (0,389)	0,319 (0,379)	0,232 (0,382)	0,217 (0,377)	0,251 (0,368)	- -	- -	- -
Economics	-0,404 (0,378)	-0,285 (0,377)	-0,415 (0,371)	-0,404 (0,367)	-0,399 (0,364)	-0,359 (0,357)	- -	- -
Practice sports before	- -	0,156 (0,464)	- -	- -	- -	- -	- -	- -
More than 6h before	-0,141 (0,460)	- -	- -	- -	- -	- -	- -	- -
More than 8h before	- -	- -	-0,912 (0,567)	-0,879 (0,557)	-0,853 (0,550)	-0,889 (0,545)	-0,863 (0,544)	-1,01** (0,541)
Practice sports first year	- -	0,596 (0,465)	- -	- -	- -	- -	- -	- -
More than 4h first year	-0,513 (0,662)	- -	- -	- -	- -	- -	- -	- -
More than 6h first year	- -	- -	-0,519 (1,257)	- -	- -	- -	- -	- -
Practice sports currently	- -	-0,220 (0,433)	- -	- -	- -	- -	- -	- -
More than 6h currently	0,646 (0,812)	- -	0,527 (0,818)	0,320 (0,642)	- -	- -	- -	- -
GPA before NovaSBE	0,416* (0,216)	0,439** (0,212)	0,354 (0,215)	0,353 (0,213)	0,357* (0,211)	0,328 (0,205)	0,306 (0,204)	- -
Obs	56	56	56	56	56	56	56	56
R-squared	0,0989	0,1280	0,1312	0,1282	0,1238	0,1158	0,0986	0,0605

Note: Standard errors are in parentheses. ** denotes significance at the 5% level; * 10% level.

The objective of the third regression is to understand what influences the GPA of the students that already finished their undergraduate program. In this regression, the same restriction applies, only data from students who already finished their course can be used, so

the number of observations is 56 and the confidence regarding this regression model is not as high as the first regression model regarding the GPA.

The process used to do this regression was almost the same as the previous ones. The regression was done with some general variables such as “male”, “economics” and “GPA before NovaSBE”, and variables related to sports like “more than 6h before”, “more than 4h first year” and “more than 6h currently”. Only one significant variable emerged, with a significance level of 10%, “GPA before NovaSBE”, and it is not related with sports. So other variables related with it were rearranged and a second regression was run.

In this second regression, the variables related with sports were “practice sports before”, “practice sports first year” and “practice sports currently”. Again, the only significant variable with the same significance level (10%) is “GPA before NovaSBE”, and so the same procedure as before was adopted, rearrange other variables related with sports.

“More than 8h before”, “more than 6h first year” and “more than 6h currently” were the variables chosen to be part of this third regression. In this case, no variable was significant at a 10% significance level but two variables were close to a p-value of 0,10 (“more than 8h before” and “GPA before NovaSBE”). Given this, what was done from this regression on was to exclude one by one the variables that were not significant, starting with the one with the highest p-value.

At the eighth regression there was only one variable and it was significant at a significance level of 10%: “more than 8h before”. So, the equation for the GPA of a student that has finished his/her program is $y = 15,396 - 1,01 * \text{“more than 8h before”}$.

5. Discussion

Starting with the first model, GPA, our equation is $y = 8,623 - 1,040 * "2016/2017" + 0,463 * "more\ than\ 6h\ before" - 0,575 * more\ than\ 4h\ first\ year" + 0,358 * "GPA\ before\ NovaSBE"$. Regarding the categorical variable "2016/2017", it has a negative relationship with GPA: the equation suggests that a student that entered in NovaSBE in 2016/2017 (first year student) has less 1,040 points in GPA comparing with students that entered NovaSBE in a different year. This means that is more likely that grades in the first year in NovaSBE are lower than in subsequent years. This fact suggests that the courses taken in the first year (such as calculus and linear algebra) demand more time of study and are less likely to have better grades than in the courses of the subsequent years.

The variable "more than 6h before" is not significant but the decision was to keep it not only because it has a p-value close to 0,10 but also because it is a variable related with sports. This variable is positively related with GPA, with more 0,463 points than a student that practice sports less than 6 hours per week before the entry in NovaSBE. This result can be explained by the fact that the practice of sports allows people to be more intellectually developed and more organized, as seen in introduction and literature review, which allows students to reconcile the academic life and the practice of sports. Regarding "more than 4h first year", the effect is the opposite since the equation suggests that students in this group have a lower GPA of about 0,575 points compared with students that practice less than 4 hours per week during the first year in NovaSBE. This result can be explained by the length of time spent in the practice of sports. Even though it has the benefits that were mentioned above, it also has bad things, and one of them is the loss of time to study. In university time to study is precious and without it is normal that the GPA goes down.

The last significant variable is “GPA before NovaSBE” and is positively related with GPA in about 0,358. This means that for every point of GPA before the entry in NovaSBE, a student has 0,358 of GPA in university. This result makes sense since, on average, a better student before the entry in university will be a better student after the entry in university.

Also, there are some “omitted” variables that would help to explain the GPA. Variables related with the family and socio-economic background of the students are the ones that explain the most the GPA of each student and are not presented in this project. However, part of these factors may be incorporated in the GPA before NovaSBE.

The second regression model, where the number of semesters that a student takes to finish its program, has the following equation: $y = 11,081 + 0,344 * \text{“economics”} - 0,586 * \text{“practice sports before”} - 0,260 * \text{“GPA before NovaSBE”}$. Regarding “economics”, students that take this degree delay for 0,344 semesters its conclusion. The explanation for this result may be the different difficulty of degrees. According to this result, economics is more difficult than management and so it takes more time to finish. About “practice sports before”, it has a positive relationship. It has a negative signal, but it is good, since students that practiced sports before the entry in NovaSBE take less 0,586 semesters than the opposite group, according with the equation. The explanation for this result is the same as the one given for the first regression: people that practice sports are more intellectually developed and more organized so it is reasonable that they take less time to finish their university program. Also “GPA before NovaSBE” has a positive relationship. For each point in GPA before the entry in NovaSBE, the student takes less 0,26 semesters to finish the program.

The last regression tries to study what determines the GPA for students that have finished their program, and the final equation is $y = 15,396 - 1,01 * \text{“more than 8h before”}$. This means that students that practiced more than 8 hours per week before the entry in NovaSBE

have less 1,01 points in GPA comparing with the ones that practiced less than 8 hours per week. This was not the expectation since the period of time of the significant variable is before the entry in NovaSBE, so the expectation was one of a positive relationship between these variable and the GPA for students that have finished their program, due to the benefits that the practice of sports bring, as mentioned above in the project.

In general, the results that were obtained from the regression models are in accordance with the results that were expected and also with the results from previous studies that were analyzed in literature review. However, is important to write down that the confidence in results from second and third regression is lower than the confidence regarding the first regression, since the number of observations (56) is lower than the first (205). On the other hand, students that are being analyzed are “more comparable”, since they are at the same level (all of them have finished their degree).

6. Limitations and suggestions for future research

The first limitation has to deal with the database. The database comes only from NovaSBE students, which restricts a lot the results. From this, a suggestion for further research is to collect answers from many universities in Portugal to see whether the results that were obtained apply if more universities are covered in the study. Also, the database does not include variables related with the socio-economic background of the student, a factor that is widely recognized as having a major impact on academic success. Even though these factors may be partially incorporated in the GPA before the entry in NovaSBE, this is a limitation of this research.

Secondly, the low separation of time of practice of sports. A student that practices 2 hours per week is completely different from a student that practices 12 hours per week, and that

separation may be more explained. Given that, a suggestion for the future is to explore more the different periods of time of practice, to see if there is a “maximum point” where it maximizes GPA (i.e. the maximum point is to practice sports 6 hours per week in order to have the highest GPA possible).

Thirdly, the type of sports that is being practiced. As seen in the introduction and literature review, individual and team sports have different outcomes, and that difference is not being studied in this working paper. So a suggestion for a future research is to study the difference in academic achievement regarding the type of sports that is being practiced, whether it is individual, such as tennis, or teams, like football or basketball.

Lastly, the size of the sample in the second and third regression models. There is a restriction since these regression models are directed to students that already have finished their program in NovaSBE and so the sample size decreases from 205 to 56 which leads to a lower confidence in the results of these two regression models.

7. Conclusion

It is undeniable the benefits that sports bring to the welfare of a human being. However, it also has impact on a student’s performance in university. Generally, the practice of sports before the entry in university is positively related with the GPA of a student. On the other hand, the practice of sports during the university may be harmful since it “steals” time of study to be spent in sports. The results of estimations suggest that the practice of sports for more than four hours per week in the first year of NovaSBE is negatively related with GPA and that the practice of sports before the entry in NovaSBE is positively related with the time taken to finish the degree. Regarding the GPA for students that already have finished their degree, the practice of

sports for more than 8 hours per week before the entry in NovaSBE is negatively related with GPA.

8. References

Barron, John M., Bradley T. Ewing, and Glen R. Waddell. "The effects of high school athletic participation on education and labor market outcomes." *The Review of Economics and Statistics* 82.3 (2000): 409-421.

Gurin, P., Dey, E., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard educational review*, 72(3), 330-367.

Livestrong. 2017. "One person baseball drills." <https://www.livestrong.com/article/143287-one-person-baseball-drills/>

Long, James E., and Steven B. Caudill. "The impact of participation in intercollegiate athletics on income and graduation." *The Review of Economics and Statistics* (1991): 525-531.

Lumpkin, A., and R. Achen. "Participation in interscholastic sports: Do the academic performances of athletes and non-athletes differ." *Lawrence, KS: Department of Health, Sport, and Exercise Sciences, University of Kansas* (2014).

Lunn, Pete, Elish Kelly, and Nick Fitzpatrick. "Keeping them in the game: taking up and dropping out of sport and exercise in Ireland." *Economic and Social Research Institute (ESRI) Research Series* (2013).

Muñoz-Bullón, Fernando, Maria J. Sanchez-Bueno, and Antonio Vos-Saz. "The influence of sports participation on academic performance among students in higher education." *Sport Management Review* (2017).

Observer. 2016. "How playing sports, even poorly, can make you more successful in business."

<http://observer.com/2016/03/how-playing-sports-even-poorly-can-make-you-more-successful-in-business/>

República Portuguesa. 2017. "Dados e Estatísticas de Cursos Superiores."

<http://infocursos.mec.pt>

Robst, John, and Jack Keil. "The relationship between athletic participation and academic performance: Evidence from NCAA Division III." *Applied Economics* 32.5 (2000): 547-558.

ScienceDaily. 2016. "University students who do sports achieve better academic results."

<https://www.sciencedaily.com/releases/2016/03/160331082649.htm>

The Guardian. 2014. "Do athletes make better students?"

<https://www.theguardian.com/education/2014/aug/04/sport-at-university-do-athletes-make-better-students>

The New Times. 2015. "Teachers platform: Importance of sports to a student."

<http://www.newtimes.co.rw/section/read/187850>

The Telegraph. 2015. "Four reasons why university is still a great life choice."

<http://www.telegraph.co.uk/education/universityeducation/student-life/12047754/Four-reasons-why-university-is-still-a-great-life-choice.html>

Times higher education. 2017. "Best universities in the United States 2018."

<https://www.timeshighereducation.com/student/best-universities/best-universities-united-states#survey-answer>