

The influence of sports participation on academic outcomes among students in higher education: a case study

Fernando Muñoz-Bullón
Universidad Carlos III de
Madrid
Calle Madrid, 126
28903 Getafe, Madrid
Phone: +34 916245842
Email:
fernando.munoz@uc3m.es

Maria J. Sanchez-Bueno
Universidad Carlos III de
Madrid
Calle Madrid, 126
28903 Getafe, Madrid
Phone: +34 916248420
Email: mjsanche@ing.uc3m.es

Antonio Vos-Saz
Club de Campo Villa de
Madrid
Ctra. Castilla, km. 2
28040 Madrid
Email: antonio.vos@ccvm.es

Abstract

The purpose here is to analyze the effect that participating in extracurricular sporting activities has on academic outcomes among students in higher education. We compare the academic outcomes of student-athletes with those of non-athletes in terms of grades in a specific university population.

The empirical evidence is provided by a sample of undergraduate students who studied at Universidad Carlos III de Madrid (Spain) over the 2008-2014 time period. Our results reveal that participation in formal sporting activities is associated with higher grades.

Keywords: sporting activities, academic outcomes, student-athletes, higher education.

Acknowledgements

We would like to thank Universidad Carlos III de Madrid for their helpful support in the development of this study. The dataset used in this work was provided by Universidad Carlos III de Madrid.

1. Introduction

The research question we seek to answer in this paper can be stated thus: does sports participation impact on college students' academic outcomes? Accordingly, we present a theoretical background that specifies the two sides of the argument (defending a positive and a negative relationship between participation in sports and academic outcomes). Empirically, we use a sample of 3,671 students from the Universidad Carlos III de Madrid (Spain) who began to study a five-year undergraduate course in 2008, and had all completed it by 2015. Our findings show that regular, organised physical-sporting activity has a positive impact on the academic performance of students at this university.

The value added and implications of this study can be summarized as follows. First, our work highlights the importance of taking part in sports for earning good grades among undergraduate students. Many studies have analyzed the effect of participation in extracurricular activities, such as sporting activities, on academic outcomes in middle and high-school students (i.e., Bailey, 2006; Fox, Barr-Anderson, Neumark-Sztainer, Wall, 2010; Fredricks and Eccles, 2005). However, the research stream considering the effect of being a student-athlete on academic outcomes in higher education is more limited (i.e., Aries, McCarthy, Salovey, and Banaji 2004; Kiger and Lorentzen, 1986; Levine et al., 2014). In addition, most extant literature has focused on undergraduate students participating in sports in colleges in the United States (i.e., Aries et al., 2014; Kiger and Lorentzen, 1986; McArdle, Paskus, and Boker, 2015; Melendez, 2006). Our analysis focuses on Spain — which as opposed to other contexts such as the US— is an underexplored country characterized by the existence of universities that, in general, support sport as a way of complementing their students' holistic education, although it has little or no transcendence beyond the campuses themselves. There is a need for a deeper understanding of how sports participation impacts on academic performance in different contexts both in education and in different countries.

Second, prior studies have produced contradictory results on whether student-athletes score better than their non-athlete peers. On the one hand, there is a body of research reporting the beneficial effects of participation in this extracurricular activity (Broh, 2002; Fredricks and Eccles, 2005; Hunt, 2007). On the other hand, some authors have noted possible negative or even non-existent consequences of sporting activities on the academic outcomes of participating students (Aries et al., 2004; Coleman, 1959, 1961; Simons et al., 1999). Based on this unclear and heterogeneous evidence, we help to shed new light on this issue.

Finally, we empirically analyze the relationship between sports participation and students' academic outcomes by using longitudinal data (many previous works use cross-sectional analysis) and controlling for background differences (gender, age, whether or not the individual belongs to a

large family, or whether or not the student is a foreign national), which may have some influence on academic performance (Gaston-Gayles, 2004; Marsh and Kleitman, 2002; Mahoney, Cairns and Farmer, 2003). Likewise, extant literature has raised the question of whether participation in sporting activities is the result of other unmeasured variables (e.g., Fredricks and Eccles, 2010). As a result of self-selection, differences in the academic outcomes between participants and non-participants may reflect pre-existing differences between the two groups. Despite the need to separate the effects of sporting activity from pre-existing differences between participants and non-participants (Videon, 2002), few of the previous works in the literature have adjusted for the endogeneity of participation in extracurricular activities. Following the prompts in prior literature (e.g., Fredricks and Eccles, 2006, p. 711), we adjust for self-selection in sporting activities by using instrumental variable estimation techniques.

2. Theoretical framework

The extant evidence on the relationship between participation in sports and a student's academic outcome is largely inconclusive. On the one hand, in the athletic context, success has often been associated with athletes' orientations towards self-discipline, the ability to concentrate, staying focused, showing perseverance and determination, and working hard, for example. Whether these qualities are transferred to the academic field will provide a strong signal for earning good grades (Fejgin, 1994; Marsh, 1993).

Furthermore, a student's involvement in extracurricular activities such as sports helps them to develop their own personal initiative, as the student feels they are doing something they really like because they are doing so on a voluntary basis, and it is something they have chosen to do, so they will be willing to make an effort to achieve the challenge they have set themselves. All this is highly conducive to the achievement of a good academic outcome, as within this context a student will be capable of learning and acquiring new skills, setting goals, and identifying those factors and resources that will enable them to achieve the desired outcome (Mahoney et al., 2003).

Moreover, taking part in activities of this nature creates the opportunity to develop interpersonal relationships outside the classroom with other students and adults (e.g., a figure of authority such as the trainer), which provides support by increasing the student's social acceptance, and even by reducing antisocial behaviour (Mahoney et al. 2003). This also promotes the development of certain skills, such as teamwork and self-confidence, heightening self-control and effort, and encouraging students to interact with other individuals, and even learn from them, as these may possess a series of values and skills that are of great transcendence within the educational sphere (Covay and Carbonaro, 2010; Eccles, Barber, Stone, and Hunt, 2003). In sum, sporting activities provide a potential path to college attachment and belonging, as well as social capital (Eccles et al., 2003;

Finn, 1989), which provides sources for the dissemination of educational information and resources, and encourages students to comply with norms, and such activities thereby contribute positively to the quality of the academic purpose (Broh, 2002; Coleman, 1990).

Playing sport strongly reinforces and promotes the need to achieve a goal, as those individuals doing so have to perform before an audience and learn how to cope with the opinions expressed by other people, and often have to deal with both success and failure (the well-known dilemma of winning versus losing). This is yet more important when the activity involves a team (see Allen, Coffee, and Greenlees (2012) or McEwan and Beauchamp (2014) concerning the team component in sports), as in this case each individual is assigned a role and will have to behave in an ethical manner with all the other team members (Covay and Carbonaro, 2010).

Nevertheless, there is also research that contends that a student's involvement in extracurricular activities may not be as favourable as it may appear at first sight, and is not exempt from certain risks that may compromise a good academic performance. While certain qualities among student-athletes might lead to a positive impact on academic performance, other aspects of sporting activities probably have a negative impact. As student-athletes are expected to spend time on sports programmes and devote energy to them, as a result of the obligations and responsibilities towards this extracurricular activity they may sacrifice the time they should be studying, with a negative impact on academic outcomes (Cantor and Prentice, 1996; Simons et al., 1999). These students put a lot effort into participating in sports and, consequently, they do not develop the necessary knowledge, skills and competences within the educational setting.

Just as an increase in the amount of time dedicated to playing sport may lead to a drop in a student's academic performance, paying too much attention to athletic participation is another of the factors that may lead to a drop in academic performance. In this sense, and as indicated previously, although a sense of athletic identity could have a positive influence on a student's academic outcomes through the development of interpersonal skills, the formation of social networks that ease feelings of loneliness and stress, etc. (Astin, 1993; Miller and Kerr, 2002), an excessive focus on sport also has negative consequences from a more academic point of view.

Therefore, based on the above arguments we suggest the following hypotheses:

Hypothesis 1a. Participation in sports activities is positively associated with academic outcomes among students in higher education.

Hypothesis 1b. Participation in sports activities is negatively associated with academic outcomes among students in higher education.

2.1. Stable and regulated sporting activity in higher education: the case of Universidad Carlos III de Madrid (UC3M)

The Universidad Carlos III de Madrid (UC3M) is a university that provides a broad array of sporting activities that are held in facilities of the highest calibre for these kinds of events. Regarding the sum of physical activities provided by the Universidad Carlos III de Madrid, there is an extensive programme that includes numerous different types of sports, such as paddle tennis, tennis, Pilates, etc. along with water activities and fitness activities (individual and in groups); activities in which a professional individually trains and coaches a single student on a personal fitness or body-building programme; internal competitions (football, basketball, volleyball, etc.), and external competitions in which the university's teams or individual athletes participate in regional, national and international inter-university competitions (rugby, judo, karate, etc.). There are also theoretical sessions in monographic courses, among others. In addition, the Universidad Carlos III de Madrid provides its students with large, multi-purpose sports facilities that are very close to the main campus and equipped with the latest generation sports equipment. The indoor facilities have a wooden sports floor and a sound arrangement that provides excellent acoustics and suitable sound-proofing to avoid any outside disturbances. The body-building and fitness halls have heating and air-conditioning, and are divided into areas for free and machine weight-lifting exercises, and another area set aside for cardio equipment and stretching exercises. In addition, for water-based activities the Universidad Carlos III de Madrid has two heated indoor pools for free swimming exercises and swimming classes, as well as a multi-purpose pool for holding other activities (aqua Pilates, aqua toning, water aerobics, etc.). On the other hand, there are two indoor sports halls designed for team games (volleyball, indoor football, basketball, and handball) and more individual sports (badminton, tennis, table-tennis). There is also a seven-a-side football pitch with a latest generation artificial surface that can also be used as two indoor football pitches.

The Universidad Carlos III de Madrid offers sporting activities on its campuses in Getafe, Leganes, Madrid and Colmenarejo for students enrolled in the different degrees available (undergraduate and postgraduate). Within this sporting context, there are three outstanding aspects, which have made a significant contribution to the success of this university: (1) opening of the new sport centre on the Getafe Campus in 2011, which has significantly enlarged the area available for sporting activities; (2) the large number of sporting activities offered under academic credit acknowledgement for students at the University Carlos III de Madrid, which benefited 2,937 students during the 2014-2015 academic year; (3) ongoing improvement and adaptation of sporting activities to students' expectations, taking into account the new tendencies and demands that are constantly changing in such a dynamic area as is the physical-sport offer for university students.

This programme has major institutional support from the University Carlos III de Madrid, both in the obvious economic aspect, without which it would not have been possible to endow the students with the necessary resources required, as in the academic aspect, necessary to be able to hold an important sporting activity backed by the fact already stressed of academic credit acknowledgement by the university.

Methodology

Data collection and sample

The data have been extracted from an administrative dataset collected by Carlos III University of Madrid (Spain) that provides information on the educational attainment of the entire population of students beginning their undergraduate studies from 2008 onwards. Out of these, we base our analysis on those students who had finished their undergraduate degree by 2015. The quality of this dataset is deemed to be high; being administrative in nature, the information is free of the problems common in survey data (such as non-response and interviewer bias). It includes the students' initial and ending degree dates, their grade point average (GPA) in the degree, their way of access into Carlos III University —vocational training, university entrance examination, previous graduate, mature students aged over 40, or course validation—, the student's GPA at high school, and their date of birth, gender, region of residence, and nationality. The dataset also has information on the number of times a student has been awarded a university grant and the number of years the student has belonged to a large family during his/her degree. This dataset was matched with another administrative dataset that provides information on each student's sports participation at Carlos III University. Thus, we know whether or not each student has participated in sporting activities during their degree, and, when doing so, the type of sporting activity, as well as the start and end dates of each one. Our final sample consists of 3,671 individuals. These university students were classified as sports participants if they played any sport before finishing their degree. Around one third of our sample were sports participants (1,174 students). The definitions of the variables used in this study are presented in the appendix.

Table 1 reports descriptive statistics for the whole sample, and also separately for sports participants and non-participants (columns 3 and 4). Overall, a higher fraction of sports participants (as opposed to non-participants) are male and younger. Sports participants are also more likely to be Spanish nationals, to have finished degrees belonging to the Engineering branch (instead of Social Sciences and Law or Humanities), and to have taken longer to finish their degrees. Finally, on average sports participants record a lower GPA than their non-participant counterparts.

Insert Table 1 here

Model

The main purpose of this study is to assess the impact that participating in sporting activities has on students' degree results. Prior studies have sought to address this effect by estimating the following model:

$$y_i = \alpha I_i + \beta X_i + \varepsilon_i \quad (1)$$

where y_i captures the outcome being examined —i.e., students' degree results (measured via their GPA) — vector X_i includes a variety of controls, I_i is a binary variable that takes the value one if student i is a sports participant and zero otherwise; and ε_i is the error term. In order to assess whether the impact of being a sports participant originates from its correlation to other individual or family characteristics crucial to sports participants and non-participants or, rather, from intrinsic features of being a sports participant (e.g., socialization via sports), the vector X_i includes a variety of controls.

In order to address the potential endogeneity of an individual's sports participation status, we use instrumental variable methods in the estimation of equation (1). Following the existing literature, we used regional-level variables —the presence of internet technology and of sports clubs in the student's region of residence— as instruments for estimating an endogenous binary-variable model —see, e.g., Cameron and Trivedi (2005) or Wooldridge (2010). This model considers that sports and non-sports participants have different unobserved characteristics that may bias the estimation if they are not correctly controlled for. The choice of these instruments rests on the assumption that they do not directly influence a student's GPA, except insofar as they determine the student's likelihood of participating in sports. On the one hand, we use the ratio of households with broadband internet connection (ADSL, cable, etc.) in the student's region of residence, because sports participation is generally assumed to be in direct conflict with products of mass culture for indoor and sedentary use. For instance, Kokolakakis et al. (2015) report that indoor entertainment (e.g., television, DVDs, Internet, video games) is a major factor that hinders sports participation. On the other hand, the number of sport clubs in the student's region of residence is used as a second instrument, as in the field of public sports policy financial support for professional sports clubs and the public sponsorship of sporting events may help to increase the sports participation rate (see, e.g., Lera López & Rapún-Gárate, 2011, for the Spanish case).

Results: The effect of sports participation on GPA scores

Table 2 displays the results of the impact of sports participation on university GPA scores.

Insert Table 2 here

The upper part of this table shows the estimated results for the outcome equation in order to test hypotheses 1a and 1b. This model estimates the relationship between sports participation and university scores, while simultaneously accounting for endogeneity in sports participation. The likelihood ratio test indicates that we can reject the null hypotheses of lack of correlation between treatment and outcome errors. Specifically, the $\chi^2(1)$ statistic takes the value of 32.72 —with a corresponding p-value of 0.0000. Our results therefore support the finding that there is significant endogenous selection in sports participation. The estimated correlation ρ between the error terms in the sports participation equation and in the university score equation is negative (-0.67), indicating that the unobservables that raise university GPA scores tend to coincide with unobservables that lower sports participation. One interpretation is that students with greater ability or motivation are more likely to achieve higher GPA scores and, at the same time, are less likely to participate in sporting activities. Additionally, the lower part of Table 3 shows the corresponding estimates for the sports participation equation. All the variables in this equation were assessed prior to participation in the sporting activity, and account for certain factors that influence the selection of sporting activities. The instrumental variables proposed above are significant predictors of the probability of sports participation. In particular, students from regions with a larger proportion of households with internet connection (a larger number of sports clubs) appear significantly less (more) likely to participate in sports.

What are the key findings when we instrument for students' sports participation status? The estimates in Table 3 reveal that average GPA scores are 9.1 percentage points higher for sports participants than for their non-participant counterparts. This result implies that a 10% (i.e., 0.1) increase in the proportion of students participating in sporting activities would raise average scores by 0.9%, from an average of 6.91 to approximately 7.53. Therefore, sports participation improves undergraduate students' university achievement in terms of final GPA scores. Note that the descriptive statistics analysis from the previous section concluded that the relationship between students' GPA scores and their sports involvement status was of the opposite sign. This is plausible if some of the omitted variables in the analysis are directly (inversely) correlated to the likelihood of participating in sports, but inversely (directly) correlated to the university grade attained. Take, for instance, educational expectations, which are necessarily omitted from the empirical model

proposed because they are missing from the dataset: students who think they will go far at university are usually the ones that achieve better grades. At the same time, these students may avoid participation in sporting activities because they think they pose a threat to their academic performance. Under such circumstances, estimates that do not take into account the endogeneity of sports participation may be downward biased.

Secondly, sports participation status remains a significant determinant of university scores even after we account for a wide range of personal, family and regional characteristics linked to the sports participation and GPA scores being examined. These characteristics range from various measures of accumulated human capital—including age, previous educational attainment, and migrant status—to students' university records—type of degree chosen, time taken in completing the degree, the way of access into university—their region of residence, or proxies for family wealth—whether the student has been a grant holder or belongs to a large family. As such, the role played by sports participation on student academic achievement does not appear to be driven solely by its correlation to the aforementioned individual, family, or regional characteristics. Instead, sports participation may be impacting on university grades through other circumstances innate to being a sports participant, such as potential socialization and the other reasons discussed in the hypothesis section above.

Other findings are as expected. For instance, we find that scores are higher among older student and among those with better previous academic records. Moreover, female students outperform male ones in terms of GPA. Higher scores are also closely associated with students receiving grants. Families with students in this situation may be under higher financial stress, which may result in pressing economic need and the need for the student to achieve higher grades in order to enjoy better career opportunities after completing their degree. In contrast, students who take longer to finish their degrees record lower average grades, as do students in engineering degrees.

Discussion and conclusions

There has been a major debate over the question of whether those students participating in sporting activities achieve better academic outcomes than their non-athlete peers (i.e., Aries et al., 2004; Busch et al., 2014; Levine et al., 2014). Previous evidence is mixed and inconclusive, and scholars have long been interested in identifying the factors that may influence the academic success of students in different educational settings (from middle school to higher education) (Gaston-Gayles, 2004; Comeaux and Harrison, 2011; Crisp, Taggart, and Nora, 2015; Wolniak, Pierson, and Pascarella).

In this article, we have sought to shed new light on the role of sports participation in academic performance in higher education by providing new insights from a sample of

undergraduate students at the Universidad Carlos III de Madrid (Spain) over the period between 2008 and 2014. This is a very recent timeframe and in our analysis we take a longitudinal perspective, which enables us to consider both a temporal development and the different sporting and educational aspects within a university setting —such as, e.g., incorporation of different sporting activities, different degree courses (branch of social science versus engineering), etc. Taking into account the specific realities of the current higher education context in Europe, in which college students may include sport within their degree course, and the constraints and pressures related to participation in university sports, there is a need for continuing to examine the effect of sports participation on students' academic outcomes (Gaston-Gayles and Hu, 2009). In fact, EU Member States have already undertaken several actions in this field within the university sector, such as the development of academic services, elite sporting provisions, and post-athletic career preparation (Aquilina and Henry, 2010).

The results here show that sporting activities, apart for the value they provide in view of the unquestionable health benefits for practitioners, lead to the attainment of the performance goals that educational institutions aspire to, and thereby uphold academic standards (Fox et al. 2010). This finding is consistent with works in which it is emphasized that sporting activities are essential for academic achievement (i.e., Melendez, 2006; Robst and Keil, 2000). Therefore, it is comforting to find that undergraduate students scored high in academic outcomes because, in general, universities and other educational institutions consider that academic achievement is positively related to professional success.

Our results provide significant support and acknowledgement for those policies in higher education that seek the holistic education of students and present sporting activity as one of the mainstays of education. This circumstance is especially important at the university in question here, the Universidad Carlos III de Madrid, where one of the goals of the department responsible for developing the sports programme for students is *“to contribute to the better integration of students in university life and prevent personal and academic failure”*. As Umbach, Palmer, Kuh, and Hannah (2006, p. 727) have pointed out *“it is incumbent on colleges and universities to learn more about the experiences of their student-athletes and determine whether they are taking part in educationally sound activities and benefiting in desired ways from college at levels commensurate with their non-athlete peers”*. Similarly, Simons et al. (1999) and Gaston-Gayles and Hu (2009) have also indicated the need for faculty staff to offer services and support that help student-athletes to interact more with other students and see themselves as legitimate students as well as athletes.

In addition, it is important to note the value that our results may have at academic level in higher education in helping to better prepare students for success in their degrees. University

students that play sport have an active mindset, and are self-disciplined, able to concentrate and stay focused, persevering and determined, hard-working, etc. In this sense, universities should consider offering more formal sports programmes to complement their educational offerings. More developed sports programmes may help these students to transfer their passion for sport into the educational arena, and thus increase their academic motivation, their ability to cope with and overcome obstacles, and develop new skills and competencies.

Promoting participation in sporting activities can also play an important role in our society because in recent years Spanish universities have raised the number and quality of their offer of physical activities for students on their campuses, and what's more, students have responded to this offer by participating in large numbers. The latest data available from the 2015 Survey on Sports Habits indicate that from 2010 to 2015 there has been an increase of almost 10% in weekly sports participation among students in higher education or similar. The rate of participation in the main sporting activities arranged for students in higher education is now very high, bearing in mind that these activities are voluntary and take place outside class times. Likewise, the data corresponding to the specific case of the Universidad Carlos III de Madrid show that the figure for participation has risen from 9,425 students in 2009 to 13,691 in 2014.

Furthermore, in recent years the role that sport plays at universities has adapted to the European Higher Education Area, whereby students may extend their degrees to include the skills they have acquired through sport. Article 90 of Spain's Organic Law 6/2001 on Universities, of 21 December, amended by Organic Law 4/2007 of 12 April, stipulates that "sport at university is part of each student's education and is considered to be of general interest for all members of the university community...universities shall introduce the necessary measures to encourage members of the university community to play sport and, as appropriate, provide instruments for the effective compatibility between sport and the student's academic education". This same legislation (article 46.2.i of Organic Law 6/2001, of 21 December, on Universities) allows students to validate up to six optional credits through the undertaking of sundry extra-curricular activities at university -of a sporting or cultural nature, as student delegates, working for charity or in cooperation- which may be recorded in the European Diploma Supplement, which is designed to be a unified and personalised model of information for graduates, covering their studies, their national context, and the skills and competencies acquired. In this way, Spanish universities have experienced greater support for the fitness and sports programmes they provide for their students.

Finally, the widespread participation of university students in extracurricular activities such as sport provides a great opportunity to influence a new generation of students that not only have the motivation to pursue such opportunities, but also aspire to academic achievement. Similarly, the

growth in the number of college students in sport may increase the interest universities have to offer education in sports subjects. The latest data provided by the Ministry of Education, Culture and Sport (2015) indicate that those Spanish universities that are members of the Spanish University System now provide 45 official degree courses, 37 master's degrees, and 34 PhD programmes in subjects involving fitness and sport.

This research is not without its limitations, whereby further contributions may be made to this field of study. Firstly, our study focuses on a single institution of higher education (Universidad Carlos III de Madrid, Spain), which restricts the possibility of generalising its findings (Gaston-Gayles, 2004; McArdle, Paskus, and Boker, 2015). Therefore, one of the future lines informed by this research involves conducting a comparative study across different institutions (e.g., public versus private universities; European versus US, etc.), with a view to discovering whether the findings reported here are also valid in other educational contexts. Thus, for example, regarding the distinction between public and private universities in Spain, we may highlight the different ways in which students access sporting activities, as the ones provided by public universities are largely funded by the students themselves, through the payment of a registration and participation fee; while in most private universities these activities are included in the student's enrolment fees.

In addition, future research could analyse the potential benefits of taking part in other kinds of extracurricular activities (Eccles and Barber, 1999; Mahoney et al., 2003), for as Feldman & Matjasko (2005, p. 194) reported at the time, not all extracurricular activities are the same. For example, activities such as sport require very close supervision by a trainer or sponsor, they are held several times a week, they entail a certain amount of competition, and they generally involve a large body of students. By contrast, activities such as, for instance, foreign language clubs tend to have a fewer number of students with a higher turnover, and involve less contact with the sponsor.

Finally, note should also be taken of the need to know whether the duration, number and type of activities in which students take part have an impact on the academic outcome recorded (Feldman & Matjasko, 2005; Fredricks and Eccles, 2006), which would allow conducting further studies that consider solely those students that play sport, and analyse such aspects as the effect of the duration or intensity that playing sport has on academic performance.

References

- Allen, M. S., Coffee, P., & Greenlees, I. (2012). A theoretical framework and research agenda for studying team attributions in sport. *International Review of Sport and Exercise Psychology*, 5, 121-144. doi: 10.1080/1750984X.2012.663400
- Aquilina, D., & Henry, I. (2010). Elite athletes and university education in Europe: a review of policy and practice in higher education in the European Union Member States. *International Journal of Sport Policy and Politics*, 2(1), 25-47. doi: 10.1080/19406941003634024
- Aries, E., McCarthy, D. Salovey, P., & Banaji, M. (2004). A comparison of athletes and non-athletes at highly selective colleges: Academic performance and personal development. *Research in Higher Education*, 45, 577-602.
- Bailey, R. (2006). Physical education and sport in schools: A review of benefits and outcomes. *The Journal of School Health*. 76, 397-401. doi: 10.1111/j.1746-1561.2006.00132.x
- Busch, V., Loyen, A., Lodder, M., Schrijvers, J. P., van Yperen, T. A., & de Leeuw, J. R. J. (2014). The effects of adolescent health-related behavior on academic performance: A systematic review of the longitudinal evidence. *Review of Educational Research*, 84, 245-274. doi: 10.3102/0034654313518441
- Broh, B. A. (2002). Linking extracurricular programming to academic achievement: Who benefits and why? *Sociology of Education*, 75 (1), pp. 69-95. doi: 10.2307/3090254
- Cameron, A. C., & Trivedi. P. K. (2005). *Microeconometrics: Methods and applications*. Cambridge University Press: New York.
- Cantor, N. E., & Prentice, D. A. (1996). *The life of the modern-day student-athlete: Opportunities won and lost. Paper presented at the Princeton Conference on Higher Education*. Princeton University, Princeton, NJ.
- Chuan, C. C., Yusof, A., & Mohd, S. P. (2013). Sports involvement and academic achievement: a study of Malaysian University athletes. *International Education Studies*, 6, 12-21. doi: 10.5539/ies.v6n2p12
- Coakley, J. (2011). Youth sports: what counts as “positive development”? *Journal of Sport and Social Issues*, 35, 306-324. doi: 10.1177/0193723511417311
- Coleman, J. S. (1959). Academic achievement and the structure of competition. *Harvard Educational Review*, 29, 330-351. <http://psycnet.apa.org/psycinfo/1961-05326-001>
- Coleman, J. S. (1961). *The adolescent society*. Free Press of Glencoe: New York.
- Coleman, J. S. (1990). *Foundations of social theory*. Belknap Press of Harvard University Press: Cambridge, MA.

- Comeaux, E., & Harrison, K. C. (2011). A conceptual model of academic success for student-athletes. *Educational Researcher*, 40, 235-245. doi: 10.3102/0013189X11415260
- Consejo Superior de Deportes (2010). Plan integral para la actividad física y el deporte. Madrid.
- Cornelius, A. (1995). The relationship between athletic identity, peer and faculty socialization, and college student development. *Journal of College Student Development*, 36, 560-573. <http://psycnet.apa.org/psycinfo/1996-21355-001>
- Covay, E., & Carbonaro, W. (2010). After the bell: participation in extracurricular activities, classroom behavior, and academic achievement. *Sociology of Education*, 83 (1), 20-45. doi: 10.1177/0038040709356565
- Crisp, G., Taggart, A., & Nora, A. (2015). Undergraduate Latina/o students: A systematic review of research identifying factors contributing to academic success outcomes. *Review of Educational Research*, 85, 249-274. doi: 10.3102/0034654314551064
- Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular activities matters? *Journal of Adolescent Research*, 14, 10-43. doi: 10.1177/0743558499141003
- Eccles, J. S., Barber, B. L., Stone, M., Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues*, 59, 865-889. doi: 10.1046/j.0022-4537.2003.00095.x
- Fejgin, N. (1994). Participation in High School competitive sports: a subversion of school mission or contribution to academic goals? *Sociology of Sport Journal*, 11, 211-230.
- Feldman, A. F., & Matjasko, J. L. (2005). The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. *Review of Educational Research*, 75, 159-210. doi: 10.3102/00346543075002159
- Finn, J. D. (1989). Withdrawing from school. *Review of Educational Research*, 59, 117-42. doi: 10.3102/00346543059002117
- Fox, C., Barr-Anderson, D., Neumark-Sztainer, D., & Wall, M. (2010). Physical activity and sports team participation: Associations with academic outcomes in middle school. *Journal of School Health*, 80 (1): 1-55. doi: 10.1111/j.1746-1561.2009.00454.x
- Fredricks, J. A. (2012). Extracurricular participation and academic outcomes: testing the over-scheduling hypothesis. *Journal of Youth and Adolescence*, 41, 295-306. doi: 10.1007/s10964-011-9704-0
- Fredricks, J. A., & Eccles, J. S. (2005). Developmental benefits of extracurricular involvement: Do peer characteristics mediate the link between activities and youth outcomes? *Journal of Youth and Adolescence*, 34, 507-520. doi: 10.1007/s10964-005-8933-5

- Fredricks, J. A., & Eccles, J. S. (2006). Extracurricular involvement and adolescent adjustment: Impact of duration, number of activities, and breadth of participation. *Applied Developmental Science*, 10, 132-146. doi: 10.1207/s1532480xads1003_3
- Fredricks, J. A., & Eccles, J. S., (2006). Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Developmental Psychology*, 42, 698-713. doi: 10.1037/0012-1649.42.4.698
- Fredricks, J. A., & Eccles, J. S. (2010). Breadth of extracurricular participation and adolescent adjustment among African-American and European-American youth. *Journal of Research on Adolescence*, 20, 307-333. doi: 10.1111/j.1532-7795.2009.00627.x
- Garcia, M., & Llopis, R. (2010). Encuesta sobre los Hábitos Deportivos en España. Centro de Investigaciones Sociológicas y Consejo Superior de Deportes. Catálogo de publicaciones de la Administración General del Estado. Madrid.
- Gaston-Gayles, J. L. (2004). Examining academic and athletic motivation among student athletes at a Division I university. *Journal of College Student Development*, 45(1), 75-83. doi: 10.1353/csd.2004.0005
- Gaston-Gayles, J. L., & Hu, S. (2009) The influence of student engagement and sport participation on college outcomes among Division I student athletes. *The Journal of Higher Education*, 80, 315-333. doi: 10.1353/jhe.0.0051
- Gerber, S. B. (1996). Extracurricular activities and academic achievement. *Journal of Research and Development in Education*, 30, 42-50. <http://psycnet.apa.org/psycinfo/1997-02671-005>
- Hunt, D. (2007). The effect of extracurricular activities in the educational process: influence on academic outcomes. *Sociological Spectrum*, 25, 417-445. doi: 10.1080/027321790947171
- Keely, Thomas J.H. & Fox, Kenneth, R. (2009). The impact of physical activity and fitness on academic achievement and cognitive performance in children. *International Review of Sport and Exercise Psychology*, 2 (2), 198-214. Doi: 0.1080/17509840903233822
- Kiger, G., & Lorentzen, D. (1986). The effects of athletic participation on university academic performance: A comparison of athletes and the general student population. *College Student Journal*, 22, 287-293.
- Kokolakakis, T., Lera-López, F., & Panagouleas, T. (2015). Analysis of the determinants of sports participation in Spain and England. *Applied Economics*, 44, 2758-2798. doi: 10.1080/00036846.2011.566204
- Levine, J., Etchison, S., & Oppenheimer, D. M. (2014). Pluralistic ignorance among student-athlete populations: a factor in academic underperformance. *Higher Education*, 68, 525-540. doi: 10.1007/s10734-014-9762-0

- Lera-López, F. & Rapún-Gárate, M. (2011). Determinants of sports participation and attendance: differences and similarities. *International Journal of Sports Marketing & Sponsorship*, 12, 167-190. doi: 10.1108/IJSMS-12-02-2011-B007
- Mahoney, J. L., Cairns, B. D., & Farmer, T. W. (2003). Promoting interpersonal competence and educational success through extracurricular activity participation. *Journal of Educational Psychology*, 95, 409-418. doi: 10.1037/0022-0663.95.2.409
- Marsh, H. W. (1993). The effects of participation in sport during the last two years of high school. *Sociology of Sport*, 10, 28-43.
- Marsh, H. W., & Kleitman, S. (2002). Extracurricular school activities: The good, the bad, and the nonlinear. *Harvard Educational Review*, 72, 464-511. doi: 10.17763/haer.72.4.051388703v7v7736
- McArdle, J. J., Paskus, T. S., & Boker, S. M. (2013). A multilevel multivariate analysis of academic performances in college based on NCAA student-athletes. *Multivariate Behavioral Research*, 48 (1), 57-95. doi: 10.1080/00273171.2012.715836
- McEwan, D., & Beauchamp, M. R. (2014). Teamwork in sport: a theoretical and integrative review. *International Review of Sport and Exercise Psychology*, 7(1), 229-250. doi: 10.1080/1750984X.2014.932423
- Melendez, M. (2006). The influence of athletic participation on the college adjustment of freshmen and sophomore student athletes. *College Student Retention*, 8 (1), 39-55. doi: 10.2190/8GLY-G974-V7FM-E1YD
- Meyer, B. B. (1990). From idealism to actualization: The academic performance of female collegiate athletes. *Sociology of Sport Journal*, 7, 44-57.
- Miller, P. S., & Kerr, G. (2002). The athletic, academic, and social experiences of intercollegiate student athletes. *Journal of Sport Behavior*, 25, 346-368.
- Miller, K. E., Melnick, M. J., Barnes, G. M., Farrell, M. P., & Sabo, D. (2005). Untangling the links among athletic involvement, gender, race, and adolescent academic outcomes. *Sociology Sport Journal*, 22, 178-193. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1343519/>
- Ministerio de Educación, Cultura y Deporte (2015). Encuesta de hábitos deportivos 2015. Subdirección General de Documentación y Publicaciones, Madrid.
- Richards, S., & Aries, E. (1999). The Division III student-athlete: Academic performance, campus involvement, and growth. *Journal of College Student Development*, 40, 211-218.

- Robst, J., & Keil, J. (2000). The relationship between athletic participation and academic performance: evidence from NCAA Division III. *Applied Economics*, 32, 547-558. doi: 10.1080/000368400322453
- Sedlacek, W., E., & Adams-Gaston, J. (1992). Predicting the academic success of student-athletes using SAT and noncognitive variables. *Journal of Counseling & Development*, 70, 724-727. <http://search.proquest.com/docview/219089483?pq-origsite=gscholar>
- Shapiro, B. J. (1984). Intercollegiate athletic participation and academic achievement: A case study of Michigan State University student-athletes, 1950-1980. *Sociology of Sport Journal*, 1(1), 46-51.
- Simons, H. D., Van Rheenen, D., & Covington, M. V. (1999). Academic motivation and the student athlete. *Journal of College Student Development* 40, 151-162.
- Videon, T. M. (2002). Who plays and who benefits: Gender, interscholastic athletics, and academic outcomes. *Sociological Perspectives*, 45, 415-444. doi: 10.1525/sop.2002.45.4.415
- Umbach, P.D., Palmer, M. M., Kuh, G. D., & Hannah, S. J. (2006) Intercollegiate athletes and effective educational practices: Winning combination or losing effort. *Research in Higher Education*, 47, 709-733. doi: 10.1007/s11162-006-9012-9
- Yukhymenko-Lescroart, M. A. (2013). Students and athletes? Development of the Academic and Athletic Identity Scale (AAIS). *Sport, Exercise, and Performance Psychology*, 3, 89-101. doi: 10.1037/spy0000009
- Wolniak, G.C., Pierson, C. T., & Pascarella, E. T. (2001). Effects of intercollegiate athletics participation on male orientations toward learning. *Journal of Collegiate Student Development*, 42, 604-624.
- Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. 2nd ed. MIT Press Cambridge, MA.

Table 1. Differences in means: sports participants versus non-sports participants

| Variable | Total sample¹ | Sports participants¹ | Non-participants¹ |
|-----------------------------------------|---------------------------------|----------------------------------------|-------------------------------------|
| Degree GPA | 6.91 (0.76) | 6.76 (0.71) | 6.98 (0.77) |
| Gender (1=male) | 0.52 (0.50) | 0.72 (0.45) | 0.43 (0.49) |
| Immigrant (1=yes) | 0.02 (0.15) | 0.02 (0.13) | 0.03 (0.16) |
| Time taken in completing degree | 3.46 (0.78) | 3.52 (0.80) | 3.43 (0.77) |
| Age | 18.75 (2.51) | 18.62 (1.74) | 18.81 (2.79) |
| <i>Bachelor's Degree Branch:</i> | | | |
| Engineering | 0.31 (0.46) | 0.42 (0.49) | 0.25 (0.44) |
| Social Sciences and Law | 0.69 (0.47) | 0.58 (0.49) | 0.73 (0.44) |
| Humanities | 0.008 (0.09) | 0.003 (0.06) | 0.01 (0.10) |
| Average high-school score | 5.34 (1.10) | 5.33 (1.11) | 5.35 (1.10) |
| University entrance examination (1=yes) | 0.95 (0.22) | 0.96 (0.20) | 0.95 (0.22) |
| No. times as grant holder | 1.05 (1.59) | 1.02 (1.55) | 1.07 (1.61) |
| No. years in large family | 0.58 (1.45) | 0.58 (1.46) | 0.58 (1.44) |
| Number of observations | 3,671 | 1,174 | 2,497 |

¹ Mean (std. dev.)

Note: see appendix for the definition of variables.

Table 2. Results on the influence of sports participation on college scores

| Variables | | Coefficient | Standard error |
|-----------------------------------------|--------------------------------------|-------------|----------------|
| | <i>Outcome equation</i> | | |
| Sports participant | | 0.091*** | 0.010 |
| Gender (1=male) | | -0.026*** | 0.004 |
| Migrant (1=yes) | | -0.008 | 0.011 |
| Time taken in completing degree | | -0.013*** | 0.002 |
| Age | | 0.004*** | 0.001 |
| <i>Bachelor's Degree Branch:</i> | | | |
| | Engineering | | |
| High-school GPA | | -0.058*** | 0.004 |
| | | 0.049*** | 0.002 |
| University entrance examination (1=yes) | | 0.21 | 0.014 |
| Times as a grant holder | | 0.007*** | 0.001 |
| Number of years in large family | | -0.001 | 0.001 |
| ρ | | -0.671*** | 0.041 |
| <i>Number of observations</i> | | | 3,671 |
| <i>LR test ($\rho = 0$)</i> | | | |
| χ^2 statistic | | | 32.72 |
| Prob>F | | | 0.0000 |
| | <i>Sports participation equation</i> | | |
| Gender (1=male) | | 0.664*** | 0.048 |
| Migrant (1=yes) | | -0.083 | 0.151 |
| Age | | -0.051*** | 0.013 |
| <i>Bachelor's Degree Branch:</i> | | | |
| | Engineering | | |
| Average high school score | | 0.259*** | 0.050 |
| | | -0.003 | 0.020 |
| University entrance exam (1=yes) | | -0.002 | 0.117 |
| % households with broadband connection | | -0.013*** | 0.002 |
| Number of sports clubs | | 0.00003*** | 0..00001 |
| <i>Number of observations</i> | | | 3,671 |

Note: *** Signifies statistically different from zero at the 1% level or better, **at the 5% level or better and *at the 10% level or better. All regressions include a constant. Reference categories include Social Sciences & Law/Humanities degree. Correlation (ρ) indicates the correlation between the error terms in the sports participation equation and the outcome equation.

Appendix. Variables and definitions

| Variables | Definitions |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| University grade | Student's grade point average (GPA) in their degree, coded on a running scale from 0 to 10 |
| Way of access to university | Dummy variables for: Vocational training, university entrance examination, previous graduate, mature students aged over 40, or course validation |
| High-school GPA | Student's grade point average (GPA) at high school, coded on a running scale from 0 to 10 |
| Age | Age of student as of the first year of university degree |
| Male | Gender dummy |
| Region | Dummy variables equal to 1 for the student's region of residence in Spain |
| Engineering | Dummy variable equal to 1 for students graduating in Aerospace Engineering, Biomedical Engineering, Industrial Technologies Engineering, Electrical Power Engineering, Computer Science and Engineering, Mechanical Engineering, Communication System Engineering, Telematics Engineering, Audiovisual System Engineering, Telecommunication Technologies Engineering, and Computer Science Engineering, and Business Administration |
| Social Sciences & Law | Dummy variable equal to 1 for students graduating in Business Administration, Economics, Employment and Labour Relations, Film, Television and Media Studies, Finance and Accounting, Journalism, Law, Library and Information, Political Science, Sociology, Statistics and Business, Tourism, Sociology, Law and Business Administration, Law and Economics, Journalism and Film, Television and Media Studies, and Law and Political Science |
| Humanities | Dummy variable equal to 1 for students graduating in Humanities |
| Migrant | Dummy variable equal to 1 for migrant students |
| Times as grant holder | Number of times the student received a grant at Carlos III University before finishing his/her degree |
| Number of years in large family | Number of years the student belonged to a large family before finishing his/her degree |
| Sports participant | Dummy variable equal to 1 for students that have participated, at least, in one sports activity before finishing his/her degree (according to the description shown in Appendix I) |
| Time taken in completing degree | Number of years it takes students to finish their degree |
| % households with broadband connection | Percentage of households with broadband internet connection in the student's region of residence |
| Number of sports clubs | Number of sports clubs in the student's region of residence |

Source: Carlos III University. The percentage of households with broadband internet connection and the number of sports clubs were obtained from the dataset DEPORTEData obtained from the Spanish Ministry of Education, Sports and Culture (accessible at <http://www.mcu.es/deportebase/cgi/um?L=0>).