Mechanisms Behind Substance Abuse and Rugby. Lessons from a Field Experiment with Incarcerated Offenders

Posibles canales entre el rugby y el descenso en el consumo de sustancias en la prisión. Lecciones de un experimento de campo con encarcelados

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Abstract

There are a broad range of rehabilitation programs but results differ significantly among them, from positive to no-effect programs —and even to negative-effect programs. Hence, in order to guide policy, it is necessary to find out the features that should be present in programs for inmates to guarantee positive effects. We used a random assignment to evaluate an innova-

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tive rehabilitation program —rugby classes offered by players of the national team— for incarcerated offenders in an overcrowded prison in Uruguay. We find the program positively influences inmates' behavior, lowering the consumption of drugs. Also, studying the mechanisms behind these findings, our results suggest that the program fosters healthier conduct and positive social attitudes. After studying the criminogenic attitudes addressed by this rugby program, we suggest lines for policy.

Key words: Prison, rehabilitation, impact evaluation, randomized experiment.

JEL classification: I38, I28.

Resumen

Existe una amplia gama de programas de rehabilitación en prisión, pero el impacto de estos programas sobre los reclusos difieren de manera importante: desde programas con efecto positivo hasta programas con ningún efecto, o incluso con efectos negativos. Con el fin de orientar a los formuladores de políticas, se hace necesario conocer las características que deberían estar presentes en los programas para garantizar los efectos positivos. Siguiendo una metodología experimental, con aleatorización, en esta investigación evaluamos el impacto sobre los reclusos de un programa innovador de rehabilitación. El programa consiste en entrenamientos de rugby dirigidos por jugadores profesionales en una de las cárceles con mayor hacinamiento de Uruguay. Los resultados de la evaluación sugieren que el programa influye de manera positiva en el comportamiento de los internos, reduciendo los problemas de consumo de drogas. Asimismo, estudiando los posibles mecanismos que podrían explicar estos resultados positivos, encontramos evidencia empírica que indica que el programa favorece las conductas saludables e impulsa actitudes sociales positivas. Concluimos la investigación estudiando las actitudes criminógenas que enfrenta el programa, con el fin de sugerir líneas de política carcelaria.

Palabras clave: prisión, programas de rehabilitación, evaluación de impacto, experimento por aleatorización.

Clasificación JEL: I38, I28.

Introduction

There are a broad range of rehabilitation programs but results differ importantly among them, from positive effects to no-effect programs —and even to negative-effect programs. Though systematic reviews of international findings are not few, many of them mix high standard evaluation methods (randomization) with quasi-experimental or even non-experimental approaches, thus introducing some bias in the scientific discussion. A question frequently asked in previous literature is about the mechanisms which could explain the positive effects found in many rehabilitation programs. In other words, it is necessary to discover the characteristics needed in the designing of a program in order to cope with a range of individual factors associated with involvement in persistent juvenile delinquency and adult criminality. These criminogenic characteristics include the presence of adherence to antisocial attitudes and beliefs, and a pattern of deficits in social-interactive, problem-solving, and self-management skills.

This research intends to permit policy makers a deeper understanding of the factors that could prevent risky behaviors among inmates. Using random assignment, we evaluate an innovative rehabilitation program —rugby classes offered by professional players— for incarcerated offenders in an overcrowded prison in Uruguay.

Since 2008 volunteers have been developing programs to help the imprisoned offenders in the COMCAR establishment (an overcrowded prison with about 3200 offenders in a facility initially built for 1800). Some of these undergraduate volunteers are rugby players of the national team. In October 2010 they started a program which offers rugby training to the incarcerated offenders. Since then and until May 2011, offenders have been participating in weekly rugby classes. The aims of this rugby program are: a) to improve prisoners' health by weekly exercises in the fresh air, b) to change risk behaviors and develop better habits, and c) to raise inmates' educational and labor aspirations.

Rugby has proved to be useful in reclusion environments by helping to release stress, fill the large amount of leisure time and develop desirable virtues for coexistence. It demands following rules, respecting others and using self-control.

In this research, we focus on the short run —an eight month term— impact of the program in drugs consumption. Also, we plan to collect data on long term outcomes, such as involvement in criminal activities in prison, recidivism, health, beliefs and expectations (more time is needed to evaluate longer term effects).

The rest of the paper is as follows. Section I reviews the related literature. Section II introduces the theoretical framework. Section III presents the experimental design. Section IV the econometric model and the results. Section V presents the discussion and concludes.

I. Related Literature

Questions about the possible effectiveness of different rehabilitation strategies for offenders have encouraged many attempts to identify available evidence from previous evaluations. There are a broad range of rehabilitation programs and the results differ fundamentally among them, from positive effects to no-effect programs —and even to negative-effect programs. Moreover, these different results may be influenced by the mixing of the roles of program developer and program evaluator of many investigations: Petrosino and Soydan (2005), using meta-analysis, find that intervention studies in which evaluators were greatly influential in the treatment-setting report consistently and substantially larger effect-sizes than other types of evaluators. Another issue to keep in mind in order to make a proper reading of previous studies is the presence of important differences in the intensity of the treatment in rehabilitation programs. Bierie, MacKenzie and Mitchell (2007) compare the effects of similar therapeutic programs on inmates randomly assigned to a boot camp or to a traditional prison. The authors examine whether those incarcerated in the two facilities received the planned education, drug treatment and cognitive skills programs. Each inmate was expected to receive such therapeutic treatment but, while all inmates in the boot camp participated in these programs, this did not occur in the traditional prison: researchers found participation rates of only 31 percent in academic education, 64 percent in drug treatment and 43 percent in cognitive skills.

Though systematic reviews of international evidence are not few, many of them mix high standard evaluation methods (randomization) with quasi-ex-

perimental or even non-experimental approaches, thus introducing some bias in the scientific debate. Asscher, Deković, Prins, van Arum and van der Laan (2007) state that the existence of relatively few randomized evaluations in the crime justice setting may be due to several difficulties encountered when implementing a randomized experiment in a legal context (difficulties in ensuring the cooperation of institutions and individuals, and a complex justice system and referral process that may undermine randomization). Jolliffe and Farrington (2007) conduct a systematic review on the impact of interventions with violent offenders and find that these programs are effective both at reducing general and violent re-offending. But, although all the studies included by the authors met a minimum standard of good methodological quality, the studies of highest methodological quality were associated with a smaller reduction in general re-offending and no significant reduction in violent re-offending. MacKenzie, Wilson and Mitchell (2007) synthesize results from 66 experimental and quasi-experimental evaluations of different incarceration-based drug treatment programs using meta-analysis; authors found consistent support for the effectiveness of therapeutic communities and this finding is robust in understanding variations in method, sample, and program features. Farrington (2005) reviews randomized experiments in criminology between 1982 and 2004. His meta-analyses suggests that prevention methods, correctional therapy, programs addressed to batterers, drug courts, juvenile restitution and deterrent policing were effective in reducing offenses, while Scared Straight (where adolescent offenders visit adult prisoners to be frightened of the prospects of criminality) and boot camp programs caused a significant increase in offenders.

Another question frequently asked in previous literature is about the mechanisms which could explain the positive effects present on some rehabilitation programs. Bilby, Hatcher, Hollin, Hounsome, McGuire and Palmer (2008) state that in conjunction with environmental influences and crime opportunities, a range of individual factors could be associated with involvement in persistent juvenile delinquency and adult criminality. These factors include the presence of criminal associates; adherence to antisocial attitudes and beliefs; and a pattern of deficits in social-interactive, problem-solving, and self-management skills. Phillips (2004) investigates a moral education program designed for prisoners that focuses on teaching aspects of character and practice of these traits (integrity, honesty, justice, citizenship, accountability, self-discipline, and positive thinking and resilience). Using randomization, results sup-

port the hypothesis that individuals who complete this program would show significant improvements in their socio-moral reasoning when compared to individuals who not complete the program. Also Jolliffe and Farrington (2007) find that interventions which addressed cognitive skills and anger control seem to be more effective. Landenberger and Lipsey (2005) develop a meta-analysis of 58 experimental and quasi experimental studies and find that the factors independently associated with larger recidivism reductions were treatment of higher risk offenders, high quality treatment implementation, and a cognitive-behavioral therapy program that included anger control and interpersonal problem solving. Bierie et al. (2007) study a group of inmates that was randomly assigned to a boot camp (i.e. strict rules and discipline) or to a traditional prison —both programs provided an intensive array of treatment and education. Authors found that although boot camp program had little impact on criminogenic characteristics at first sight, inmates in the traditional prison become more antisocial, lower in self control, worse in anger management, and reported more criminal tendencies by the end of their time in prison. These researchers also find that criminogenic attitudes and impulses were significantly associated with recidivism.

In sum, previous literature suggests that more high quality evaluation needs to be implemented to establish what works best, by which mechanisms, and for whom. And this suggestion should be followed not only in the developed world: rigorous impact evaluations are nowadays nearly nonexistent in developing or underdeveloped countries (Farrington, 2005; MacKenzie et al., 2007).

II. Rugby and Socialization. A Theoretical Framework

Viña (2011) argues that rugby has proven itself to be useful in reclusion environments by helping to develop desirable virtues for coexistence. It demands obedience to rules, respect for others and a great deal of self-control. Also rugby requires, on the one hand, the player's strength and physical effort, and, on the other, a great deal of partnership and team commitment. It embraces particular values such as sacrifice of individuality for the benefit of the team and a mandatory dependence on other players. Individual plays in rugby are not prominent and the whole commitment of the team is necessary in order to score. These particular features make rugby a sport that requires self-discipline and the internalization of rules to work as a unit.

Mead (1934) describes from a symbolic interaction analysis that sports plays a major role in socialization. Sports have a certain logic that obliges a person work in an organized way, as, for instance, a defined objective is needed and individual non-conflictive actions are related towards the sport's goal. It is a source for self-genesis as it makes the person adapt to the "generalized attitudes of the other people" and therefore to the social group's meanings. By playing the game every individual should have the same objective and own a common cluster of meanings, such as the same dispositions, to act in the same way or have the same attitudes that other individuals show in determined circumstances. When individuals adopt the other member´s attitudes towards them, then it is possible to own the symbolic social or community meanings. Thus, the individual becomes self-aware by adopting the organized social attitudes of its group and incorporating them into its person structure. This is why rugby could be a factor that introduces a new range of meanings for inmates who get involved, as it is substantially different from those attitudes they bring from their first socialization environments.

Adopting responsible attitudes and rules while playing rugby, involving a new way of relating to peers, as well as the large amount of physical effort needed, might have a positive impact on the inmate's health and his *universe of meanings*, possibly changing it towards more socially desirable attitudes. As Blumer (1982) describes from a symbolic interaction perspective, meanings are built by social interaction, and in this context, rugby could be a new source of meanings to people incarcerated and a factor to change their habits. For instance, Fornons (2008) and Martos García, Devís and Sparkes (2009) suggest from ethnographic research that inmates who practiced sports said they found themselves healthier and in better physical shape due to sport practice and not consuming drugs. They described sports as a relaxing, stress-releasing activity that made life in prison less conflictive.

III. Program and Experiment Design

A. The Program

The humanitarian emergency in the prison system, declared by the President of Uruguay in March 2005, persists and is getting worse (Garcé, 2009). The number of detainees does not record any reduction in growth: according to

schedule, 2009 was the first time that the number of incarcerated offenders surpassed the 8,000 people imprisoned in a country of 3.5 million inhabitants. The group is largely composed of young men (71% of prisoners are under 35). By June 2009, 8403 people (7796 men and 607 women) were distributed in 29 institutions. The system as a whole has a capacity of 6077 inmates (Garcé, 2009). Consequently, the overall density at the end of the first half of 2009, stood at 138 percent. The overcrowding is especially evident in some establishments such as COMCAR (173% occupancy). Six out of ten people who have been in prison, sooner or later return to prison. This is a failure of rehabilitation programs, while also making evident the difficulties in inclusion into society of those released (Garcé, 2009).

Overcrowding leads to several disparate problems such as poor hygiene, the collapse of health facilities, distribution of electricity, lack of recreational areas, limitation in visits, overloading of the prison staff, weakening of security, insufficiency in providing medical and dental services, lack of effective opportunities for work or study, shortage of food, etc. Another risk factor is the increase in substance abuse that is recorded in major establishments. In addition to the problem of entry of such substances in prisons, overcrowding it also compromises the daily routines of inmates.

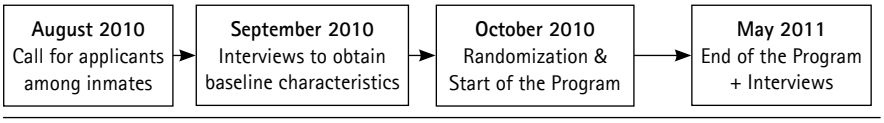
Since 2008 a group of volunteers (most of them undergraduate students) have been developing programs to help the imprisoned offenders in one of the most overcrowded prisons of Uruguay, known as the "COMCAR". Some of these undergraduate volunteers are rugby players on the national team. In October 2010 they started a program offering rugby training to the incarcerated offenders. Since then and until May 2011, offenders have been participating in weekly two-hour classes during the first four months. Following that, they have another four months of two classes per week. The aims of this rugby program are: a) to improve prisoners' health by weekly exercises in the fresh air (due to the overcrowded condition of the prison and the inadequate number of policemen, inmates are locked in their tiny, damp cells nearly all day); b) to change risk behaviors —smoking, taking drugs, alcohol: the association between excessive alcohol consumption and violence is well established (Newcombe, Shepherd and Watt, 2008)—; and c) to raise inmates' educational and work-life aspirations (rugby is a school of hard knocks where training and matches are never cancelled, no matter the adverse weather conditions, and which requires the effort of every player to reach any goal; also, the fact of

training with undergraduate students may have positive peer effects). Aims b) and c) are closely related to developing what theorists have defined as some core character traits: accountability, self-discipline, positive thinking, and resilience (Phillips, 2004).

B. Methodology

For the evaluation design of participants entering the program we use randomized trials. The selection process into this program was as follows: a) in August 2010, volunteers, after getting the approval of the prison authorities to promote the rugby program in one unit of 500 inmates, organized several meetings with the leaders of the offenders to motivate their participation and disseminate the project among other offenders. Volunteers emphasized to the prisoners that this program doesn't exclude anyone because of age, health or ignorance of rugby. As a result of this promotion, 87 candidates showed up; b) in September 2010 all 87 applicants were interviewed. In this baseline survey we collected data on offenders' characteristics and living standards; c) from this population, 34 applicants were randomly assigned to the treated group while the remaining candidates were assigned to the control group; d) in October 2010, the volunteers started the weekly rugby classes for inmates; e) in May 2011, the first part of the program concluded and the individuals of both the control and treatment groups were subject to an interview for the first follow-up impact evaluation. At the end of this first part of the program, we were interested in the impact of the program on substance abuse. Specifically, we asked the inmates in May 2011: "Have you consumed drugs last month (marijuana, cocaine derivative, etc.)?"

Figure 1. Timeline of the Program and Data Collection



Source: Authors calculations.

A necessary condition for the validity of the impact-evaluation results is that every pre-treatment characteristic must be evaluated in relation to the control group and the treated group (the balancing condition). Thus, once the random allocation was performed, the balancing condition was checked. In

case of significant differences at the ten percent level in mean pre-treatment characteristics between control and treated groups the random assignment procedure was repeated until we obtained an allocation that fulfills the balancing condition.

Table 1. Pre-treatment characteristics by treatment assignment

	N	Treated	Control	Difference	p-value
He was born in...	86	1985	1986	-1.05	.311
Years of education	87	6.617	6.905	-.288	.605
Rank Health (from: 1=Excellent; to: 5=Bad)	86	2.294	2.365	-.071	.739
Annual Health Variation (Rank from: 1=Better; to: 3=Worse)	87	1.794	1.679	.114	.454
Health in Comparison with Mates (Rank from: 1=Better; to: 3=Worse)	82	1.468	1.520	-.051	.714
Depression (1=He reports depression; 0 otherwise)	87	.147	.150	-.003	.961
Psychiatric problems (1=He reports psychiatric problems; 0 otherwise)	87	.088	.075	.012	.833
Drug/Alcohol consumption (*)	87	.205	.358	-.152	.132
Without appetite (Rank from: 1=Never; to: 4=Very Frequently)	84	1.529	1.640	-.110	.596
Frequency of smoking (Rank from: 1=Never; to: 4=Every day)	86	2.787	2.509	.278	.389
Non receiving visits	85	.088	.156	-.068	.361
No children	86	.529	.461	.067	.543
No wife/girlfriend	84	.333	.411	-.078	.475
Involved in activities (work, studying, etc.)	80	.575	.617	-.041	.714
Atheist	86	.147	.192	-.045	.593
Never pray	84	.411	.420	-.008	.940
He does not study in prison	87	.852	.886	-.033	.647
He does not read in prison	87	.352	.358	-.005	.958
He does not practice sports in prison	87	.264	.169	.094	.291
Happiness (Rank from: 1=Very Happy; to: 4=Very Unhappy)	79	2.870	3	-.129	.551
First time incarceration	86	.823	.826	-.003	.968
He is in this jail since...	86	2008.559	2008.308	.251	.546
Months incarcerated in his whole life	85	27.500	27.019	.480	.942
Age at first arrest	86	19.441	19.538	-.097	.930

(*) Note: We were not able to disconnect drugs from alcohol consumption at the start of the program because the baseline interview included only a single question for both problems: "Have you experienced problems of substance abuse in the last two months (drugs, alcohol, etc)?"

Source: Authors calculations.

As usual in random evaluations of rehabilitation programs in extremely critical subpopulations, there was much attrition. Table 2 reports that of the 87 inmates that showed up at the baseline survey, 49 suffered attrition[1]. Besides the 87 original inmates, five new ones entered the program while it was taking place (these five new ones were not included at all in this research to avoid a possible bias).

Table 2. Attendance intensity by group

	Attendance intensity						
Group	**1**	**2**	**3**	**4**	**5**	**Suffered Attrition**	**Total**
1. Randomly assigned to the program	9	10	0	3	0	12	34
2. Randomly assigned to the control group	4	1	0	1	10	37	53
3. New inmates who showed up during the program	0	2	0	3	0	0	5
Total	13	13		7	10	49	92

Source: Authors calculations.

Chamarro, Blasco and Palenzuela (1998) describe that it is not new that, during the implementation of sport programs, inmates tend to withdraw as the programs persists. There were also aspects particular to the Uruguayan context that could be attributed as causes for the attrition: prisoners were changed from one prison to another due to overcrowding, some were released, other offenders became disheartened. Finally others were lost because of the absence of personal follow-up. This was due to the lack of material and human resources in the prison system itself.

In Table 3, we compare the pre-treatment characteristics between the individuals that have attrited and those inmates who remain in the treated/con-

1 We have not performed an ex-ante power analysis due to we had no way to attain any certain estimation about the number of inmates that would show up after our call: the poor conditions of the prison and offenders are extreme. Though a posteriori power analysis may be arguable, it shows that detecting a difference in the consumption of drugs of 40 points (0.6 in the control group and 0.2 in the treated group) may reach a statistical power of 93.2 %, allowing a confidence interval of 90 percent. And principally, the robustness of the findings in the present research is validated by the significance of all the results in regressions subjected to different specifications.

trol groups. Baseline data provide a measure of the similarity of these two groups. Only one variable is not balanced and it is drug consumption. While 22.4 percent of those who suffered attrition consume drugs, almost 40 percent of those who remained in the program reported substance abuse. This information suggests that those who remained in the program were those with greater problems of drugs consumption.

Table 3. Pre-treatment characteristics of those who suffered attrition

Variable	Treatment & Control	Suffered Attrition	Difference	p-value
He was born in...	1986.297	1986.429	-.131	.898
Years of education	6.921	6.693	.227	.679
Rank Health (1=Excellent; 5=Bad)	2.289	2.375	-.085	.685
Annual Health Variation (1=Better; 3=Worse)	1.815	1.653	.162	.280
Health in Comparison with Mates (1=Better; 3=Worse)	1.405	1.577	-.172	.207
Depression	.157	.142	.0150	.847
Psychiatric problems	.105	.061	.044	.459
Drug/Alcohol consumption	.394	.224	.170	.087
Without appetite (1=Never; 4=Very Frequently)	1.513	1.659	-.146	.479
Frequency of smoking (1=Never; 4=Every day)	2.648	2.591	.056	.858
Non receiving visits	.131	.127	.003	.957
No children	.5	.479	.020	.849
No wife/girlfriend	.315	.434	-.118	.269
Involved in activities (work, studying, etc.)	.694	.522	.171	.121
Atheist	.131	.208	-.076	.357
Never pray	.405	.425	-.020	.854
He does not study in prison	.842	.897	-.055	.442
He does not read in prison	.368	.346	.021	.837
He does not practice sports in prison	.131	.265	-.133	.129
Happiness (1=Very Happy; 4=Very Unhappy)	3	3.244	-.244	.292
First time incarceration	.815	.833	-.017	.833
He is in this jail since...	2008.579	2008.271	.308	.452
Months incarcerated in his whole life	26.189	28	-1.810	.784
Age at first arrest	18.894	19.979	-1.084	.319
Observations	38	49		

Source: Authors calculations.

As with most empirical evaluations in prisons, this research experienced a rate of non compliance. As table 2 illustrates, from those randomly selected to play rugby (group 1), 19 individuals (86 percent of those who had not suffered attrition) showed high attendance, whereas three showed low attendance. Also the table reports that within the group not selected to play rugby (group 2), five inmates (31 percent of those that not suffered attrition) showed

high attendance while eleven barely attended. The presence of non-compliant students introduces bias. Those prisoners who completed the program could have more ability or be more committed to their health, etc. and these unobservable variables may affect both attendance to the program and prisoners outcomes (drugs consumption). So we employ "intention-to treat" to address this issue.

IV. Econometric Methods and Results

The primary purpose of this study is to determine the causal effect of attending the rugby program on the drug consumption of inmates. We employ intention-to treat to address the problem of endogeneity. Thus, we compare individuals according to whether they were *offered* treatment. In other words, this comparison —known as intention-to-treat (ITT) effect— is based on the randomly assigned groups' formation (treatment and control group) by the initial lottery. Since the *offered* treatment was randomly assigned, the ITT effect has a causal interpretation: it tells us the causal effect of the *offer* of playing rugby on drugs consumption. For this reason, the ITT effect is informative because it is smaller relative to the average causal effect on those who were in fact treated (Angrist and Pischke, 2009).

Table 4 illustrates that those who had high attendance in the rugby sessions showed a 33 percent drug use against a 71 percent of those with low attendance in the sessions, being such difference that is statistically significant. Hence, playing rugby seems to diminish the intensity of drug consumption.

Table 4. Intensity of attendance to rugby sessions vs. drug use

Group	N	Mean	Std. Dev.
Low attendance	14	.714	.468
High attendance	24	.333	.481
combined	38	.473	.506
diff		.380	p-value = 0.0230

Source: Authors calculations.

It could be argued that the positive effect of the rugby program on drug consumption is due to the bias introduced by the existence of non-compliers. Thus, we instrument the possible endogenous variable *Attended Rugby Program* by

using the exogenous variable *Randomly Assigned to the Program*. This instrument seems to accomplish the monotonicity assumption required by an instrumental approach. In other words, while the instrument may have no effect on some inmates, all of those who are randomly assigned to the rugby program are affected in the same way, thus, have a greater probability of effectively participating in the rugby program. It seems to be a quite firm assumption in this experiment where the inmates are obliged all day to be in their cell desperate for any opportunity to get out into the fresh air.

Table 5. Random assignment vs. drug use

Group	Observations	Mean	Std. Dev.
1. Randomly assigned to rugby program	22	.363	.492
2. Randomly assigned to control group	16	.625	.5
Combined	38	.473	.506
difference		-.261	p-value = 0.117

Source: Authors calculations.

In Table 1, we have reported that being selected for the treatment group is random; therefore, *ex ante*, it should have no impact on drug consumption. But in order to appreciate the effect of being randomly selected on drug use (the "intention-to-treat" effect), Table 5 reveals that from those 22 randomly selected to the rugby program, the percentage of drug consumption reaches 36 percent, whereas the drug use percentage of those not selected for the rugby program almost doubles that number, reaching a 62.5 percent. That difference is significant at 11.7 percent, so we could argue that this p-value is low enough —taking into account the lack of power due to the number of observations— and it shows that the mean of drug consumption is different between both groups.

Both groups were balanced in pre-test characteristics, but after the program one of them showed a lower drug use level. The only difference between both groups is that those who were randomly selected to play rugby, effectively played rugby in a greater proportion as Table 6 reports.

In other words, to address endogeneity of attending the rehabilitation rugby program in drugs consumption, the endogenous dummy variable *Attended Rugby Program* is instrumented by the exogenous *Randomly Assigned to Rugby*

Program. First-stage estimates are reported in Table 7. The point estimate of the coefficient on *Randomly Assigned to Rugby Program* is significantly different from zero and indicates that the probability for attending the *Rugby Program* is 55 percentage points higher for those randomly selected to the rehabilitation program compared to those who were randomly selected for the control group.

Table 6. Selection to play rugby vs. intensity of participation

	Play Rugby		
RandomlyAssigned to Play Rugby	No	Yes	
No	68,75%	31,25%	100,00%
Yes	13,64%	86,36%	100,00%

Source: Authors calculations.

Thus, we focus on the effect of the instrument *Randomly Assigned to Rugby Program* on the outcome *Drug Consumption.* We find that the instrument impacts the reduction of drugs consumption. Since the instrument is independent of the vector of potential outcomes and potential treatment assignments, the unique channel for causal effects of the instrument on the outcome is that the fact of being *Randomly Assigned to Rugby Program* increases the likelihood of playing rugby effectively. Hence, the rehabilitation rugby program for incarcerated offenders seems to be effective in reducing drug consumption.

Table 7. Probability of playing rugby

	Dependent Variable: Play Rugby
Randomly assigned to play rugby	0.551*** (0.134)
Observations	38

Note: The standard deviations are in brackets; ***significant at 1% estimated by ordinary minimum squares.

Source: Authors calculations.

Although the lottery for participating in the Rugby Program is orthogonal to the baseline characteristics, we could include some controls in the regressions to seek an improvement in the efficiency of the estimates. Hence, Table 8 shows the results of both the Ordinary Least Squares (OLS) and the Intention-to-treat (ITT).

As Table 8 reports, though there's no important gain in terms of efficiency, the results are robust to different specifications. The post-program drugs consumption at the control group is around 70 percent and the rugby program seems to reduce this rate by 25 points (ITT Model), which represents more than 1/3 reduction in drugs consumption.

Table 8. Effect of Rugby Program on drugs consumption

		(1) Drugs Consumption	(2) Drugs Consumption	(3) Drugs Consumption
	Drugs Consumption at Control Group	0.714	0.714	0.714
	High Attendance of Rugby Program	-0.381**	-0.331*	-0.350*
		(0.023)	(0.054)	(0.063)
Controls	Years of Education	No	Yes	Yes
	First Time Incarceration	No	Yes	Yes
	No children	No	No	Yes
	Atheist	No	No	Yes
	Age at Leaving one or both Parents	No	No	Yes
	Observations	38	38	37
	Model	OLS	OLS	OLS
	Randomly Assigned to Rugby Program	-0.261	-0.264	-0.259
		(0.117)	(0.105)	(0.124)
Controls	Years of Education	No	Yes	Yes
	First Time Incarceration	No	Yes	Yes
	No children	No	No	Yes
	Atheist	No	No	Yes
	Age at Leaving one or both Parents	No	No	Yes
	Observations	38	38	37
	Model	ITT	ITT	ITT

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors calculations.

It was interesting to test this pattern of lower risk behavior among the participants of the program in other indicators of personal health. We repeated the analysis exploiting data on smoking available both before and after the program. In particular, the question in the pre and post program interview was: "How frequently have you smoked cigarettes last month?"[2] In both points of time, more than 90 percent of the answers were concentrated in two options:

2 Possible answers: "Never", "Once or twice during last month", "Once or twice a week", "Everyday".

"Never" and "Everyday", so we create dummies variables for both points of time that takes the value 0 if the inmate never smoked and 1 otherwise. Then we build the variable "Smoking Variation"[3].

Table 9 illustrates that those who had low attendance to the rugby sessions showed a 7 percent growth in smoking, while those inmates with high attendance to the rugby sessions show a reduction in 12 percent in smoking, being such difference statistically significant as the p-value reports. Hence, playing rugby seems to diminish the intensity of smoking.

Table 9. Intensity of attendance to rugby sessions vs. smoking variation

Group	Obs	Mean	Std. Dev.
Low Attendance	14	.071	.267
High Attendance	24	-.125	.337
Combined	38	-.052	.324
diff		.196	p-value = 0.071

Source: Authors calculations.

It could be argued that the positive effect of the rugby program on smoking is due to the bias introduced by the existence of non-compliers. Thus, we instrument the possible endogenous variable *Attended Rugby Program* by using the exogenous variable *Randomly Assigned to the Program*.

As Table 10 reports, those 22 randomly selected for the rugby program reduce their rate of smoking more than 13 percent, whereas those not selected to the rugby program increase their rate of smoking more than 6 percent, such a difference being statistically significant.

Also, we include some controls in the regressions to seek an improvement in the efficiency of the estimates. Hence, Table 11 shows the results of both the Ordinary Least Squares (OLS) and the Intention-to-treat (ITT).

3 Smoking Variation = Dummy Smoke Post Program – Dummy Smoke Pre Program.

Table 10. Random assignment vs. smoking variation

Group	Obs	Mean	Std. Dev.
Randomly Assigned to the control group	16	.062	.250
Randomly Assigned to the Rugby Program	22	-.136	.351
Combined	38	-.052	.324
diff		.198	p-value = 0.061

Source: Authors calculations.

As Table 11 reports, though there's no important gain in terms of efficiency, the results are robust to different specifications. Thus, we could infer that the rugby program seems to have a positive impact on health issues and in particular on substance abuse and smoking.

Table 11. Difference in difference estimate of the impact of Rugby Program on smoking variation

		(1) Smoking Variation	(2) Smoking Variation	(3) Smoking Variation
	Smoking Variation at Control Group	.071	.071	.071
	High Attendance of Rugby Program	-0.196* (0.071)	-0.185* (0.090)	-0.210* (0.089)
Controls	Years of Education	No	Yes	Yes
	First Time Incarceration	No	Yes	Yes
	No children	No	No	Yes
	Atheist	No	No	Yes
	Age at Leaving one or both Parents	No	No	Yes
	Observations	38	38	37
	Model	OLS	OLS	OLS
	Randomly Assigned to Rugby Program	-0.199* (0.061)	-0.198* (0.052)	-0.194* (0.077)
Controls	Years of Education	No	Yes	Yes
	First Time Incarceration	No	Yes	Yes
	No children	No	No	Yes
	Atheist	No	No	Yes
	Age at Leaving one or both Parents	No	No	Yes
	Observations	38	38	37
	Model	ITT	ITT	ITT

p-values in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

Source: Authors calculations.

V. Discussion and Conclusions

There are a broad range of rehabilitation programs but results differ fundamentally among them, from positive to no-effect programs —and even to negative-effect programs. Hence, in order to guide policy, it is necessary to find out the features that should be present in programs for inmates to guarantee positive effects. We used random assignment to evaluate an innovative rehabilitation program —rugby classes offered by players of the national team— for incarcerated offenders in an overcrowded prison in Uruguay. Our findings suggest that playing rugby impacts on practices that frequently occur in a prison environment, such as drug use. Also, our results report evidence that this program impacts favorably in other health issues such as smoking. One could argue that these positive impacts on healthy behaviors could be generated just because rugby is a way to occupy the large amount of leisure time and similar results —with lower costs— could be reached just promoting walking exercises among the inmates or some equivalent. Obviously, we would need another experiment to answer that question scientifically and thoroughly. However, we here exploit some data collected to understand the likely mechanisms behind the positive effects of the rugby program. In the interview after the program, the inmates had to assign a grade of acceptance[4] for each of the following statements:

1) "No matter how much a person could work in his life, it is impossible to change our quality and conditions of life."

2) "Only the corrupt and dishonest individuals are those who may improve their quality and conditions of life."

3) "Only the individuals who leave this country may improve their quality and conditions of life".

4) "At my age, the most important aim is to enjoy myself, without worrying about the future."

5) "I have no moral debt to anyone and I could exist and do whatever I want without thinking about others."

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4 Grades from: 1= "A deep approval of this statement", to 4= "A deep disapproval of this statement".

6) "No matter how much effort I make, I will not be able to get a good job when I leave this jail".

Taking into account that each of these six statements shows a negative attitude towards life and society, we build an index[5] of social attitudes in order to evaluate the possible effect of the Rugby Program on this index. As we mentioned before, previous theoretical literature predicts that rugby could impact on social attitudes. Hence, changing social attitudes could be a mechanism that explains the positive effect of rugby on lowering risky behaviors (for instance, substance abuse).

As Table 12 reports, the Rugby Program impacts positively on the index of social attitudes, increasing the index about 15 percent in comparison with the mean of the index of the control group. This estimate is statistically significant and robust to different specifications as table 12 shows.

Table 12. Effect of Rugby Program on social attitudes

		(1) Social Attitudes Index	(2) Social Attitudes Index	(3) Social Attitudes Index
	Social Attitudes Index at Control Group	16.875	16.875	16.875
	Randomly Assigned to Rugby Program	2.475**	2.564**	2.808**
		(0.023)	(0.016)	(0.015)
Controls	Years of Education	No	Yes	Yes
	First Time Incarceration	No	Yes	Yes
	No children	No	No	Yes
	Atheist	No	No	Yes
	Age at Leaving one or both Parents	No	No	Yes
	Observations	36	36	35
	Model	ITT	ITT	ITT

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors calculations.

Thus, rugby has proven itself to be useful in reclusion environments to lower substance abuse not only by occupying the large amount of leisure time but also by developing desirable attitudes for coexistence. Rugby is a school of hard knocks where training and matches are never cancelled, no matter the adverse

5 Index of Social Attitudes = Answer of Question1 + Answer of Question2 + ... + Answer of Question6 (thus, the index takes values from 6 —approval of all sentences— to 24 – disapproval of all sentences)

climate or conditions. It demands obedience to rules, respect for others, self-control, and besides that, a great sense of partnership and team commitment. Hence, our results could help in the designing of rehabilitation programs to address criminogenic characteristics and impulses that are significantly associated with recidivism. The inmates who participate in the program underline these features during the personal interviews: they seem to be necessary ingredients in any rehabilitation sports program. This is why rugby could be a factor that introduces a new range of meanings to the inmates who become involved. These are substantially different from those brought from their first socialization environments.

Theoretically, considering a symbolic interaction perspective (Blumer, 1982; Mead, 1934) we can analyze this effect by thinking of the rugby program as a new source of interaction for inmates, whether it is among themselves, or between them and the program applicators. As an illustration, at the end of the rugby program, some of the participants claimed that it was helpful for getting to know new people and having the chance to obey the coaches, learn the rules, be involved in a group: to have "team spirit". Therefore, it can be considered as a way to build new meanings that are incorporated as cognitive guides. Rugby is particularly a sport that requires great deals of discipline, sacrifice, and team cooperation (as Viña describes, 2011), so it is not far fetched to assert that it represents a whole new experience for inmates as compared to their initial socialization environments. For instance, rules are very important in this sport, bringing an experience that requires the internalization of a shared standard of behavior. Related to this, Fornons (2008) explains that team games facilitate the generation of links between participants that cannot be produced otherwise. These include more open relationships than they usually have in a prison context, as well as helping to develop networks of solidarity. Some of the inmates alleged the rugby program worked as a source for fellowship, a means of getting to know new people, not to think only in oneself and improving the coexistence. A clear example was presented when one of the participants made a comparison with soccer, the traditional Uruguayan sport: "While in soccer one has rivals, in rugby one has mates".

For further research and policy, it is necessary to state some potential concerns of our paper. First, it is important to bear in mind that our results show only the short-term impact (just eight months) of a program on substance abuse, smoking and social attitudes. We plan to collect data on subsequent

follow-ups on these outcomes, and also other long term outcomes, such as involvement into criminal activities in prison, recidivism, health, beliefs and expectations, we just need time to evaluate longer term effects.

Second, the data in this study was collected only through self report scales, and this could be a potential threat to internal validity. The use of multiple methods for evaluation (e.g., prison authorities, peer reports) may minimize the influence of subjectivity. With the data available, we build three outcomes (drugs consumption, smoking, index of social attitudes) looking for robustness in our study, obtaining positive effects, and hence reducing the problem of possible subjectivities. One could argue that inmates could have manipulated their answers with an opportunistic behaviour (for instance, inmates who have participated in the program could underreport their drug consumption in order to leave the program). However, it is important to take into account that the inmates could leave the program in any part of it without any cost. Also, our approach is focused in the Intention-to-treat estimate, and thus, we measure the impact of Randomly Assigned to the Treatment Group on the outcomes, and this lottery is not affected by personal characteristics.

Third, the study group was composed by incarcerated offenders who are not necessarily representatives of the prison population. This fact limits the generalization of the findings of the current study. Despite this limitation, the current study considerably extended the insights into the underlying mechanism between rehabilitation programs and risky behaviour.

Fourth, it is necessary to intend to develop longitudinal studies (Farrington, 2006, states the advantages of these studies) and evaluate alternative treatment strategies not only for incarcerated offenders but also in prevention programs for youth (for instance, Farrington and Welsh, 2006, review the effectiveness of 22 family-based crime prevention programs and find that these programs are effective in reducing later criminality). All these evaluations should be accompanied by cost-benefit analyses which are very necessary inputs for policy makers who usually wrestle with budget declines and potential cuts. In light of the methodological advantages of randomized experiments, it is mandatory that many new ones be carried out in criminology. For instance, Buehler, Petrosino and Turpin-Petrosino (2003), found that Scared Straight interventions (visits by juvenile delinquents to prison facilities to frighten them) on average are more harmful to juveniles than doing noth-

ing. They recommend that governments should institute rigorous programs of research to ensure that well-intentioned treatments do not cause harm to the citizens they pledge to protect. Farrignton (2005) states that there are often problems in getting permission and cooperation from practitioners which lead to cash flow problems and difficulties in carrying through the randomization successfully. Thus, randomized experiments still present many challenges to researchers.

In addition, it would be useful if this kind of experiment were accompanied by an ethnographic or phenomenological approach in order to analyze the participants and controls' perspective. Their subjectivities should be considered before, during and after this kind of programs are implemented. In-depth interviews and observational approaches are techniques that would be useful to consider along with the econometric analysis. That way a broader view would be achieved. The ethnographic perspective could be useful to deepen the analysis and consider the participants discourse.

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