

ORIGINAL

Financed research from Government Delegation grants for the National Plan on Drugs: Research assessment and scientific impact

Repercusión científica de las ayudas de la Delegación del Gobierno para el Plan Nacional sobre Drogas: Publicaciones derivadas e impacto científico

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Abstract

Addictive disorders are a serious health problem to which large amounts of research resources are devoted. This study aims to analyze the evolution and scientific impact of the publications derived from the funding of research projects by the Spanish National Plan on Drugs (PNSD). The list of grants awarded was provided by the PNSD. Derived publications were obtained by asking the principal investigators of the grants and searching in the Web of Science and Scopus. Bibliometric indicators and evolutive trends of scientific production per project were calculated. On average, the PNSD conferred 15 annual grants to research projects, with an annual amount close to one million euros (€944,200.64) and an average amount per grant of just over €60,000, being higher in basic research and in alcohol. 71,9% of the grants had derived publications and almost half of them produced between one and three publications, with basic research being the most prolific. The international journal in which most articles were published was *Psychopharmacology* (50) and among Spanish journals, *Adicciones* stood out (28). A high level of co-authorship and international collaboration was identified. Most of the PNSD-funded projects produced research articles, many of them in journals belonging to the first and second quartiles of the *Journal Citation Reports*. The results of this study have revealed the scientific impact of the PNSD research projects funding and may contribute to determining future funding priorities.

Keywords: substance-related disorders, funding support, research projects, bibliometrics, publications resulting

Resumen

Los trastornos adictivos son un grave problema de salud al que se destinan gran cantidad de recursos de investigación. El propósito de este trabajo es analizar la evolución e impacto científico de las publicaciones derivadas de las ayudas a proyectos de investigación financiados por el Plan Nacional Sobre Drogas (PNSD). La relación de ayudas concedidas fue proporcionada por el PNSD. Las publicaciones derivadas se obtuvieron preguntando a los investigadores principales de las ayudas y buscando en Web of Science y Scopus. Se calcularon indicadores bibliométricos y tendencias evolutivas de la producción científica por proyecto. Por término medio, el PNSD concedió 15 ayudas anuales a proyectos de investigación, con un importe anual cercano al millón de euros (944.200,64€) y un importe medio por ayuda de algo más de 60.000€, siendo mayor en la investigación básica y en alcohol. El 71,9% de las ayudas tuvieron publicaciones derivadas y casi la mitad produjeron entre una y tres publicaciones, siendo la investigación básica la más prolífica. La revista extranjera en la que más artículos se publicaron fue *Psychopharmacology* (50) y entre las españolas destacó *Adicciones* (28). Se identificó un alto índice de coautoría y de colaboración internacional. La mayoría de los proyectos financiados por el PNSD produjeron artículos de investigación y muchos de ellos en revistas del primer y segundo cuartil del *Journal Citation Reports*. Los resultados de este estudio han permitido conocer la repercusión científica de las ayudas a proyectos de investigación del PNSD y puede contribuir a determinar futuras prioridades de financiación.

Palabras clave: trastornos por abuso de sustancias, ayudas económicas, proyectos de investigación, bibliometría, publicaciones derivadas

■ Received: May 2020; Accepted: December 2020.

■ ISSN: 0214-4840 / E-ISSN: 2604-6334

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Almost five decades ago, drug use and its consequences became one of the main concerns in Spanish society. The problem sparked debates at political, health and social levels, calling for a government response that came at the Council of Ministers on July 24, 1985, the date on which the National Plan on Drugs was brought into being to promote and coordinate the drug addiction policies of public administrations. In its declaration of principles, Section 4 referred to research on drug addiction in the following terms as “permanent research that must be strengthened both with regard to the knowledge of reality in a way that facilitates the planning and development of actions consistent with it, and in applied research, which enables new experiences of prevention and treatment to be defined. Similarly, in the field of research in Spain, there is an urgent need to develop standardized methods that make it possible to compare and complete the results obtained, in different studies and at different times” (Royal Decree 1677/1985).

Thirty-five years have passed since that declaration of principles, and with hindsight it can be said that drug addiction research has been a firmly established reality in Spain for a long time, as observed in several bibliometric studies analyzing Spanish research in the field (Aleixandre, 1999; Álvarez & del Río, 2003; Ballesteros, Torrens & Valderrama, 2006; González-Alcaide, Calafat, Becoña, Thijs & Glänzel, 2016; Rodríguez de Fonseca et al., 2006). One of the main achievements is the consolidation of an annual round of research project funding by the National Plan on Drugs. Grants are awarded on the basis of the quality criteria of the projects presented in concurrent competition, and this has led to state subsidy of a very considerable number of projects, as well as greater monitoring and control by the administration of how well goals are met by the principal investigators (Plan Nacional sobre Drogas, s.f.a). Other types of subsidy have also been established, such as, for example, financial aid to private non-profit organizations for implementing addiction programs paid for by the Confiscated Assets Fund resulting from operations against illicit drug trafficking and other related crimes under Law 17/2003; grants for implementing supra-community programs on addictions (Ministerio de Sanidad, Servicios Sociales e Igualdad, 2019); help for local corporations who can charge the cost of developing drug prevention programs to the Confiscated Assets Fund (Plan Nacional sobre Drogas, s.f.b).

An important aspect of research assessment is quantifying the performance of such public or privately funded research. The aim of this study is to ascertain which projects were financed by the PNSD from 2000 to 2016 and to assess the academic performance of the grants through the bibliometric analysis of the publications derived from these projects in scientific journals.

Methods

Obtaining project data

The list of grants for research projects funded from 2000 to 2016 by the PNSD was obtained on the website <http://www.pnsd.mscbs.gob.es/delegacionGobiernoPNSD/convocatoriaSubvenciones/ongs/proyecInvestig.htm>. The following information was collected from the projects: name of the principal investigator (PI), institution, amount and year of grant. In the case of 77 grants for projects prior to 2004, information was available regarding the institution to which the PI belonged but not on the researcher's identity since names were not registered. The projects were classified according to: a) substances covered, classified as alcohol, hallucinogens, cannabis, cocaine, synthetic drugs, opiates, psychostimulants, tobacco, and drugs in general; b) type of research, divided into basic, clinical-psychiatry, documentation, genetics, general medicine, public policies, prevention, radiology, public health, social services, treatment, emergency services.

Search for publications derived from grants

In order to identify the derived publications, the PIs of each grant were emailed with a request for the bibliographic references of the publications derived from the funded projects. When these references were not provided by the PIs, searches were made in the Web of Science (WoS) Core Collection and Scopus, combining the keywords from the project title with the surnames of the PIs. These sources are the two reference databases commonly used in the evaluation of scientific activity and in determining bibliometric indicators, especially those based on the citations received by published papers (Bar-Ilan, Levene & Lin, 2007; Marx, Schier & Wanitschek, 2001).

In the 77 grants in which the main researcher was not listed, the derived output was identified from the project title. A bibliographic search was also carried out in the WoS and Scopus “Funding Entity” field. The search equation included the terms (“Spanish national drug*” OR “pnd” OR “pnsd” OR “plan nacional de drogas” OR “plan nacional sobre drogas” OR “plan nacional en drogas” OR “plan nacional drogas” OR “national drug plan” OR “National Plan on Drugs” OR ((Nacional OR Plan OR National) AND (drug* or droga*)) and the articles and reviews were filtered out. The results obtained were cross-checked by four of the authors, specialists in the field of addictive disorders and scientific documentation, to determine whether each paper retrieved really corresponded to the project to which it was assigned. For an article to be considered as a derived publication, two criteria had to be met: a) the PI the project had to be one of the authors of the article; b) the date of publication of the article had to be after or in the same year as the grant award. The searches for derived articles were carried out from September to December 2019 and all papers derived from the research projects found in the

databases on December 31, 2019 were included. Thus, there was a wait of at least less 3 years after the last PNSD call for projects included in this work; this amount of time is considered sufficient for the results of the investigations to be published and to minimize possible losses, according to Kingwell et al (2006). The number of citations for each derived publication was consulted on April 6, 2020 to ensure the most updated information possible.

Data extraction and indicators

The following information was extracted from each derived article: authors, article title, journal, number of citations received and year of publication. These data were completed with the following supplementary information about the journals from the 2018 edition of the *Journal Citation Reports* (jcr.clarivate.com): country of publication and five-year impact factor.

The following indicators were then obtained: trends in the number of annual grants, annual total investment and average amount per grant; substance studied under the project and type of research funded; annual development of subsidies depending on whether or not publications were derived; gap in years between grants awarded and publications derived; annual number of articles published in Spanish and foreign journals; institutions benefiting from the aid and number of articles published; journals in which the articles were published, number of citations received, author collaboration rates, existence of national and international collaboration and map showing collaboration between the countries of the authors' institutions. Citation analysis was used to assess the academic impact of published papers in a given subject field (Moed, 2009; Waltman, 2016); this has become a useful and widely used tool since the frequency with which papers are cited can be considered an objective parameter of their quality (Bornmann & Leydesdorff, 2014; Byrne & Chapman, 2005; Mahabee-Gittens, Gordon, Melink & Merianos, 2017; Marx et al., 2001; Tanner-Smith & Polanin, 2016; van Wesel, 2015).

Statistical analysis was carried out using SPSS version 26 (IBM, Armonk, NY, USA). Descriptive and frequency analyses were performed, with the chi-square (χ^2) test for comparing categorical variables and the non-parametric Kruskal-Wallis test (K-W) for quantitative variables of various categories. The level of statistical significance was established at $p < 0.05$. For the type of research, the various categories were grouped into three large research areas: basic, health sciences (clinical-psychiatry, genetics, general medicine, radiology, public health, treatment, emergencies) and social sciences (documentation, public policies, prevention, social services).

To represent the network of international collaboration on the derived publications, Pajek software was used, with its Pathfinder scaling algorithm to reduce the dimensional space and the Kamada-Kawai algorithm as the visualization

algorithm. This network is shown in the form of a geographical world map. In it, the diameter of the spheres is proportional to the number of different countries with which each country is related and the thickness of the lines represents the number of times that two countries collaborate. The network was established on the basis of a threshold of more than one article published in collaboration.

The data from which the results were extracted, as well as additional tables and figures, are available as supplementary material on Zenodo (Aleixandre-Benavent et al., 2020a; Aleixandre-Benavent et al., 2020b; Aleixandre-Benavent et al., 2020c).

Results

The PNSD has been distributing grants for the development of research projects on addictions since 2000. Table 1 shows the annual distribution of the 253 grants awarded from 2000 to 2016, to a total value of €16,051,410.87. To present homogeneous values for the complete period, subsidies in 2000 and 2001, originally published in pesetas (107,700,000 pesetas in 2000 and 75,250,000 pesetas in 2001), have been converted to euros (at the official 2002 exchange rate of 166,386 pesetas per euro). The year with most grants awarded was 2005 (21 grants), while in 2012 only ten were conferred. On average, around 15 grants were awarded annually, with an average annual amount close to one million euros (€944,200.64) and an average amount per grant of a little over €60,000. As can be seen, neither the number of grants nor their amount follow a rising trend over time as there are annual fluctuations. Although the number of grants increased in the last three years (from 11 grants in 2014 to 17 in 2016), the amount awarded fell by 27% (from €1,117,951 in 2014 to €815,286 in 2016). At the same time, the average amount per grant fell by almost half from 2014 to 2016.

Alcohol was the focus of 36% of the projects, while 22.9% were on drugs in general and 19% on cocaine (Table 1 of supplementary material (SM)), and only one project dealt specifically with hallucinogens (0.4%). Except in one year, projects on alcohol or drugs in general have always been funded. Since 2010, funding has gone mainly to projects on alcohol, ranging from 52.9% of the projects annually in 2016 to 83.3% in 2015. The two projects receiving the most funding were on psychostimulants (€194,087) and cannabis (€193,357), with synthetic drugs projects obtaining the most funding (median: €68,943). Statistically significant differences were found in the amounts granted according to the type of substances investigated (K-W: $\chi^2 = 20.04$; $p < 0.006$) (Figure 1a).

Basic research is the focus of 42.7% of the projects, followed by studies in the area of health sciences, and among them those focused on clinical aspects in the area of psychiatry and psychology. Prevention projects represent

9.5% of all projects. Among the least funded areas, those of social aspects, general medicine, brain radiological studies, emergency services and public policies stand out (Table 2, SM). Differences were found in the amounts awarded to the research areas (K-W: $\chi^2=20.7$; $p<0.001$), with the projects in the basic area receiving more funding (Figure 1b).

Figure 2 provides an overview of year-on-year changes in the projects with derived articles in terms of absolute numbers. At the beginning of the period (2000-2004) there is almost parallel development between grants with and without derived publications, followed by the rise in the number of grants with derived publications as of 2005. The year in which all projects saw at least one publication was 2012 (100%), while the year with the lowest percentage (43.8%) was 2000.

Figure 1 SM shows the number of published articles derived from the 182 grants leading to scientific publications. Of the total grants ($n=253$), 84 (33.2%) generated one, two or three derived publications, with grants leading to a single derived publication predominating (32 grants; 12.6%), followed by grants with two publications (31 grants, 12.3%) and grants with three publications (22 grants; 8.7%). Grants with more than 14 publications represent 4.4%. The total number of derived publications was 1,019, although 31 of them were funded by two PNSD grants. Projects

in the basic research area have a higher median number of derived publications than those in health sciences and social sciences (K-W: $\chi^2=14.99$; $p<0.002$) (Table 2). In terms of the substances covered by the research projects, it is psychostimulants that present the greatest number of derived publications. Statistically significant differences were found in the number of publications derived from the projects on cocaine or alcohol with respect to those on drugs in general (Table 2). The median number of publications derived from projects on opioids is one article, which is the same median for projects on tobacco and drugs in general.

It is also relevant to know the time elapsed between grant award and publication (Figure 2, SM). Most papers were published three years (21.5%) and four years (19%) after the award. The percentage of articles published within the same year the project was funded was 3.3%. The rate of publication six years after the grant was 11.2%.

The number of articles published annually in Spanish and foreign journals is presented in Table 3 of SM. Of the 1,019 articles, 937 (92%) were published in foreign journals and 82 (8%) in Spanish journals.

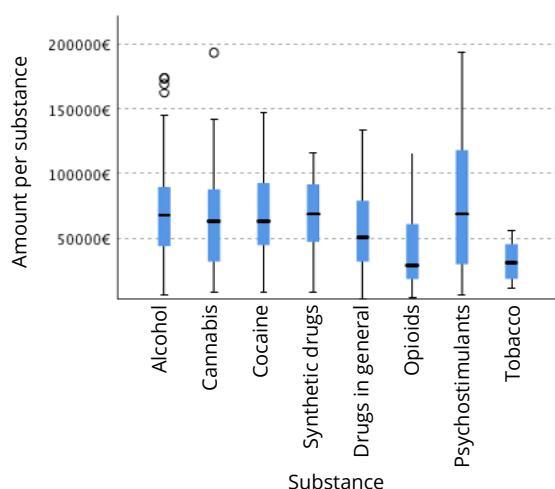
Table 3 shows the journals in which five or more studies derived from the grants were published. The journals receiving the largest number of papers were Psychopharmacology ($n=50$), followed by Drug and Alcohol Dependence ($n=38$)

Table 1

Annual changes in the amounts in euros granted by the Spanish National Plan on Drugs for the development of research projects on addictions

Year	N° grants	Total invested (€)	Mean amount granted (€)	Standard deviation (€)	5% trimmed mean (€)	Min. (€)	Max. (€)
2000	16	647,290.04	40,455.63	21,524.54	39,508.20	10,818.21	87,146.76
2001	16	452,261.61	28,266.35	19,095.57	27,433.70	3,005.06	68,515.38
2002	17	866,124.92	50,948.52	40,555.07	48,998.36	4,000	133,000
2003	20	1,380,925.31	69,046.27	44,164.66	65,316.02	11,150	194,087
2004	14	655,510	46,822.14	47,827.73	40,526.38	13,611	193,357
2005	21	1,158,149	55,149.95	36,242.69	54,224.42	11,400	115,630
2006	13	893,366	68,720.46	23,318.05	68,466.90	35,000	107,005
2007	14	1,089,010	77,786.43	44,316.25	77,809.43	8,000	147,160
2008	13	772,610	59,431.54	31,602.93	58,615.60	10,550	123,000
2009	15	975,700	65,046.67	33,703.78	64,829.63	16,000	118,000
2010	16	1,214,490	75,905.63	33,028.72	74,228.47	20,000	162,000
2011	15	1,134,821	75,654.73	22,673.36	74,621.09	43,915	126,000
2012	10	918,200	91,820	38,422.15	90,661.11	35,300	169,200
2013	13	939,060	72,235.38	38,981.04	71,598.26	15,793	140,146
2014	11	1,117,951	101,631.91	37,484.70	100,064.68	57,836	173,638
2015	12	1,020,656	85,054.67	26,264.88	83,401.24	54,844	145,027
2016	17	815,286	47,958	19,905.50	47,914.56	12,698	84,000
Total	253	16,051,410.87	63,444.31	37,514.36	61,172.43	3,005.06	194,087

Figure 1a
Amount per substance researched. Kruskal-Wallis test ($p<0.006$)



Nota. As only one project on hallucinogens was funded, it was excluded from the analysis.

Figure 1b
Distribution of amounts granted by research area

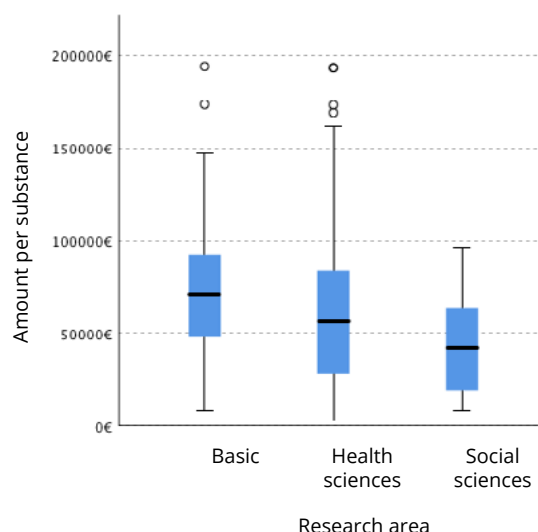
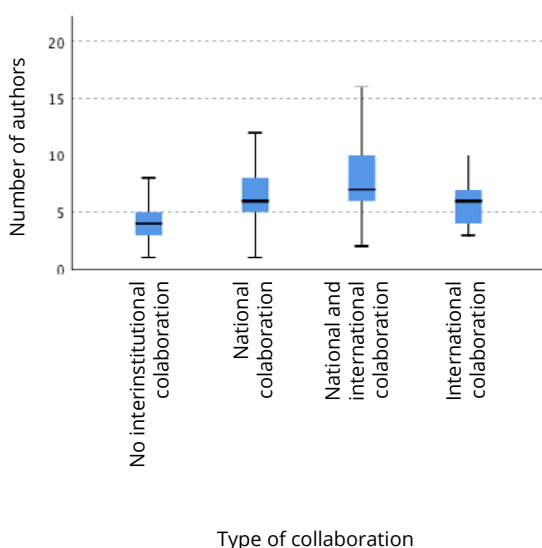


Figure 1c
Distribution of the number of authors by type of collaboration. Kruskal-Wallis test ($p<0.001$)



and Addiction Biology ($n=35$). The first Spanish journal was Addictions ($n=28$). In the number of citations in WoS, the ranking is headed by Drug and Alcohol Dependence ($n=1,243$). The journal with the highest “citations per paper” indicator in WoS was Biological Psychiatry ($C/P=74.25$). Of the 52 journals in which five or more papers were published, 26 (50%) were in the first quartile of JCR and 17 (32.7%) in the second quartile, with 603 papers published in journals in top two quartiles.

The 70 beneficiary institutions of Spanish National Plan on Drugs funding are presented in Table 4. Of these, 14

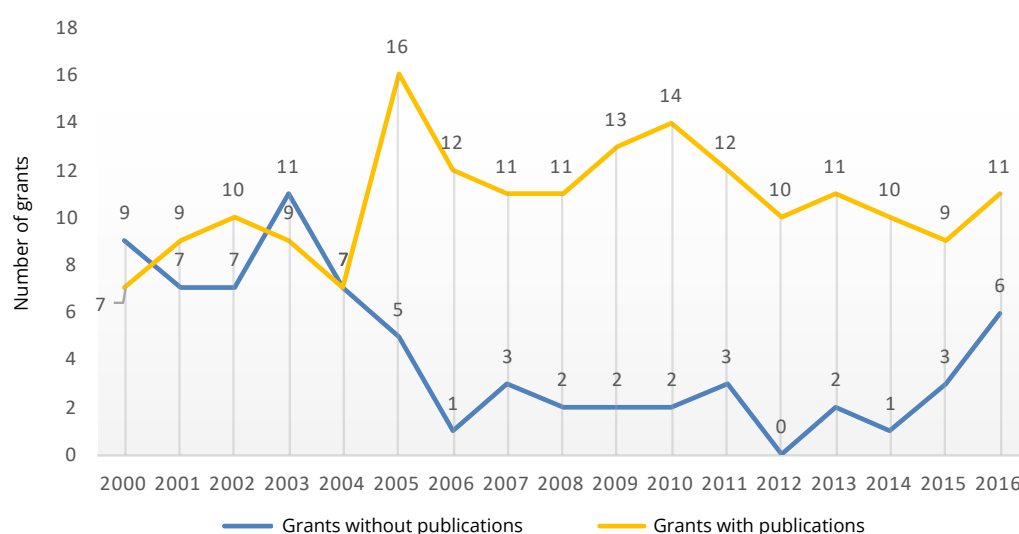
did not report any derived publications. Those receiving the most aid during the period analyzed were the Complutense University of Madrid ($n=21$), followed by the Fundación Instituto Mar de Investigaciones Médicas (IMIM) ($n=18$), the Consejo Superior de Investigaciones Científicas (Higher Council for Scientific Research) ($n=15$) and the universities of Santiago de Compostela ($n=13$) and València ($n=12$). The five institutions that received the highest total amount were the same as those mentioned above. In absolute number of studies derived from the grants, the Complutense University of Madrid ($n=79$) stands out, followed by Pompeu Fabra University ($n=63$) and the University of València ($n=60$). The indicator “number of papers per grant” is higher for the Marqués de Valdecilla Public Foundation ($n=27$), followed by the Jiménez Díaz Foundation Health Research Institute ($n=18$) and the Andalusian Public Foundation for Research in Biomedicine and Health (FIMABIS) in Malaga ($n=17$). Finally, the indicator “grant per paper” (€/P) was €261,197.46 for the Biomedical Research Foundation of the 12 de Octubre University Hospital, since only one publication was derived from five funded projects, and €110,920 for the Foundation for Health Training and Research of the Region of Murcia.

Regarding the number of citations, the institutions with the most citations for papers by its authors were the Consejo Superior de Investigaciones Científicas, Centro de Investigación Príncipe Felipe at the Fundación de la Comunidad Valenciana, and the Complutense University of Madrid with 2,591, 2,182 and 2,104 citations, respectively. The Centro de Investigación Príncipe Felipe at the Fundación de la Comunidad Valenciana remains among the top three institutions with respect to the number of citations per paper ($n=68$) and number of papers per grant ($n=727$).

Table 2
Derived publications according to research area and type of substance

Number of derived publications					
Research area	Min.	Max.	Median	5% trimmed mean	Kruskal-Wallis test
Basic	0	19	4	4.58	$\chi^2=14.99$ p<0.002
Health sciences	0	27	2	3.02	
Social sciences	0	15	1	1.93	
Substance					
Alcohol	0	19	3	4.37	$\chi^2=19.13$ p<0.009
Cannabis	0	27	2.5	4.11	
Cocaine	0	24	3	4.38	
Synthetic drugs	0	11	2	3.57	
Drugs in general	0	18	1	1.94	
Opioids	0	17	1	2.20	
Psychostimulants	0	13	4	5.94	
Tobacco	0	7	1	1.97	

Figure 2
Annual change in the number of grants from the Spanish National Plan on Drugs with and without derived publications



Derived articles written in collaboration comprised 99.7% of all papers. The 5% trimmed mean of the number of authors of the articles derived from the funded projects stands at 6.5 authors per paper. The average number of authors per paper is higher in health sciences (7.15) than in basic sciences (6.27) and social sciences (5.23) (K-W: $\chi^2=40.61$; $p<0.001$). As regards collaboration between institutions, this occurred in 17.2% of the articles, and a foreign institution was involved in 28.8% of the papers. International collaboration is higher in health sciences (33.8%) compared to other areas ($\chi^2=14.3$; $p<0.002$). Differences were observed in the number of authors

per paper according to the type of collaboration (K-W: $\chi^2=174.2$; $p<0.001$) (Figure 1c). The papers where authors from various national and international institutions collaborated had a greater number of authors per paper.

The authors collaborated with researchers from 89 countries. The collaboration map shown in Figure 3 has a threshold of two or more articles in collaboration, thus generating a network of 29 participating countries. It can be seen that the country with which Spain collaborates the most is the United States ($n=112$), followed by the United Kingdom ($n=57$) and Australia ($n=43$).

Table 3
Journals with more than 5 derived articles and number of citations (sorted by number of derived articles and total number of citations)

Journal	Country	Nº Derived Articles	Total Nº of Citations	Citations/ Article in WoS	FI 5 years	Quartiles
Psychopharmacology	Germany	50	1,075	21.5	3.3	Q2
Drug and Alcohol Dependence	Switzerland	38	1,243	32.71	3.989	Q1
Addiction Biology	England	35	581	16.6	4.02	Q1
Neuropharmacology	England	34	807	23.74	4.494	Q1
Plos One	United States	32	673	21.03	3.337	Q2
Adicciones*	Spain	28	225	9.78	2.221	Q1
British Journal of Pharmacology	England	23	643	27.96	5.755	Q1
Journal of Psychopharmacology	England	23	332	14.43	4.434	Q1
Neuropsychopharmacology	England	22	1,104	50.18	6.705	Q1
European Neuropsychopharmacology	Netherlands	19	332	17.47	4.394	Q1
Journal of Neurochemistry	England	16	829	51.81	4.371	Q1
International Journal of Neuropsychopharmacology	England	15	223	14.87	4.39	Q1
Neuroscience	England	14	430	30.71	3.504	Q2
Alcoholism-clinical and Experimental Research	United States	14	328	23.43	3.276	Q2
Progress in Neuro-psychopharmacology & Biological Psychiatry	England	14	235	16.79	4.159	Q1
European Journal of Pharmacology	Netherlands	12	194	16.17	3.12	Q2
Gaceta Sanitaria	Spain	12	140	11.67	1.918	Q2
Psychiatry Research	Netherlands	12	128	10.67	2.67	Q2
Scientific Reports	England	11	54	4.91	4.525	Q1
Alcohol and Alcoholism	England	10	556	55.6	2.882	Q2
Pharmacology Biochemistry and Behavior*	England	10	266	29.55	2.867	Q2
Schizophrenia Research*	Netherlands	10	233	25.88	4.583	Q1
Addictive Behaviors	England	10	220	22	3.325	Q1
Behavioural Pharmacology	United States	10	196	19.6	1.869	Q3
Neuroscience Letters	Netherlands	10	155	15.5	2.228	Q3
Behavioural Brain Research	Netherlands	10	154	15.4	3.021	Q2
Neurobiology of Disease	England	9	434	48.22	5.304	Q1
Neuroscience and Biobehavioral Reviews	England	9	393	43.67	9.42	Q1
Addiction	England	9	202	22.44	6.45	Q1
Frontiers in Behavioral Neuroscience	Switzerland	9	145	16.11	3.454	Q2
Biological Psychiatry	United States	8	594	74.25	11.275	Q1
European Addiction Research	Switzerland	8	67	8.38	2.532	Q2
Frontiers in Psychiatry	Switzerland	8	41	5.13	n/a	Q2
Journal of Psychiatric Research	England	7	225	32.14	4.475	Q1
Physiology & Behavior	United States	7	136	19.43	2.848	Q2
Biochemical Pharmacology	United States	7	50	7.14	4.637	Q1
Substance Use & Misuse	United States	7	42	6	1.584	Q4
Journal of Affective Disorders	Netherlands	7	39	5.57	4.16	Q1
Psicothema	Spain	6	104	17.33	2.057	Q2
European Journal of Neuroscience	England	5	240	48	3.023	Q3
Alcohol	United States	5	220	44	2.528	Q3
Cerebral Cortex	United States	5	218	43.6	6.149	Q1
Brain Behavior and Immunity	United States	5	215	43	6.616	Q1
Psychological Medicine	United States	5	196	39.2	6.313	Q1
Brain Research	Netherlands	5	151	30.2	2.937	Q2
Current Pharmaceutical Design	United Arab Emirates	5	144	28.8	2.832	Q3
Hormones and Behavior	United States	5	68	13.6	4.041	Q1
International Journal of Environmental Research and Public Health	Switzerland	5	55	11	2.948	Q1
Journal of Substance Abuse Treatment	United States	5	52	10.4	2.753	Q2
Actas Españolas de Psiquiatría	Spain	5	40	8	1.318	Q3
International Journal of Drug Policy	Netherlands	5	40	8	4.45	Q3
Trastornos Adictivos**	Spain	5	-	-	n/a	n/a

Note. *In these journals the number of citations per article was calculated from the number of articles included in the Main Collection of WoS. *Adicciones* (n=23); *Pharmacology Biochemistry and Behavior* (n=9); *Schizophrenia Research* (n=9).

***Trastornos Adictivos* was not included in the Main Collection of Web of Science nor in *Journal Citation Reports*.

Table 4
Beneficiary institutions of the Spanish National Plan on Drugs and number of derived articles (alphabetical order)

Beneficiary institution	Nº of grants	Nº of derived articles	Total cost	Derived articles per grant	Cost per article	Citations	Citations/ article	Citations/ grant
Agència de Salut Pública de Barcelona	5	16	€304,787	3	€19,049.19	390	24	78
Agencia Laín Entralgo	1	0	€57,000	0	No publication	0	0	0
Asociación Colaboración Cochrane Iberoamericana	1	0	€20,000	0	No publication	0	0	0
Consejo Superior de Investigaciones Científicas	15	57	€1,328,112.53	4	€23,300.22	2,591	45	173
Escuela Andaluza de Salud Pública	1	0	€80,000	0	No publication	0	0	0
Fundació Clínic per a la Recerca Biomèdica	3	7	€196,047	2	€28,006.71	69	10	23
Fundació Institut de Recerca de l'Hospital Universitari Vall d'Hebron	4	31	€270,055	8	€8,711.45	704	23	176
Fundació Institut d'Investigació en Ciències de la Salut Germans Trias i Pujol	4	23	€287,643	6	€12,506.22	54	2	14
Fundació Privada Institut de Recerca Biomèdica	1	10	€99,000	10	€9,900	297	30	297
Fundación Andaluza para la Atención a las Drogodependencias	2	5	€124,770	3	€24,954	140	28	70
Fundación Biomédica Galicia Sur	1	0	€33,925	0	No publication	0	0	0
Fundación Canaria de Investigación Sanitaria (FUNCANIS)	1	0	€12,698	0	No publication	0	0	0
Fundación de la Comunidad Valenciana Centro de Investigación Príncipe Felipe	3	32	€252,250	11	€7,882.81	2,182	68	727
Fundación Hospital Alcorcón	2	0	€31,400	0	No publication		0	0
Fundación Hospital Carlos Haya	2	2	€88,815.74	1	€44,407.87	173	87	87
Fundación IDICHUS	1	2	€83,037	2	€41,518.50	10	5	10
Fundación IMABIS	4	36	€335,000	9	€9,305.56	820	23	205
Fundación Instituto Mar de Investigaciones Médicas (IMIM)	18	51	€1,650,740.90	3	€32,367.47	1,256	25	70
Fundación Miguel Servet	1	14	€23,000	14	€1,642.86	262	19	262
Fundación para la Formación e Investigación Sanitaria de la Región de Murcia	1	1	€110,920	1	€110,920	0	0	0
Fundación para la Investigación Biomédica del Hospital Universitario 12 de Octubre	5	1	€261,197.46	0	€261,197.46	0	0	0
Fundación para la Investigación Biosanitaria de Andalucía Oriental Alejandro Otero (FIBAO)	1	2	€8,000	2	€4,000	50	25	50
Fundación para la Investigación Sanitaria en Castilla la Mancha	2	1	€28,525	1	€28,525	129	129	65
Fundación Parc Científic de Barcelona	1	0	€70,100	0	No publication	0	0	0
Fundación Progreso y Salud	1	2	€53,650	2	€26,825	17	9	17
Fundación Pública Andaluza para la Investigación de Málaga en Biomedicina y Salud (FIMABIS)	2	33	€192,573	17	€5,835.55	190	6	95
Fundación Pública Marqués de Valdecilla	1	27	€61,000	27	€2,259.26	680	25	680
Fundación Universitaria San Pablo CEU	6	11	€359,481	2	€32,680.09	54	5	9
Fundación Valenciana de Investigaciones Biomédicas	2	1	€90,752.83	1	€90,752.83	0	0	0
Fundación Vasca de Innovación e Investigación Sanitaria	2	13	€210,695	7	€16,207.31	191	15	96
Hospital General Gregorio Marañón	2	6	€176,000	3	€29,333.33	158	26	79
Hospital Universitario de Canarias	1	0	€13,611	0	No publication		0	0
Hospital Universitario de Salamanca	1	3	€48,450	3	€16,150	38	13	38
Hospital Universitario Ramón y Cajal	1	3	€14,350	3	€4,783.33	51	17	51
Institut de Recerca de l'Hospital de la Santa Creu i Sant Pau	10	10	€301,849.35	1	€30,184.94	117	12	12

Table 4
Beneficiary institutions of the Spanish National Plan on Drugs and number of derived articles (alphabetical order)(cont.)

Beneficiary institution	N° of grants	N° of derived articles	Total cost	Derived articles per grant	Cost per article	Citations	Citations/article	Citations/grant
Institut d'Investigacions Biomèdiques August Pi i Sunyer	1	6	€82,980	6	€13,830	63	11	63
Instituto de Investigación Sanitaria Fundación Jiménez Díaz	1	18	€70,773	18	€3,931.83	54	3	54
Instituto de Salud Carlos III	2	8	€114,314	4	€14,289.25	237	30	119
Universidad Autónoma de Madrid	2	22	€335,284	11	€15,240.18	195	9	98
Universidad Castilla la Mancha	1	4	€91,300	4	€22,825	87	22	87
Universidad Complutense de Madrid	21	79	€1,774,464.05	4	€22,461.57	2,104	27	100
Universidad de A Coruña	1	0	€27,805	0	No publication	0	0	0
Universidad de Alcalá	2	4	€74,882	2	€18,720.50	14	4	7
Universidad de Almería	1	2	€37,000	2	€18,500	9	5	9
Universidad de Cantabria	2	3	€131,775	2	€43,925	133	44	67
Universidad de Deusto	1	0	€57,000	0	No publication	0	0	0
Universidad de Granada	6	30	€240,636.30	5	€8,021.21	888	30	148
Universidad de Huelva	1	3	€22,769	3	€7,589.67	2	1	2
Universidad de la Rioja	1	0	€73,916	0	No publication	0	0	0
Universidad de León	3	4	€143,886.22	1	€35,971.55	5	1	2
Universidad de Lleida	1	0	€31,853.64	0	No publication	0	0	0
Universidad de Málaga	2	0	€71,949	0	No publication	0	0	0
Universidad de Murcia	3	10	€116,234.17	3	€11,623.42	71	7	24
Universidad de Navarra	3	18	€208,683	6	€11,593.50	401	22	134
Universidad de Oviedo	6	37	€287,914	6	€7,781.46	441	12	74
Universidad de Salamanca	6	9	€191,330.97	2	€21,259	126	14	21
Universidad de Santiago de Compostela	13	51	€904,235.99	4	€17,730.12	850	17	65
Universidad de Sevilla	4	16	€221,422	4	€13,838.88	485	30	121
Universidad de Valladolid	1	1	€26,444.53	1	€26,444.53	0	0	0
Universidad del País Vasco	3	13	€97,871.35	4	€7,528.57	225	17	75
Universidad Miguel Hernández	6	28	€321,616.52	5	€11,486.30	742	27	124
Universidad Nacional de Educación A Distancia	5	24	€398,380.31	5	€16,599.18	389	16	78
Universidad Rey Juan Carlos	1	0	€24,500	0	No publication	0	0	0
Universitat Autònoma de Barcelona	3	29	€301,892.38	10	€10,410.08	552	19	184
Universitat de Barcelona	10	50	€639,986	5	€12,799.72	915	18	92
Universitat de les Illes Balears	5	19	€256,437	4	€13,496.68	238	13	48
Universitat de València	12	60	€554,979.27	5	€9,249.65	707	12	59
Universitat Jaume I	7	39	€287,823.52	6	€7,380.09	787	20	112
Universitat Pompeu Fabra	7	63	€549,636.85	9	€8,724.39	1,171	19	167
Total	253	1,050	€16,051,410.87	4	€15,287.06	22,514		

Note. NG: Number of Grants; NS: Number of studies; SG: Number of studies published per grant; €/S: amount in euros per published study. The same study can be financed by two grants.

Discussion

This study has made it possible to ascertain and investigate relevant aspects related to research funding on addictive disorders in Spain by the Spanish National Plan on Drugs and its academic profitability in terms of scientific publications and their impact. On average, the PNSD awarded 15 grants per year for research projects, to an annual value of close to one million euros. Almost three quarters of the grants had derived publications, the vast majority of them in foreign magazines. *Adicciones* was the Spanish journal in which the largest number of articles were published. A high degree of international collaboration was identified and most of the derived articles were from the basic research field.

Public funding for research on addictive disorders competes with other government funding priorities aiming to improve the health of the population. In Spain, funding for research projects in this area comes from the European Union, the Spanish Government, the Spanish Autonomous Communities, the pharmaceutical industry, foundations and non-governmental organizations, as in other areas of health sciences and social sciences and within the framework of what has come to be known as a multilevel R&D&I model (Fernández-Formoso, Pérez-Ortega, Sanz-Martíul and Blázquez-Herranz, 2010). However, in the area of addictive disorders, the Spanish Government is the main source of funding through the PNSD rounds since 2000 of the Acción Estratégica en Salud del Instituto de

Salud Carlos III (s.f.) and the Plan Estatal de Investigación Científica y Técnica y de Innovación (Ministerio de Ciencia e Innovación, s.f.a, s.f.b), previously known as the Plan Nacional I+D+I (R&D&I).

The analysis of publications derived from funded projects has been the object of study in some biomedical areas (Lewison & Dawson, 1998; Sun, Steinberg & Jagsi, 2013) as, for example, in nutrition (Thomson, 2007), genomics (Schiermeier, 1999), rehabilitation (DeLisa & Rosenthal, 2005; Zwingmann, Buschmann-Steinhage, Gerwinn & Klosterhuis, 2004), stem cell research (Campbell, 2005) and cardiology (Aleixandre et al., 2011; Rodríguez-Padial et al., 2019). However, we have not found studies analyzing the performance of publications funded by investment from official bodies or scientific associations and foundations in the area of addictive disorders. Most of the studies on funding refer to the subsidising of treatments (Chalmers, Ritter, Berends & Lancaster, 2016; Mark, Levit, Vandivort-Warren, Coffey & Buck, 2007; Stewart & Horgan, 2011) and harm reduction (Atun & Kazatchkine, 2010; Bridge et al., 2016; Kulesza, Teachman, Werntz, Gasser & Lindgren, 2015; World Health Organization, 2012).

With regard to the grants awarded by the PNSD, our analysis has shown that the funded projects are fundamentally in the area of basic sciences, an area in which a greater number of projects are presented and on which greater funding is conferred, while the number of projects in the social sciences is lower and they are also awarded less.

Figure 3
Collaborating network of countries of derived article authors



A study on the funding practices of the Research Council of Norway's Programs for Mental Health found that the projects it funded were mainly focused on biological, genetic and neurological areas, while those dedicated to community health and living conditions were less frequent (Andersen, Borg, Karlsson & Larsen, 2016).

As Becoña (2016) has stated, funding by the National Institute on Drug Abuse in the United States and Spanish institutions has, for a variety of reasons, probably focused on brain disease and the biologicistic perspective, with more research required in the area of prevention and other models of action. It is possible that the methodological standardization used in the basic sciences results in greater approval and funding when projects are assessed. It would therefore be advisable to establish correction factors in the calls for projects to make more room for those from other areas of knowledge that also have more difficulties in other national funding rounds. Moreover, it should be noted that despite recognizing the importance of PNSD funding, the percentage of gross domestic product (GDP) dedicated to research in Spain (1.21% of GDP) is far behind the investment levels in large European countries such as France, which allocates 2.19%, or Germany (3.04%), and even China (2.13%) and the United States (2.80%) (World Bank, 2019).

Previous studies analyzing publications derived from research projects in other areas have shown mixed results. Thus, in two studies on the performance of cardiology projects funded by the Spanish Society of Cardiology in two different time periods, derived publication were found in 59.4% of the projects in one case (Aleixandre et al., 2011) and 37% in the other (Rodríguez-Padial et al., 2019). In our study, 71.9% of the grants had derived publications, a percentage that is quite close to the first of the above. However, it is likely that there are methodological differences that may explain the differences, based on whether only those derived articles acknowledging the funding in the manuscript are counted or whether all papers are counted, both with or without explicit recognition of funding. Nevertheless, the fact that the percentage of derived publications obtained in our study is higher than in an area as consolidated as cardiology shows the importance of the research on addictive disorders. The number of derived publications is higher in the area of basic research, an area that receives the most funding per project.

The largest number of funded projects is on alcohol, drugs in general, and cocaine. This is linked to the fact that alcohol is the most widely used drug, both in the general population and in adolescents, and because social science research usually focuses on all drugs, as for example in studies on neurobiological substrates and on prevention. The significant number of projects on cocaine is related to the high number of articles published by Spanish researchers on this drug (Khalili et al., 2018). Currently,

with the increase in cannabis use, the appearance of synthetic cannabinoids and the opening of the international debate on the medical or recreational use of cannabis and the consequences of its legalization (Cerdá et al., 2020; Mاتيolo, et al., 2018; Smart & Pacula, 2019), it would be advisable to promote research on this drug, especially taking into account the 58% decrease in funded projects related to cannabis when comparing the first half of the period studied (23 projects) to the second half (11 projects).

As has been seen, the grants were distributed among research groups from a wide variety of beneficiary institutions, including universities, hospitals, research institutes, and public and private foundations throughout the country. The profitability in terms of derived publications from these institutions has been inconsistent, and it should be taken into account that other variables that could relativize this profitability, such as the size of the research teams or researchers requesting help through various institutions to which they may be attached, have not been considered.

The fact that 92% of the derived publications were published in foreign journals is a sign of the internationalization of Spanish research on addictive disorders and also confers high visibility. Furthermore, as a sign of their quality, almost 80% of the most productive journals have impact factors that place them in the first or second quartile in their corresponding subject areas of the *Journal Citation Reports*. It is important to highlight that the internationalization of research is inextricably linked to factors such as the allocation of financial investment and human resources to research (González, Valderrama & Aleixandre, 2012; Moya Anegón et al., 2008; Peters, 2006). The subject areas of the journals in which most papers were published are substance abuse disorders, neurosciences and neurology, psychiatry and pharmacology, areas in which numerous articles on addictive disorders and their treatment are normally published (Tran et al., 2019). However, there is a shortage of publications in journals in the areas of general medicine, public health and education; these are fundamental areas in the approach to addictive disorders. The fact that papers published in the journal *Drug and Alcohol Dependence* received the greatest number of citations had already been observed in an earlier study on the scientific map of addiction treatment (Blobaum, 2013).

The average number of authors per study of 6.5 is higher than that revealed as part of the study on 50 years of Spanish research on addictive disorders funded by the National Plan on Drugs (Aleixandre-Benavent et al., 2020d) and was also higher than that found in another study on eating disorders, where the average was 4.39 authors per study (Valderrama-Zurián et al., 2017). Publications derived from research projects in health sciences have a greater average number of authors per paper than those from basic science or social science projects.

The study of collaboration in the derived publications shows that 82.8% of the papers were carried out in national or international collaboration and that this collaboration was reflected in a greater number of authors per study. Collaboration in the derived publications involved 87 countries, principally the United States. These data show that Spanish research on drug addiction is carried out with researchers from all continents and that the possibility of financing training in the United States is endorsed by the National Institute on Drugs of Abuse (NIDA) has had an important impact. The potential influence of the creation in 2002 of the Red de Trastornos Adictivos (RTA, Addictive Disorders Network) as part of the Ministry of Health initiative to promote research networks should also be highlighted (Rodríguez de Fonseca et al., 2006). Both the high degree of collaboration between authors and the high percentage of studies carried out in international collaboration in the derived articles are consistent with previous results showing that articles funded in the area of addictive disorders present a higher author per paper average, a greater degree of international collaboration and a greater number of citations per article (Valderrama-Zurián, Castelló-Cogollos, Melero-Fuentes, Aleixandre-Benavent & Bueno-Cañigral, 2019).

Limitations

This study has some limitations that should be taken into account. First, it is possible that some research may have been overlooked if the grant's principal investigators did not report publication, or if they were published in journals not indexed in the WoS Main Collection or Scopus. However, the databases consulted in this study are today considered the gold standard, enjoying significant international prestige and being the most used in bibliometric studies, especially those analyzing citation and scientific impact indicators (Moed, 2009). Secondly, it is possible that some authors have followed a strategy of fragmented publication to make their projects more academically profitable, a practice that would only be possible to identify through a careful review of potentially fragmented publications, which is an aspect beyond the scope of our study. There may also be an excess or default "funding bias". The excess bias is when some authors include acknowledgement in their study of a funded project, regardless of whether the study is actually associated with that project, with the aim of increasing the productivity of the projects in reports, or even continue acknowledging it many years after funding with no apparent connection. Conversely, the default "funding bias" happens when the authors omit acknowledgment in a funded paper. Third, it is possible that by not knowing who the PI was of the projects funded during the period 2000-2003, there was an under-representation of the publications derived from these projects. Finally, it is clear that the projects awarded

in recent years had less time to publish their results, which may have produced a lower percentage of derived publications and citations.

Despite these limitations, the results of our analysis provide information of interest to ascertain the current state of research in addictive disorders, the aspects that may deserve greater attention and those with the greatest issues. The information obtained may be useful for making strategic decisions aimed at correcting the weaknesses detected or continuing to finance the most relevant aspects identified.

Conclusions

The results of this study have revealed the return on financial investment in PNSD research projects in terms of scientific publications and can help determine future funding priorities. The publication rate, and the fact that most of the studies were published in journals found in the top quartiles of the JCR, widely read and of great international impact, show that Spanish research teams carry out rigorous and high quality research, usually collaborating in national and international networks and generally optimizing the resources they obtain. Furthermore, this return provides a strong incentive for the PNSD to continue and to ensure that funding for research on addictive disorders is maintained or increased.

Future studies could follow the development of grants by the PNSD and other public or private sources and their academic performance in terms of publications, as well as their impact on society through knowledge transfer.

Acknowledgments

Delegación de Gobierno para el Plan Nacional sobre Drogas (2016 round. Proyecto 2016/028). Ministerio de Sanidad Consumo y Bienestar Social.

Servicio de Drogodependencias (PMD/UPCCA-València). Concejalía de Sanidad y Consumo. Ajuntament de València.

References

- Aleixandre Benavent, R. (1999). Investigación española en drogodependencias. ¿Hacia dónde vamos? *Trastornos Adictivos*, 1, 227-233.
- Aleixandre-Benavent, R., Agulló-Calatayud, V., Alonso-Arroyo, A., Castelló-Cogollos, L., Lucas-Domínguez, R., Melero-Fuentes, D.,... Valderrama-Zurián, J. C. (2020a). Financed projects from Government Delegation grants for the National Plan on Drugs (Spain), 2000-2016. doi:10.5281/zenodo.3778579.
- Aleixandre-Benavent, R., Agulló-Calatayud, V., Alonso-Arroyo, A., Castelló-Cogollos, L., Lucas-Domínguez,

- R., Melero-Fuentes, D.,... Valderrama-Zurián, J. C. (2020b). Financed researchs from Government Delegation grants for the National Plan on Drugs (Spain), 2001-2019. doi:10.5281/zenodo.3778642.
- Aleixandre-Benavent, R., Agulló-Calatayud, V., Alonso-Arroyo, A., Castelló-Cogollos, L., Lucas-Domínguez, R., Melero-Fuentes, D.,... Valderrama-Zurián, J. C. (2020c). Tables and figures of the supplementary material from research: Financed researchs from Government Delegation grants for the National Plan on Drugs: Research assessment and scientific impact. doi: 10.5281/zenodo.4030455.
- Aleixandre-Benavent, R., Agulló-Calatayud, V., Alonso-Arroyo, A., Castelló-Cogollos, L., Lucas-Domínguez, R., Melero-Fuentes, D.,... Valderrama-Zurián, J. C. (2020d). La evolución de la investigación española en drogodependencias presente en publicaciones científicas. <http://pnsd.uisys.es>.
- Aleixandre Benavent, R., Alonso Arroyo, A., Anguita Sánchez, M., Bolaños Pizarro, M., Heras, M., González Alcalde, G.,... Morell Cabedo, S. (2011). Evolución y repercusión científica de las becas de investigación de la Sociedad Española de Cardiología y la Fundación Española del Corazón (2000-2006). *Revista Española de Cardiología*, 64, 904-915. doi:10.1016/j.recesp.2011.03.024.
- Álvarez, F. J. & del Río, M. C. (2003). Current initiatives in drug abuse research in Spain. *Addiction*, 98, 861. doi:10.1046/j.1360-0443.2003.04511.x.
- Andersen, A. J. W., Borg, M., Karlsson, B. E. & Larsen, I. B. (2016). More of the same? A study of the funding practices of The Research Council of Norway's Programs for Mental Health in the period 1995 to 2015. *Scandinavian Psychologist*, 3. doi:10.15714/scandpsychol.3.e13.
- Atun, R. & Kazatchkine, M. (2010). The Global Fund's leadership on harm reduction: 2002–2009. *International Journal of Drug Policy*, 21, 103-106. doi:10.1016/j.drugpo.2010.01.002.
- Ballesteros, J., Torrens, M. & Valderrama Zurián, J.C. (coords.) (2006). Manual introductorio a la investigación en drogodependencias. Valencia: Sociedad Española de Toxicomanías.
- Banco Mundial (2019). Gasto en investigación y desarrollo (% del PIB). <https://datos.bancomundial.org/indicador/GB.XPD.RSDV.GD.ZS>.
- Bar-Ilan, J., Levene, M. & Lin, A. (2007). Some measures for comparing citation databases. *Journal of Informetrics*, 1, 26-34. doi:10.1016/j.joi.2006.08.001.
- Becoña, E. (2016). Adicción: No sólo un mal funcionamiento cerebral. *Papeles del Psicólogo*, 37, 118-125.
- Blobaum, P. M. (2013). Mapping the literature of addictions treatment. *Journal of the Medical Library Association*, 101, 101-109. doi:10.3163/1536-5050.101.2.005.
- Bornmann, L. & Leydesdorff, L. (2014). Scientometrics in a changing research landscape. *EMBO Reports*, 15, 1228-1232. doi:10.15252/embr.201439608.
- Bridge, J., Hunter, B. M., Albers, E., Cook, C., Guarinieri, M., Lazarus, J. V.,... Wolfe, D. (2016). The Global Fund to Fight AIDS, Tuberculosis and Malaria's investments in harm reduction through the rounds-based funding model (2002–2014). *International Journal of Drug Policy*, 27, 132-137. doi:10.1016/j.drugpo.2015.08.001.
- Byrne, F. & Chapman S. (2005). The most cited authors and papers in tobacco control. *Tobacco Control*, 14, 155-160. doi:10.1136/tc.2005.011973.
- Campbell, A. (2005). Ethos and economics: Examining the rationale underlying stem cell and cloning research policies in the United States, Germany, and Japan. *American Journal of Law & Medicine*, 31, 47-86. doi:10.1177/009885880503100102.
- Cerdá, M., Mauro, C., Hamilton, A., Levy, N. S., Santalla-Tenorio, J., Hasin, D., ... Martins, S. S. (2020). Association between recreational marijuana legalization in the United States and changes in marijuana use and cannabis use disorder from 2008 to 2016. *JAMA Psychiatry*, 77, 165. doi:10.1001/jamapsychiatry.2019.3254.
- Chalmers, J., Ritter, A., Berends, L. & Lancaster, K. (2015). Following the money: Mapping the sources and funding flows of alcohol and other drug treatment in Australia. *Drug and Alcohol Review*, 35, 255-262. doi:10.1111/dar.12337.
- DeLisa, J. A. & Rosenthal, M. (2005). Funding for rehabilitation medicine. *American Journal of Physical Medicine & Rehabilitation*, 84, 991-998. doi:10.1097/01.phm.0000187849.87038.33.
- Fernández-Formoso, J. A., Pérez-Ortega, J. M., Sanz-Martí, E. & Blázquez-Herranz, M. (2010). Para que nada ni nadie se quede sin investigar: la Acción Estratégica en Salud (AES) en el contexto del fomento y promoción de la I+D+i biosanitarias. *Emergencias*, 22, 460-469.
- González Alcaide, G., Valderrama Zurián J. C. & Aleixandre Benavent, R. (2012). Análisis del proceso de internacionalización de la investigación científica española. *Revista Española de Documentación Científica*, 35, 94-118.
- González-Alcaide, G., Calafat, A., Becoña, E., Thijs, B. & Glänzel, W. (2016). Co-citation analysis of articles published in substance abuse journals: Intellectual structure and research fields (2001–2012). *Journal of Studies on Alcohol and Drugs*, 77, 710-722. doi:10.15288/jsad.2016.77.710.
- Instituto de Salud Carlos III (s.f.). Acción Estratégica en Salud. <https://www.isciii.es/QueHacemos/Financiacion/Paginas/Accion-Estrategica-en-Salud.aspx>.
- Khalili, M., Rahimi-Movaghar, A., Shadloo, B., Mojtabai, R., Mann, K. & Amin-Esmaili, M. (2018). Global scientific production on illicit drug addiction: A two-decade analysis. *European Addiction Research*, 24, 60-70. doi:10.1159/000487590.
- Kingwell B.A., Anderson G.P., Morris, M.E. Duckett S.J., Hoole, E.A., Rothwell-Short, J. & Wilson,

- A.J. (2006). Evaluation of NHMRC funded research completed in 1992, 1997 and 2003: gains in knowledge, health and wealth. *Medical Journal of Australia*, 184, 282-286. doi:10.5694/j.1326-5377.2006.tb00238.x.
- Kulesza, M., Teachman, B. A., Werntz, A. J., Gasser, M. L. & Lindgren, K. P. (2015). Correlates of public support toward federal funding for harm reduction strategies. *Substance Abuse Treatment, Prevention, and Policy*, 10. doi:10.1186/s13011-015-0022-5.
- Lewison, G. & Dawson, G. (1998). The effect of funding on the outputs of biomedical research. *Scientometrics*, 41, 17-27. doi:10.1007/bf02457963.
- Ley 17/2003, de 29 de mayo, por la que se regula el Fondo de bienes decomisados por tráfico ilícito de drogas y otros delitos relacionados, Boletín Oficial del Estado núm. 129 (2003). <https://www.boe.es/buscar/act.php?id=BOE-A-2003-10828>.
- Mahabee-Gittens, E. M., Gordon, J. S., Melink, K. F. & Merianos, A. L. (2017). Top 100 cited articles in recent tobacco research. *Journal of Behavioral Health*, 6, 16-25.
- Mark, T. L., Levit, K. R., Vandivort-Warren, R., Coffey, R. M. & Buck, J. A. (2007). Trends in spending for substance abuse treatment, 1986-2003. *Health Affairs*, 26, 1118-1128. doi:10.1377/hlthaff.26.4.1118.
- Marx, W., Schier, H. & Wanitschek, M. (2001). Citation analysis using online databases: Feasibilities and shortcomings. *Scientometrics*, 52, 59-82. doi:10.1023/a:1012798911792.
- Matielo, C., Sarzi, D., Justolin, B., Lemos, R., Camargo, F. & Stefenon, V. (2018). A bibliometric analysis of cannabis publications: Six decades of research and a gap on studies with the plant. *Publications*, 6, 40. doi:10.3390/publications6040040.
- Ministerio de Ciencia e Innovación (s.f.a). Plan Estatal de Investigación Científica y Técnica y de Innovación 2017-2020. <http://www.ciencia.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgnnextoid=83b192b9036c2210VgnVCM1000001d04140aRCRD>.
- Ministerio de Ciencia e Innovación (s.f.b). Planes Nacionales I+D+i Anteriores. <http://www.ciencia.gob.es/portal/site/MICINN/menuitem.29451c2ac1391f1febebed1001432ea0/?vgnnextoid=79dbec05f2a7d210VgnVCM1000001d04140aRCRD>.
- Ministerio de Sanidad, Servicios Sociales e Igualdad (2019). Ayudas para la realización de programas supracomunitarios sobre adicciones en el año 2019. <https://www.ayudas-subvenciones.es/subvencion/17851/ayudas-para-la-realizacion-de-programas-supracomunitarios-sobre-adicciones-en-el-ano-2019>.
- Moed, H. F. (2009). New developments in the use of citation analysis in research evaluation. *Archivum Immunologiae et Therapiae Experimentalis*, 57, 13-18. doi:10.1007/s00005-009-0001-5.
- Moya Anegón, F. de, Chinchilla Rodríguez, Z., Benavent Pérez, M., Corera-Álvarez, E., González Molina, A. & Vargas Quesada, B. (2008). Indicadores bibliométricos de la actividad científica española 2008. Madrid: Fundación Española para la Ciencia y la Tecnología (FECYT).
- Peters, M. A. (2006). The rise of global Science and the emerging political economy of international research collaborations. *European Journal of Education*, 41, 225-244.
- Plan Nacional sobre Drogas (s.f.a). Convocatoria de ayudas para el desarrollo de proyectos de investigación sobre adicciones. <http://www.pnsd.mscbs.gob.es/delegacion-GobiernoPNSD/convocatoriaSubvenciones/ongs/proyecInvestig.htm>.
- Plan Nacional sobre Drogas (s.f.b). Programas de Corporaciones Locales. <http://www.pnsd.mscbs.gob.es/delegacionGobiernoPNSD/convocatoriaSubvenciones/ongs/programasCorpora.htm>.
- Real Decreto 1677/1985, de 11 de septiembre, de Coordinación Interministerial para la ejecución del Plan Nacional sobre Drogas, Boletín Oficial del Estado núm. 226. (1985). <https://www.boe.es/buscar/doc.php?id=BOE-A-1985-19702>.
- Rodríguez de Fonseca, F., Aleixandre, R., Camí, J., Navarro, M., Torrens, M., Iraurgi, J.,... Molina, M. (2006). La investigación en drogodependencias. *Trastornos Adictivos*, 8, 115-132.
- Rodríguez-Padial, L., Fernández Lozano, I., Hidalgo Urbano, R., Silva Melchor, L., Evangelista Massip, A., Anguita Sánchez, M. & Íñiguez Romo, A. (2019). Evolución e impacto bibliométrico de las becas de la Sociedad Española de Cardiología/Fundación Española del Corazón en el periodo 2007-2012. *Revista Española de Cardiología*, 72, 1012-1019. doi:10.1016/j.recresp.2018.08.013.
- Schiermeier, Q. (1999). Berlin places genomics among top funding priorities. *Nature*, 402, 568-568. doi:10.1038/45036.
- Smart, R. & Pacula, R. L. (2019). Early evidence of the impact of cannabis legalization on cannabis use, cannabis use disorder, and the use of other substances: Findings from state policy evaluations. *The American Journal of Drug and Alcohol Abuse*, 45, 644-663. doi:10.1080/00952990.2019.1669626.
- Stewart, M. T. & Horgan, C. M. (2011). Health services and financing of treatment. *Alcohol Research & Health*, 33, 389-394.
- Sun, G. H., Steinberg, J. D. & Jagsi, R. (2013). Funding for Biomedical Research. *JAMA*, 309, 1228-1229.
- Tanner-Smith, E. E. & Polanin, J. R. (2016). Brief alcohol intervention trials conducted by higher prestige authors and published in higher impact factor journals are cited more frequently. *Journal of Clinical Epidemiology*, 75, 119-125. doi:10.1016/j.jclinepi.2016.01.028.

- Thomson, C. A. (2007). Funding Nutrition Research: Where's the Money? *Nutrition in Clinical Practice*, 22, 609-617. doi:10.1177/0115426507022006609.
- Tran, B. X., Hoang, C. L., Tam, W., Phan, H. T., Vu, G. T., Latkin, C.,... Ho, R. C. M. (2019). A global bibliometric analysis of antiretroviral treatment adherence: implications for interventions and research development (GAPRESEARCH). *AIDS Care*, 32, 637-644. doi:10.1080/09540121.2019.1679708.
- Valderrama-Zurián, J. C., Castelló-Cogollos, L., Melero-Fuentes, D., Aleixandre-Benavent, R. & Bueno-Cañigral, F. J. (2019). Bibliometric differences between funding and non-funding papers on substance abuse scientific research. In: G. Catalano, C. Daraio, M. Gregori, H. F. Moed & G. Ruocco (Eds.), 17th International Conference on Scientometrics and Informetrics (pp. 2622-2623). Roma: Edizioni Efesto.
- Valderrama-Zurián, J.-C., Aguilar-Moya, R., Cepeda-Benito, A., Melero-Fuentes, D., Navarro-Moreno, M.-Á., Gandía-Balaguer, A. & Aleixandre-Benavent, R. (2017). Productivity trends and collaboration patterns: A diachronic study in the eating disorders field. *PLoS One*, 12, e0182760. doi:10.1371/journal.pone.0182760.
- van Wesel, M. (2015). Evaluation by Citation: Trends in Publication Behavior, Evaluation Criteria, and the Strive for High Impact Publications. *Science and Engineering Ethics*, 22, 199-225. doi:10.1007/s11948-015-9638-0.
- Waltman, L. (2016). A review of the literature on citation impact indicators. *Journal of Informetrics*, 10, 365-391. doi:10.1016/j.joi.2016.02.007.
- World Health Organization (2012). WHO, UNODC, UNAIDS technical guide for countries to set targets for universal access to HIV prevention, treatment and care for injecting drug users - 2012 revision. https://apps.who.int/iris/bitstream/handle/10665/77969/9789241504379_eng.pdf;jsessionid=707AED61E667AFF1BCE59B4E5F2CDD13?sequence=1.
- Zwingmann, C., Buschmann-Steinhage, R., Gerwinn, H. & Klosterhuis, H. (2004). Förderschwerpunkt "Rehabilitationswissenschaften": Ergebnisse - Umsetzung - Erfolge und Perspektiven. *Die Rehabilitation*, 43, 260-270. doi:10.1055/s-2004-828393.

