An empirical study of the winning applicants of the Bolyai János Research Scholarship in Hungary in 2021[1]

2021-ben nyertes Bolyai János Kutatási Ösztöndíjasok empirikus vizsgálata

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Link: https://doi.org/10.13140/RG.2.2.17751.34729

Abstract

The present paper examines some of the publishing habits observed among the winning applicants of the Bolyai János Research Scholarship. As an academic support, the Bolyai Research Scholarship Program forms a bridge between scholars owning the title of doctor of the Hungarian Academy of Sciences (HAS) and the young generation of researchers with an academic degree. The winning applicants in 2021 were researchers under the age of 45, cooperating with international co-authors, having highly-cited publications and showing a continuous publication history of 1.5 decades on average. The scholarship holders come primarily from research centres and universities. They prefer professional journals under the umbrella of Elsevier for performing their publication activities, however, there has been a significant increase in using journals belonging to MDPI, recently. One-third of the applicants already had a publication before and a fifth of them had a publication in one of the journals of MDPI two months after announcing the list of the winning applicants. The descriptive statistics presented in this paper may be used as benchmark figures by future applicants aiming for the research scholarship.

Keywords

Bolyai János Research Scholarship; MDPI; scientific career paths; Scientometrics

Absztrakt

Jelen tanulmány a publikálási szokásokat vizsgálja a nyertes Bolyai János Kutatási Ösztöndíjasok körében. A Bolyai-ösztöndíj akadémiai támogatásként hidat képez a Magyar Tudományos Akadémia (MTA), az MTA doktorai és a fiatal kutatói generáció tagjai között. 2021-ben nyertes pályázók átlagosan 1,5 évtizede aktívan publikáló, nemzetközi társszerzőkkel rendelkező, magasan idézett közleményekkel rendelkező 45 év alatti kutatók. Az ösztöndíjasok elsősorban kutatóközpontokból, tudományegyetemekről kerülnek ki. Nemzetközi publikálásra elsősorban az Elsevier kiadó folyóiratait használják, de jelentős növekedés figyelhető meg MDPI kiadó esetén. Pályázók harmada már írt, ötöde két hónappal a pályázati eredményhirdetés után rendelkezett MDPI kiadó által megjelentetett közleménnyel. A közleményben szereplő leíró statisztikai adatok célértékként jelenhetnek meg a későbbi pályázók számára.

Keywords

Bolyai János Kutatási Ösztöndíj; MDPI; tudományos karrier utak; tudománymetria

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[1] Az alábbi közlemény a Nemzeti Közszolgálati Egyetem Államtudományi és Nemzetközi Tanulmányok Kar gondozásában megjelenő **Államtudományi Hírlevél** Tudományos sarok rovatában jelent meg. A korábbi Hírlevelek elérhetőek az alábbi honlapon keresztül: https://antk.uni-nke.hu/kutatas-tudomanyos-elet/allamtudomanyi-hirlevel/aktualis-szamok.

A Hírlevélre az alábbi linken lehet feliratkozni: https://antk-dl.uni-nke.hu/at-newsletter-confirm/confirm/feliratkozas.php

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1. Introduction

For economies assuring competitive and sustainable growth, it is essential that their education systems also work as effectively as possible. It is therefore in the interest of all responsible governments to collect facts on their education systems and their effectiveness, to feed back the results and to improve in the areas concerned.[3] Among the tools, national application opportunities available for professors and researchers have significant weight. The most significant domestic applications are:

1. the Hungarian Scientific Research Fund (HSRF),
2. the Bolyai János Research Scholarship,
3. the Lendület (Momentum) Programme.

The HSRF's budget may be used to support, by means of a public bid system, scientific research or the establishment of the conditions necessary for carrying out such research and for making the results publicly available, which are expected to lead to the discovery of new scientific laws, the development of knowledge, methods and procedures. The HSRF's budget may also be used for the development of infrastructure to facilitate the production of such scientific results.[4] Established in 1986 and operating as an independent fund since 1991, the HSRF was the only dedicated basic research resource in Hungary from 1993 until the end of 2014.[5] The HSRF has supported a significant number of career-starter researchers. Its funding strategy provided opportunities for deserving research at all stages of a researcher's career.

To encourage and recognise excellence in research and development, the government establishes the Bolyai János Research Scholarship. The scholarship shall be awarded by an independent, professionally, and scientifically autonomous Board of Trustees established by the President of the Hungarian Academy of Sciences (hereinafter referred to as the HAS) within the framework of the HAS's public body, through a public application system.[6]

The aim of the Momentum Programme, established by the HAS in 2009, is to strengthen the Hungarian young researcher base by attracting and retaining internationally also outstanding researchers and young talents from abroad. The Momentum Programme aims to support both excellence and mobility by providing funding for research teams conducting ground-breaking research in host research centres.[7]

2. Presentation of Bolyai János Research Scholarship

The Bolyai János Research Scholarship is awarded by the Board of Trustees, appointed by the President of the HAS and operating within the framework of the HAS's public body, through a public application system to encourage and recognise outstanding research and development achievements. The scholarship is open to persons under 45 years of age who hold a scientific degree but have not yet obtained the title of doctor of the HAS. The aim of the scholarship is to facilitate the writing of a scientific work or the preparation of a work on an equivalent research topic as well as the preparation for the *award of the title of doctor of the HAS*. Applications may be submitted in any field of science or discipline.

The scholarship is open to an applicant with a higher education degree who

- is Hungarian citizen or Hungarian researcher living abroad,

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3 Lannert Judit: Az oktatáskutatás és -fejlesztés helyzete napjainkban [The state of educational research and development today], Educatio, 19:4 535-547. 2010.

4 Act CXXXVI of 1997 on the Hungarian Scientific Research Fund, 1997.

5 Váradi András – Zsoldos Attila – Kertész János – Klaniczay Gábor: Volt egy OTKA [There was an HSRF], Budapesti Könyvszemle, BUKSZ 04:349-363. 2014.

6 Government Decree 156/1997 (IX. 19.) on employment as a postdoctoral researcher and the Bolyai János Research Scholarship, 1997.

7 Fiatal kutatóknak indít támogatási programot az Akadémia [The Academy launches a support program for young researchers], hvg.hu, 2009.

- holds a PhD or equivalent degree at the time of application, or, if not yet held at the time of application but the university's doctoral council has already decided to award the degree, provide evidence of this fact,
- has not yet obtained the title doctor of the HAS at the time of submitting the application,
- is under 45 years of age on the closing date for applications, and
- wishes to carry out his / her research in a Hungarian scientific institution (higher education institution, research institute, other scientific research centre) and has a declaration of acceptance from the institution.

Section 64 (3) of Act XC of 2020 on the Central Budget of Hungary for 2021 (Kvtv.) establishes the monthly amount of the scholarship, which is HUF 124 500 on the day of the announcement of the application. The number of new scholarships to be awarded in 2021 is expected to be 160, from the estimate of expenditure for 2021 set out in Chapter XXXIII. on Hungarian Academy of Science in Annex 1 to the Act.

The successful researchers will receive the scholarship from 1 September 2021, based on the favourable decision of the Board of Trustees of the HAS Bolyai János Research Scholarship.

The submission and evaluation of proposals is carried out with the assistance of eleven peer review panels corresponding to the HAS classes: this facilitates the disciplinary analysis of the data as defined in Table 1.

1. Definition of disciplines by HAS classes

Number	Field of science	According to the HAS classes
1	Humanities, Arts, and Social Sciences (HASS)	I. Linguistics and Literary Studies
		II. Philosophy and Historical Science
		IX. Economics and Law
2	Life Sciences (LS)	IV. Agricultural Sciences
		V. Medical Sciences
		VIII. Biological Sciences
3	Science, Technology, Engineering, and Mathematics (STEM)	III. Mathematical Sciences
		VI. Engineering Sciences
		VII. Chemical Sciences
		X. Earth Sciences
		XI. Physical Sciences

Source: HAS

The study includes an analysis of the publication habits of successful applicants, based on both Scopus and HSB data. For both databases, I have examined the complete scientific publications. The list of complete scientific publication types is as follows:[8]
1. Published in a journal: academic article / study, summary article, short publication, multi- or group-author publication, source publication, review / critique, art criticism, essay.
2. Books: textbook, monograph, handbook, source publication, critical edition, workshop study, atlas.
3. Published in a book: professional study, book chapter, essay, source publication, review / critique, art criticism, work of art description, map, workshop study.
4. Conference publication: in a journal, book, other conference proceedings (usually at least 4 pages).

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8 HAS Presidency, Doctoral Decision, 2012.

5. Protection forms: patents.
6. Creation: for technical applications (the composition type was introduced in the HSB in 2013).

3. Results of the Empirical Study

The number of winners of the Bolyai János Research Competition, which has been operating since 1997, was 169 in 2021. Of these, 168 had an HSB ID. If we look at the number of winners over the last 11 years, we can see that from 2018 onwards, there have been 163 winners on average.
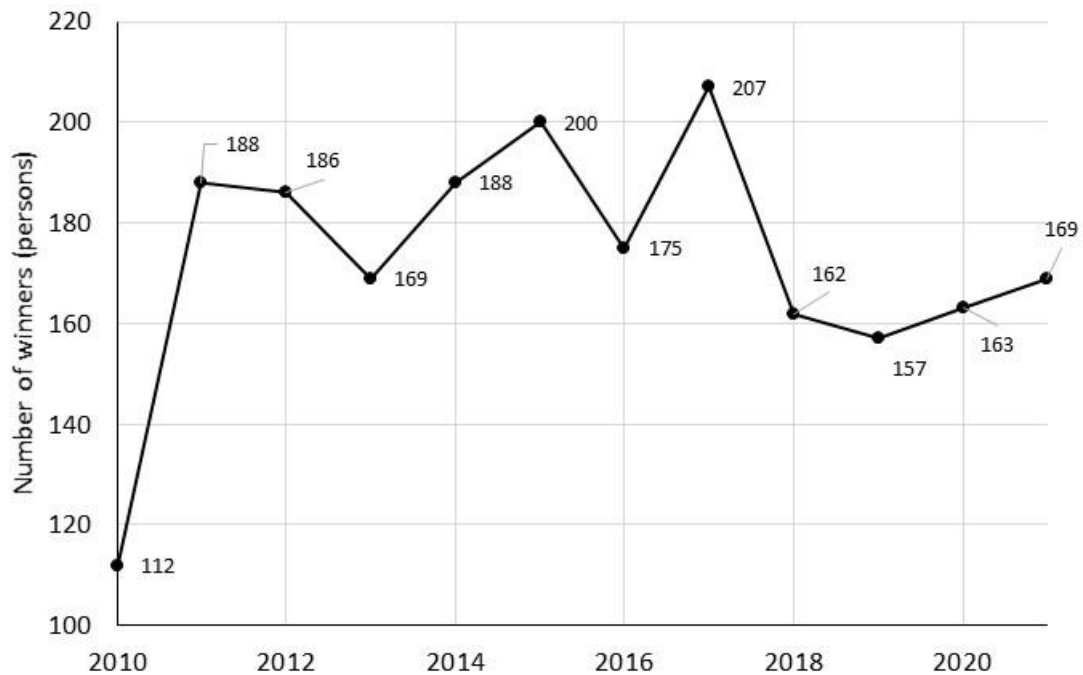
1. The number of János Bolyai Research Scholarship holders awarded between 2010 and 2021[9]

In 2021, applicants for a Bolyai Scholarship were awarded after an average of 15 years of HSB publication and 8 years after obtaining their PhD degree. The corresponding figures were 17 years (HSB) and 10 years for HASS (49 persons), 14 years and 9 years for LS (61 persons) and 13 years and 8 years for STEM (58 persons) (Table 2).

2 *2. Distribution of winners by field of study, average age, and number of years in publishing*

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9 János Bolyai Research Scholarship, Previous Awardees, 2021.

Field of science	Number of people (persons)	Average number of years since first publication according to HSB (year)	Average number of years since first publication according to Scopus (year)	Minimum age (years)	Average age (years)	Maximum age (year)
HASS	**49**	**17.2**	**10.0**	**33**	**41.0**	**45**
Linguistics and Literary Studies (HAS I.)	11	18.0	10.4	34	41.5	45
Philosophy and Historical Sciences (HAS II.)	20	17.7	10.6	33	40.8	45
Economics and Law (HAS IX.)	18	16.3	9.3	36	41.1	44
LS	**61**	**14.2**	**12.6**	**32**	**38.6**	**45**
Agricultural Sciences (HAS IV.)	10	14.3	11.8	32	38.6	44
Medical Sciences (HAS V.)	27	12.9	12.1	32	37.5	44
Biological Sciences (HAS VIII.)	24	15.5	13.4	34	39.8	45
STEM	**58**	**12.7**	**11.0**	**31**	**36.8**	**45**
Mathematical Sciences (HAS III.)	9	10.7	10.1	31	35.4	44
Technical Sciences (HAS VI.)	16	12.9	10.3	32	37.6	43
Chemical Sciences (HAS VII.)	16	12.7	11.3	31	36.2	45
Earth Sciences (HAS X.)	5	14.2	8.6	34	37.4	44
Physical Sciences (HAS XI.)	12	13.3	13.0	33	37.3	45
Total	**168**	**14.5**	**11.4**	**31**	**38.7**	**45**

Source: HSB, Scopus

The average age of the scholarship holders was 38.7 years, the youngest was 31 and the oldest was 45 years old.
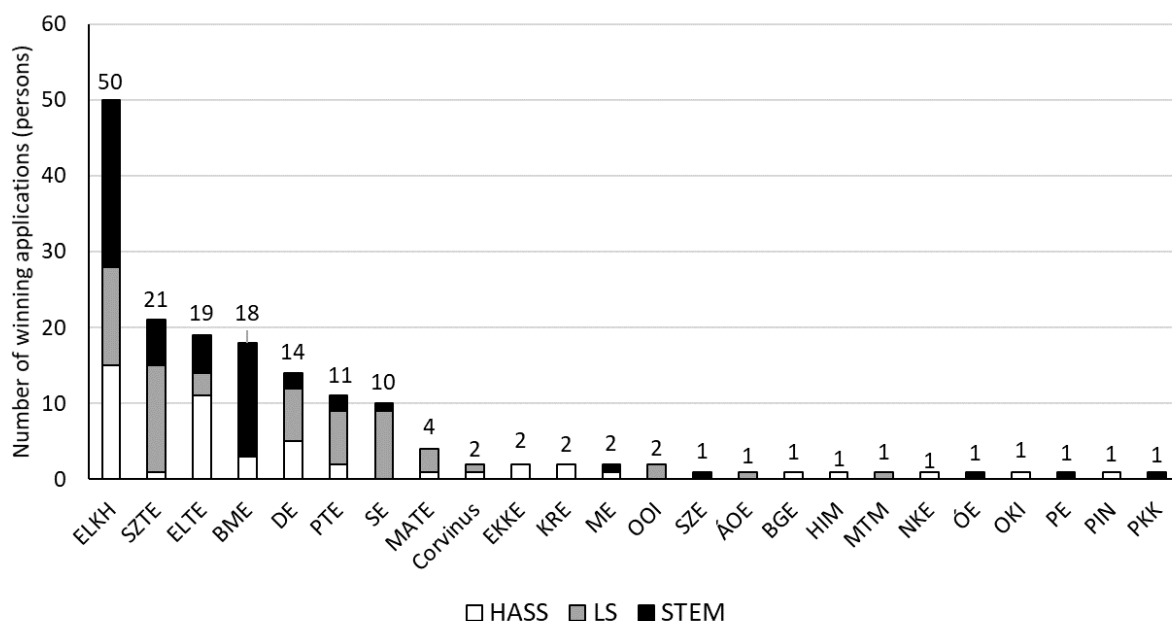
2. Distribution of 2021 Scholarship holders awarded, by institution[10]

Most of the winners came from ELKH (50 persons, 30%), SZTE (21 persons, 12%), ELTE (19 persons, 11%) and BME (18 persons, 11%) (Figure 2). There are also significant numbers of researchers from DE (14 persons), PTE (11 persons) and SE (10 persons).

Almost three quarters (73%) of the winning applicants were male. For HASS, the proportion of men was 61%, for LS 75% and for STEM, 81% of the scholarship holders surveyed.

On average, those with Scopus identifiers have 30 complete scientific publications, 420 references and an h-index of 9 according to the Scopus database (Table 3).

93% of the winning applicants (156 persons) have a Scopus identifier— i.e. at least one Scopus-indexed journal article, book or conference publication. In STEM and LS (one person with an incorrect identifier in LS), all of the scholarship holders, and in HASS 78% (38 out of 49 persons) of the scholarship holders are in the Scopus database.

The number of scholarship holders HASS research publications indexed by Scopus is nearly a third of the number of references and nearly a quarter and a sixth of the number of references of STEM and LS scholars, respectively. The specific excess of publications by STEM and LS scholarship holders can be partly explained by the higher number of co-authors. The average number of co-authored publications is 4 for HASS, 6 for STEM and 15 for LS.

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10 Abbreviations: University of Veterinary Medicine Budapest = UVMB (ÁOE); Corvinus University of Budapest = CORVINUS; Budapest Business School = BBS (BGE); Budapest University of Technology and Economics = BUTE (BME); University of Debrecen = UD (DE); Eötvös Loránd Research Network = ELRN (ELKH); Eötvös Loránd University = ELU (ELTE); Eszterházy Károly Catholic University = EKCU (EKKE); Military History Institute and Museum = MHIM (HIM); Károli Gáspár University of the Reformed Church in Hungary= KGURCHH (KRE); Hungarian University of Agriculture and Life Sciences = HUALS (MATE); Hungarian Museum of Natural Science = HMNS (MTM); University of Miskolc = UM (ME); University of Public Servic = UPS (NKE); Óbuda University = OU (ÓE); National Institute of Criminology = NIC (OKI); National Institute of Oncology = NIO (OOI); University of Pannonia = UP (PE); University of Pécs = UP (PTE); Periféria Policy and Research Center Kft. = PPRC (PKK); Institute of Political History Nonprofit Kft. = IPH (PIN); Semmelweis University = SU (SE); Széchenyi István University = SZIU (SZE); University of Szeged = USZ (SZTE).

3. Average of complete scientific publications and h-index by discipline according to the Scopus database

Field of science HAS class	Average of complete scientific publications (pcs / person)	Average number of references (pcs / person)	Hirsch index average	Average number of authors of publications (person / publication)
HASS	**11**	**115**	**4**	**4**
Linguistics and Literary Studies (HAS I.)	10	53	3	2
Philosophy an Historical Science (HAS II.)	13	210	5	6
Economics and Law (HAS IX.)	10	54	4	2
LS	**36**	**621**	**12**	**15**
Agricultural Sciences (HAS IV.)	34	363	10	11
Medical Sciences (HAS V.)	35	559	12	10
Biological Sciences (HAS VIII.)	37	796	14	22
STEM	**36**	**412**	**10**	**6**
Mathematical Sciences (HAS III.)	26	120	5	3
Technical Sciences (HAS VI.)	42	345	9	4
Chemical Sciences (HAS VII.)	37	583	13	7
Earth Sciences (HAS X.)	11	123	4	7
Physical Sciences (HAS XI.)	46	611	12	8
Average	**30**	**420**	**9**	**9**

Source: Scopus

Since 2000—the year of the first publication—the awarded applicants have published 4 698 publications according to Scopus, of which 10% are related to HASS and 45%-45% to LS and STEM. On average, they have won after 11 years of active publication, but some scholarship holders have been writing Scopus publications for 22 years. The average number of years of active publication for awarded applicants is 10 for HASS, 13 for LS and 13 for STEM.

The SCImago Journal & Country Ranking (SJR) is a free portal that provides scientific indicators for journals and countries based on Elsevier's Scopus database. The SJR is primarily used to show in which quartile a journal falls in a given field of research ranking: in the first quartile (0-25%, Q1, the first quarter from the top, where Q indicates the quartile), or in the second (Q2), third (Q3) or last quartile (Q4).

Of the successful applicants, 62% of their Scopus-ranked journal articles in the 10 years prior to the application were Q1, 23% Q2, 10% Q3, and 5% Q4 (Table 3). Higher Q-rating—Q1—is observed for LS and STEM, lower—Q4—ratings for HASS sciences.

On average, the scholarship holders have written 15 journal articles, according to Scopus. The average for STEM researchers is nearly 20 articles, 19 for LS and 6 for HASS (Table 4).

4. *Specific number and proportion of quartiles in journal articles by discipline*

Field of science, 2011-2020	Q1		Q2		Q3		Q4	
HAS class	pcs / person	%	pcs / person	%	pcs / person	%	pcs / person	%
HASS	**2.9**	**50.0%**	**1.5**	**26.8%**	**0.8**	**14.3%**	**0.5**	**8.9%**
Linguistics and Literary Studies (HAS I.)	0.8	32.1%	0.8	32.1%	0.4	14.3%	0.5	21.4%
Philosophy an Historical Science (HAS II.)	4.6	61.9%	1.4	18.4%	0.9	12.2%	0.6	7.5%
Economics and Law (HAS IX.)	2.2	38.1%	2.2	37.1%	1.0	17.1%	0.4	7.6%
LS	**12.5**	**67.0%**	**3.8**	**20.2%**	**1.5**	**8.0%**	**0.9**	**4.8%**
Agricultural Sciences (HAS IV.)	12.1	49.8%	5.3	21.8%	3.3	13.6%	3.6	14.8%
Medical Sciences (HAS V.)	12.9	72.0%	3.9	21.7%	0.7	4.1%	0.4	2.1%
Biological Sciences (HAS VIII.)	12.8	71.8%	3.0	17.0%	1.7	9.3%	0.3	1.9%
STEM	**11.9**	**59.9%**	**4.8**	**23.9%**	**2.3**	**11.8%**	**0.9**	**4.5%**
Mathematical Sciences (HAS III.)	5.9	43.8%	5.6	41.3%	1.3	9.9%	0.7	5.0%
Technical Sciences (HAS VI.)	6.7	41.8%	5.6	35.2%	2.7	16.8%	1.0	6.3%
Chemical Sciences (HAS VII.)	17.6	70.7%	4.7	18.8%	2.0	8.0%	0.6	2.5%
Earth Sciences (HAS X.)	2.6	38.2%	2.6	38.2%	1.6	23.5%	0.0	0.0%
Physical Sciences (HAS XI.)	19.9	68.7%	4.0	13.8%	3.4	11.8%	1.7	5.7%
Average	**9.5**	**61.9%**	**3.5**	**22.6%**	**1.6**	**10.4%**	**0.8**	**5.1%**

Source: SciVal

The primary purpose of scientific publishing is to communicate new scientific findings to the scientific community.[11] Co-authored publications are collaborative and thus, as a secondary goal, they facilitate information flow, productivity, informal professional discourses, scientific socialisation,[12][13][14][15] and can also be important for awareness, recognition, and resource

11 Molnár Pál – Tóth Edit – Pintér Henriett: A neveléstudomány társszerzői együttműködéseinek hálózatai hazai és nemzetközi folyóiratokban [Co-authorship networks in pedagogy in national and international journals], Jel-Kép. 7:4 18-33. 2018.
12 Katz, J. Sylvan – Martin, Ben R.: What is research collaboration? Research Policy, 26:1. 1–18. 1997.
13 Li, Eldon Y. – Liao, Chien Hsiang – Yen, Hsiuju Rebecca: Co-authorship networks and research impact: A social capital perspective. Research Policy, 42/9. 1515–1530. 2013.
14 Vinkler Péter: Tudománymetriai értékelés a leghatásosabb közlemények mutatószámaival. [Scientific metrics evaluation with indicators of the most effective publications.] Magyar Tudomány, 176/11. 1355–1364. 2015.
15 Godfrey, David: Leadership of schools as research-led organisations in the english educational environment. Educational Management Administration & Leadership, 44/2. 301–321. 2016.

acquisition.[16][17] Examining co-authorship is a widely used method for investigating scientific collaborations,[18] although it allows only a formal part of the collaborations to be revealed.[19] In our analysis, we distinguish the following co-authorships:

- publications prepared in international collaboration—at least one author from another country,
- only national collaboration—at least one author from another Hungarian institution—,
- only institutional collaboration—all authors from a given institution—,
- single-author communications.

5% of Scopus publications by scholarship holders were single-authored, more than a fifth (22%) were prepared by institutional collaboration, 30% by national collaboration and 42% by international collaboration (Table 4). For HASS sciences, the single authorship rate reaches 26%, while for LS 2% was measured. The highest percentage of international collaboration was 46% for STEM sciences, including 62% for physical sciences, and the lowest for HASS sciences (30%).

5. Number of publications and references by type of co-author for awarded applicants in Scopus between 2016 and 2020

Field of science	International collaboration			Only national collaboration			Only institutional collaboration			Single-authored		
HAS class	Ratio (%)	Publication (pcs)	Reference / Publication	Ratio (%)	Publication (pcs)	Reference / Publication	Ratio (%)	Publication (pcs)	Reference / Publication	Ratio (%)	Publication (pcs)	Reference / Publication
HASS	**29.9**	**69**	**11.5**	**28.6**	**66**	**5.8**	**15.1**	**35**	**6.6**	**26.4**	**61**	**2.9**
Linguistics and Literary Studies (HAS I.)	12.5	4	3.2	9.4	3	2.0	34.4	11	9.7	43.8	14	1.6
Philosophy an Historical Science (HAS II.)	46.3	44	12.7	40.0	38	6.3	3.2	3	20.3	10.5	10	1.1
Economics and Law (HAS IX.)	20.2	21	10.5	24.0	25	5.4	20.2	21	3.0	35.6	37	3.8
LS	**40.8**	**324**	**28.7**	**36.0**	**286**	**9.7**	**21.6**	**172**	**8.5**	**1.6**	**13**	**1.7**
Agricultural Sciences (HAS IV.)	36.7	66	19.7	41.1	74	6.6	21.7	39	6.5	0.6	1	0.0

16 Pavitt, Keith – Walker, William: Government policies towards industrial innovation: A review. Research Policy, 5/1. 11–97. 1976.

17 Okraku, Therese Kennelly – Vacca, Raffaele – Jawitz, James W. – McCarty, Christopher: Identity and publication in non-university settings: Academic co-authorship and collaboration. Scientometrics, 111/1. 401–416. 2017.

18 De Stefano, Domenico – Fuccella, Vittorio – Vitale, Maria Prosperina – Zaccarin, Susanna: The use of different data sources in the analysis of co-authorship networks and scientific performance. Social Networks, 35/3. 370–381. 2013.

19 Melin, Göran – Persson, Olle: Studying research collaboration using co-authorships. Scientometrics, 36/3. 363–377. 1996.

Field of science	International collaboration			Only national collaboration			Only institutional collaboration			Single-authored		
HAS class	Ratio (%)	Public ation (pcs)	Refere nce / Public ation	Ratio (%)	Public ation (pcs)	Refere nce / Public ation	Ratio (%)	Public ation (pcs)	Refer ence / Publi cation	Ratio (%)	Public ation (pcs)	Refere nce / Publica tion
Medical Sciences (HAS V.)	37.5	136	15.0	38.8	141	11.3	22.6	82	11.0	1.1	4	0.5
Biological Sciences (HAS VIII.)	47.3	125	48.2	27.3	72	10.2	22.4	59	6.8	3.0	8	2.5
STEM	**46.3**	**464**	**12.8**	**26.6**	**267**	**9.2**	**23.5**	**235**	**7.0**	**3.6**	**36**	**2.9**
Mathematic al Sciences (HAS III.)	48.8	39	2.0	18.8	15	3.0	8.8	7	1.4	23.8	19	3.2
Technical Sciences (HAS VI.)	35.8	126	11.6	28.4	100	8.0	32.7	115	5.4	3.1	11	1.7
Chemical Sciences (HAS VII.)	45.8	131	16.9	26.2	75	11.0	28.0	80	11.4	0.0	0	0.0
Earth Sciences (HAS X.)	33.3	9	13.1	48.2	13	8.3	11.1	3	5.3	7.4	2	1.5
Physical Sciences (HAS XI.)	62.0	160	12.9	24.8	64	10.6	11.6	30	2.4	1.5	4	5.2
Average	**42.3**	**857**	**18.7**	**30.5**	**618**	**9.1**	**21.7**	**440**	**7.5**	**5.4**	**110**	**2.7**

Source: Scopus

In the case of international collaboration, we can measure a high number of specific references in all disciplines. Between 2016 and 2020, the number of references per publication is 19 for international collaboration, 9 for national collaboration, 7.5 for institutional collaboration and 3 for single-author publications.

The functioning of the scientific publishing sector has been the subject of much debate both within and outside the scientific community, in particular with regard to the high profit margins of large publishers. In one of the largest science metrics databases, the Clarivate Analytics Web of Science (WoS), 45 million documents were indexed between 1973 and 2013. The analysis of publications shows that in the natural sciences, medical sciences, social sciences, and humanities

1. Elsevier,
2. Wiley-Blackwell,
3. Springer,
4. Taylor & Francis
5. and SAGE

have increased their share of published publications to the greatest extent, especially since the advent of digitisation (after 1990).[20]

These five publishers account for more than 50% of all journal publications published in 2013. They are most concentrated in the social sciences (top five publishers with 70% of

20 These Five Corporations Control Academic Publishing, Vocativ, 2015.

publications), while the humanities present a relatively independent, more fragmented picture (20% of the top five).

From 2016, the market share of a new publisher started to grow rapidly. The Swiss-based publisher is called Multidisciplinary Digital Publishing Institute (MDPI). MDPI is the publisher of open access—Gold Open Access—scientific journals. By October 2021, it has published 365 scientific journals, of which 159 (44%) are indexed by Scopus. The publisher's business model is based on the creation of fully open access, wide-range journals with fast processing times (Table 6) from submission to publication, and the article processing fees—CHF 500 to 2 400— are paid by the author.

6. MDPI journal processing time per journal (n=365)

	After submission, expected date of the first decision (day)	On average, how many days after the acceptance of a publication does the communication appear (day)
Average	17	4
Minimum	8	2
Maximum	56	19

Source: MDPI

The MDPI's business practices have led to significant growth, but also to criticism of peer review, alongside accusations of the quality of its publications and the subordination of academic functions to business interests.[21][22][23][24][25]

MDPI was included on Jeffrey Beall's list of[26] predatory, open-access predator publishing companies in 2014, but the publisher was removed from the list in 2015.

An analysis of Scopus publications among the winning applicants shows that the most common publishers (Figure 3) are

1. Elsevier,
2. MDPI,
3. Springer,
4. Wiley-Blackwell,
5. and the IEEE (Institute of Electrical and Electronics Engineers).

Over the last 5 years, MDPI has become the first among publishers.

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21 There is no black and white definition of predatory publishing. Impact of Social Sciences. 2020.

22 de Vrieze, Jop: Open-access journal editors resign after alleged pressure to publish mediocre papers. Science Insider, 2018.

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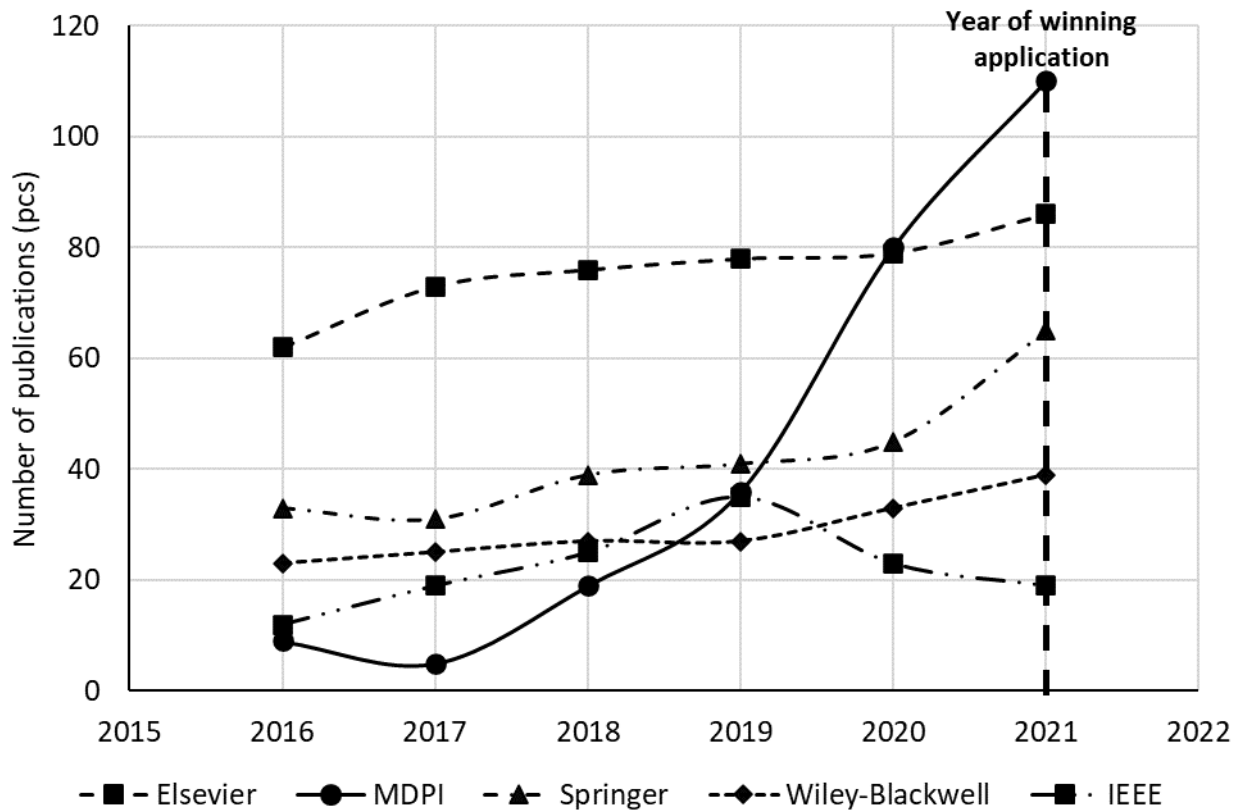
*3. Number and distribution over time of publications for the most common publishers between 2016 and 2021*

We examined what percentage of the awarded applicants wrote
- before the application,
- after winning the application,
- and did not write

MDPI publication.

31% of the successful applicants has written an MDPI publication as well before applying (Figure 4). The total number of these was 322 over their entire career.

The results of the Bolyai competition were announced in September 2021. Barely two months passed, and 32 people already wrote an MDPI publication. The average time between submission and publication was 40 days.
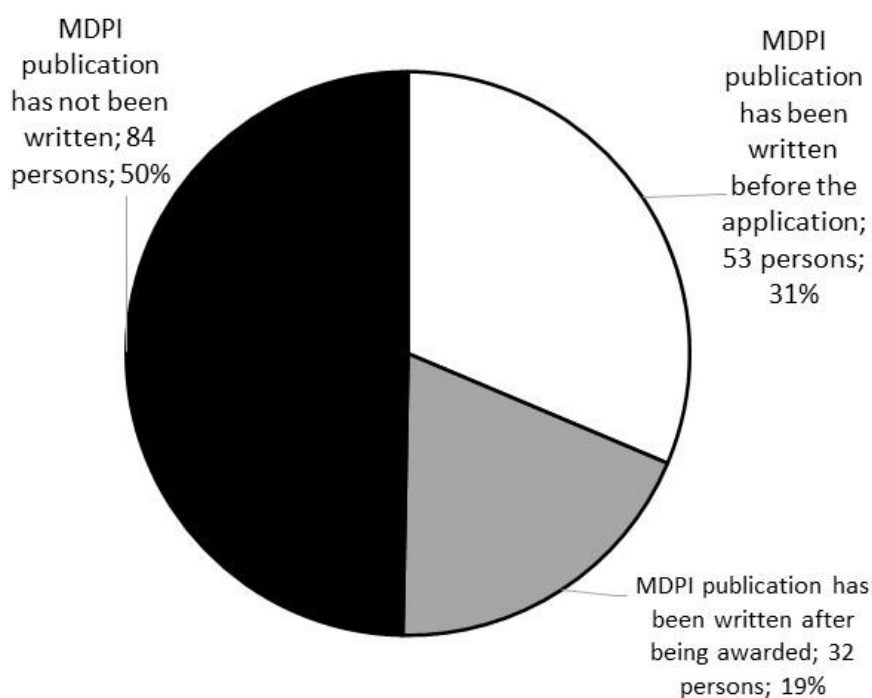
4. *Relationship between awarded applicants and the MDPI*

Half of the successful applicants (84) have not yet written an MDPI publication. These authors have been predominantly from the HASS field.

The most popular publishers when analysing the entire career have been Elsevier, Springer and MDPI (Table 7).

7. *Top publishers in different fields of science, based on the total scientific output of the scholarship holders*

Field of science, Class	Ranking	Publisher name	Number of publications (pcs)	Proportion of all journal articles (%)
HASS	**1**	**Elsevier**	**42**	**13%**
	2	**Wiley-Blackwell**	**24**	**7%**
	3	**Springer**	**21**	**6%**
	6	**MDPI**	**13**	**4%**
Linguistics and Literary Studies (HAS I.)	1	Hungarian Ethnographic Society	4	13%
	2	Budapest Tech Polytechnical Institution	3	10%
	3	Springer	2	7%
Philosophy and Historical Sciences (HAS II.)	1	Elsevier	27	17%
	2	Wiley-Blackwell	20	12%
	3	Frontiers Media S.A.	11	7%
	9	MDPI	5	3%
	1	Elsevier	15	11%

Field of science, Class	Ranking	Publisher name	Number of publications (pcs)	Proportion of all journal articles (%)
Economics and Law (HAS IX.)	2	Hungarian Central Statistical Office	10	7%
	3	Springer	10	7%
	7	MDPI	7	5%
LS	**1**	**Elsevier**	**160**	**11%**
	2	**Springer**	**133**	**10%**
	3	**MDPI**	**131**	**9%**
Agricultural Sciences (HAS IV.)	1	Elsevier	30	10%
	2	MDPI	30	10%
	3	Springer	27	9%
Medical Sciences (HAS V.)	1	Elsevier	83	15%
	2	MDPI	72	13%
	3	Springer	54	10%
Biological Sciences (HAS VIII.)	1	Springer	52	10%
	2	Elsevier	47	9%
	3	Wiley-Blackwell	47	9%
	4	MDPI	29	5%
STEM	**1**	**Elsevier**	**271**	**19%**
	2	**Springer**	**98**	**7%**
	3	**MDPI**	**98**	**7%**
Mathematical Sciences (HAS III.)	1	Springer	27	19%
	2	Elsevier	26	18%
	3	Academic Press	10	7%
Technical Sciences (HAS VI.)	1	Elsevier	56	18%
	2	MDPI	37	12%
	3	Springer	26	8%
Chemical Sciences (HAS VII.)	1	Elsevier	126	24%
	2	American Chemical Society	72	13%
	3	MDPI	40	7%
Earth Sciences (HAS X.)	1	Elsevier	8	16%
	2	Copernicus GmbH	4	8%
	3	Hungarian Central Statistical Office	4	8%
	4	MDPI	4	8%
Physical Sciences (HAS XI.)	1	Elsevier	55	14%
	2	Institute of Physics Publishing	33	8%
	3	Springer	26	6%
	7	MDPI	17	4%
Total	**1**	**Elsevier**	**473**	**15%**

Field of science, Class	Ranking	Publisher name	Number of publications (pcs)	Proportion of all journal articles (%)
	2	Springer	252	8%
	3	MDPI	242	8%

Source: Scopus

According to the HSB, the winning applicants in the field of HASS (with an average of 59 publications) have the highest number of complete scientific publications (Table 8). Here, the average number of publications is
- 30% (18 per person) are published in a journal published in Hungary, published in a Hungarian-language journal,
- 10% (6 per person) are books written or edited,
- 30% (18 per person) are conference publications published in a journal or book.

In STEM sciences, the share of conference publications reaches 27%, of which in technical sciences it exceeds 50% of total scientific publications.

8. *Average of complete scientific publications and h-index by discipline according to HSB*

Field of science HAS class	Average of total scientific publications (pcs)	I. Average of journal articles (pcs)	II. Average number of books (pcs)	III. Average number of book excerpts (pcs)	IV. Average number of conference publications (pcs)	Hirsch index average
HASS	**59**	**30**	**6**	**18**	**5**	**7**
Linguistics and Literary Studies (HAS I.)	66	32	8	22	5	7
Philosophy an Historical Science (HAS II.)	47	26	3	16	3	7
Economics and Law (HAS IX.)	69	33	8	19	9	8
LS	**46**	**39**	**1**	**2**	**4**	**13**
Agricultural Sciences (HAS IV.)	72	47	1	4	19	11
Medical Sciences (HAS V.)	36	35	0	1	0	13
Biological Sciences (HAS VIII.)	45	40	1	2	2	14
STEM	**48**	**32**	**1**	**2**	**13**	**10**
Mathematical Sciences (HAS III.)	29	22	2	1	5	6

Field of science HAS class	Average of total scientific publications (pcs)	I. Average of journal articles (pcs)	II. Average number of books (pcs)	III. Average number of book excerpts (pcs)	IV. Average number of conference publications (pcs)	Hirsch index average
Technical Sciences (HAS VI.)	63	29	1	1	32	9
Chemical Sciences (HAS VII.)	41	38	0	1	2	13
Earth Sciences (HAS X.)	54	27	2	14	11	8
Physical Sciences (HAS XI.)	50	39	0	1	10	12
Average	**50**	**34**	**2**	**7**	**8**	**10**

Source: HSB

4. Conclusion

The Bolyai János Research Scholarship, established to provide financial support for young talented researchers, was first awarded in 1998 by the Board of Trustees of the scholarship. Since then, some 3 400 people have been awarded the grant for 1, 2 or 3 years. The main aim of the scholarship is to help researchers to write a large-scale scientific study, to prepare them to apply for the title of doctor of the HAS and to encourage them to succeed in the research community in their home country.[27]

In 2021, 169 people were awarded the scholarship, after an average of 15 years of MTMT and 11 Scopus publications. The winners had 30 Scopus, 50 HSB scientific publications, and three-quarters were male in 2021. The most popular publisher was Elsevier, but the presence of MDPI has grown rapidly among the scholarship holders. The perception of MDPI is ambiguous, but according to a statement from the National Research, Development and Innovation Office (NRDI), the funding authority, a publication intended for consideration can be published by fully open access publishers for a fee in gold open access journals (which includes MDPI) where the publication is freely available and reusable on the journal's platform immediately after publication.[28] A high proportion of international (over 40%) and high (9 persons per journal) co-authorship is observed in LS and STEM disciplines. In contrast, the HASS scholarship holders attracted attention with a high number of book (6 papers) and book chapters (18 papers). Researchers in STEM, LS and HASS disciplines are undoubtedly characterised by different scientific manner, which are reflected in different publication strategies.[29] These metrics could form the basis for the development of a conscious talent management centre aimed at a carefully designed replacement researcher training programme.

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