Covid-19 in research funding applications submitted in 2021 Jasmiina Myllys, Sara Illman, Timo Lehtinen





Academy of Finland funds research related to Covid-19

- The Covid-19 pandemic has highlighted how important high-quality science and expertise are for welfare and society. A strong research base and the ability to use it have made it possible for different sectors to react quickly to the pandemic.
- Long-term research prepares us to tackle sudden crises. Research creates competence and ability to respond to challenges and thus advances society's ability to survive and think ahead.
- For further information on research funded by the Academy of Finland related to the Covid-19 pandemic and other societal crises and the utilisation of this research in society, visit <u>www.aka.fi/en/resilience</u>.



Background of the analysis

- In 2020, the Covid-19 pandemic and its consequences emerged as a new research topic in Finland and the whole world.
- A year ago, the Academy of Finland conducted an initial <u>analysis</u> that examined how the new research questions produced by the pandemic appeared in research funding applications submitted to 2020 calls. We analysed what kinds of perspectives and research areas researchers have applied in the Covid-19-related research to find solutions.
- The first analysis showed that researchers had posed Covid-19-related research questions in health sciences as well as in social sciences.
- Many of the first research questions have now been answered, and some of them have proved less important. On the other hand, new research questions have emerged.
- Therefore, we wanted to analyse how the field of Covid-19-related research has changed over the past year, and we decided to repeat the analysis with applications submitted in 2021.

Purpose and implementation of the analysis

- We examined how the appearance of the Covid-19 pandemic in applications submitted to the Academy of Finland and in the funding granted has changed in comparison to the previous analysis one year ago.
 - What themes emerge in 2021 applications?
 - What themes have been set aside compared to 2020 applications?
- We analysed applications submitted both to the Academy's autumn call and to special calls in 2021. All analysed calls are listed in appendix 1.
 - In the autumn call, funding can be applied for without thematic restrictions.
 - Special calls are used to grant funding that the Finnish Government has directed towards a specific theme, such as research related to the pandemic or climate change. These calls therefore set certain requirements for the application's theme.



Methods

- To identify applications where Covid-19 was a central research topic, we utilised a multi-method approach combining automated and qualitative methods. Multimethodology enabled both a faster process and a more creative qualitative analysis.
- Applications that passed both automated and qualitative screens were selected for analysis.
- We repeated the analysis using the same methods as in the analysis of 2020 applications in order for the results to be comparable.

Automated screen:

- The application's title, summary or keywords contain one of our Covid-19related search words*
- 2. The application's research plan contains Covid-19-related search words*

Qualitative screen:

- 1. Is Covid-19 a focus of the application's research questions or goals?
- 2. Would the application have been submitted to the Academy of Finland without the Covid-19 pandemic?



* Search words we used were coronavirus, covid-19, sars-cov-2 and other names for the Covid-19 virus.

Result 1: In how many applications was Covid-19 a central research topic?

•

	2021			2020		
Call	All analysed applications (number)	Covid-19 as a central theme (number)	Covid-19 as a central theme (%)	All analysed applications (number)	Covid-19 as a central theme (number)	Covid-19 as a central theme (%)
All analysed calls together	3,144	57	1.8%	3,417	108	3.2%
Autumn call*	2,713	46	1.7%	2,887	56	1.9%
Research Council for Biosciences, Health and the Environment	865	15	1.7 %	893	16	1.8 %
Research Council for Culture and Society	832	26	3.1 %	895	33	3.7 %
Research Council for Natural Sciences and Engineering	1,016	5	0.5 %	1,099	7	0.6 %
Other analysed calls together**	431	11	2.6%	528	52	9.8%

- The number of applications with Covid-19 as a central theme decreased approximately by half from 2020.
- In the autumn call, where research subjects are not restricted to a certain theme, the number of Covid-19-related applications decreased significantly less. In 2020 1.9% of applications in the autumn call were Covid-19-related, in 2021 1.7%.
- In 2021, the Academy opened only one thematic research funding call with a theme related to pandemics. In 2020, there were three such calls.

13/01/2023

* Includes the following calls: Academy Research Fellows, Postdoctoral Researchers, Academy Research Projects and Clinical Researchers.

** Other analysed calls are listed in appendix 1.

NB. Consortium applications in the analysis have been calculated by consortium, not by subproject. Only applications sent to the Academy of Finland have been included in the analysis of applications for international joint calls.



Result 2: Most common fields of research in Covid-19 applications



The figure only includes fields of research that occurred in at least 10% of the applications either in 2020 or in 2021. The applicant can choose 1–5 fields of research for their application. Fields of research are based on the Academy of Finland research field classification. For the purpose of this analysis, fields of research are aggregated to main fields.

Result 3: Occurrence of most common keywords in Covid-19 applications



Applicants can determine a set of keywords for their application. For the keyword analysis, we combined together all keywords from Covid-19-related applications and analysed their occurrence in the application texts. Some keywords in the figure might not be entirely related to the Covid-19 theme, as we looked for keywords in the entire application text, which also includes parts other than those describing the research. The figure only includes words that were used as keywords in both years. The word count demonstrates how many times, on average, each word has been used in one application in 2020 or in 2021. The figures for 2020 differ slightly from the previous analysis, as we developed the statistical methods used. Figures presented in this figure are comparable with each other.

ACADEMY OF FINLAND

Observations

Based on the results presented, we have made the following observations when comparing Covid-19-related applications in 2020 and 2021:

- The vocabulary used in Covid-19-related research plans has changed.
 - For example, the word "epidemic" was used in 2020 calls, but in 2021 the word used was "pandemic".
- The number of Covid-19-related applications has decreased.
 - Simultaneously, the funding granted to Covid-19-related research decreased from €20m to €12.5m.
- The focus of Covid-19-related research questions has shifted.
 - The change is visible in both the most common keywords and fields of research of the Covid-19related applications.
 - In Covid-19-related applications, the proportion of applications with biosciences and pharmacy as a field of research decreased compared to 2020. Conversely, applications with economics, public health research or social sciences as a field of research increased.
 - The occurrence of keywords "coronavirus", "biology" and "evolution" decreased, whereas "mobility", "media", "public health" and "pandemics" became more common.



Topics of Covid-19 applications 1/3

- Like in the analysis of 2020 applications, we wanted to analyse more extensively what kinds of perspectives and research areas researchers have applied in Covid-19-related research.
- The aim was to identify themes shared between the applications, i.e. research topics that multiple researchers have considered important. We compared these topics to the ones identified in the analysis of 2020 applications.
- For the analysis, we created an automated network where the applications were grouped based on their research field classifications. We analysed these automatically formed groups using qualitative methods and identified themes and topics represented in them.
- We identified eight different topics, which are presented on pages 11–18.



Topics of Covid-19 applications 2/3

- The research questions that can be identified within the topics, the keywords describing them and connections between topics are presented on the next pages.
- The descriptions allow us to form an understanding of the research questions that Finnish researchers identified and considered most important in the 2021 calls.

Topic

- 1. Biosciences and medicine
- 2. Societal functions
- 3. Politics and governance
- 4. Social dimensions of the pandemic
- 5. Mathematics and computational science
- 6. Language and culture
- 7. Impacts on public health
- 8. Materials science and technology



Topics of Covid-19 applications 3/3

- The figure shows in a simplified manner how the topics are connected to each other.
- The lines represent connections based on the fields of research of the applications in the topics. Each line represents one application.





Topic 1: Biosciences and medicine

- 14 applications in total
- Examples of topics:
 - Characteristics of the SARS-CoV-2 virus and the immune reaction caused by the virus
 - Antiviral medicine in preventing infection
- Emerging keywords:



- The most common research field in this topic was microbiology (in 10 applications).
- Other fields of research:
 - Biochemistry, biophysics
 - Biomedicine
 - Clinical medicine
 - Cellular and molecular biology
 - Systems biology, bioinformatics

For the keyword analysis, we combined together all keywords from Covid-19-related applications and analysed their occurrence in the application texts. Fields of research are based on <u>the Academy of Finland research field classification</u>. The applicant can choose 1–5 fields of research for their application. For the purpose of this analysis, fields of research are aggregated to main fields.



Topic 2: Societal functions

- 9 applications in total
- Examples of topics:
 - Resilience of the education system
 - Business environment in the post-pandemic world
- Emerging keywords:



- The most common research field in this topic was economics (in 6 applications).
- Other fields of research:
 - Public health research
 - Psychology
 - Business administration
 - Education

For the keyword analysis, we combined together all keywords from Covid-19-related applications and analysed their occurrence in the application texts. Fields of research are based on <u>the Academy of Finland research field classification</u>. The applicant can choose 1–5 fields of research for their application. For the purpose of this analysis, fields of research are aggregated to main fields.



Topic 3: Politics and governance

- 8 applications in total
- Examples of topics:
 - Maintaining wellbeing in a crisis
 - Fundamental rights in recovering from the crisis
- Emerging keywords:

- The most common research field in this topic was political science (in 7 applications).
- Other fields of research:
 - Law
 - Social sciences
 - Public health research



For the keyword analysis, we combined together all keywords from Covid-19-related applications and analysed their occurrence in the application texts. Fields of research are based on the Academy of Finland research field classification. The applicant can choose 1–5 fields of research for their application. For the purpose of this analysis, fields of research are aggregated to main fields.



Topic 4: Social dimensions of the pandemic

- 8 applications in total
- Examples of topics:
 - Changes in working life
 - Effects of the pandemic on leisure and wellbeing
- Emerging keywords:



- The most common research field in this topic was social sciences (in 8 applications).
- Other fields of research:
 - Human geography
 - Development research
 - Psychology

For the keyword analysis, we combined together all keywords from Covid-19-related applications and analysed their occurrence in the application texts. Fields of research are based on <u>the Academy of Finland research field classification</u>. The applicant can choose 1–5 fields of research for their application. For the purpose of this analysis, fields of research are aggregated to main fields.



Themes in topics 5–6

- The rest of the applications make up smaller topics with five or fewer applications.
- Topic 5: Mathematics and computational science
 - As the name of the topic suggests, applications represented mainly mathematics and computational science. Some research themes included in this topic were modelling and network analysis in the context of the pandemic.
- Topic 6: Language and culture
 - Fields of research in this topic included linguistics, women and gender studies and social sciences, for example. Research themes included narratives of crises and communication in a crisis.



Themes in topics 7–8

• Topic 7: Impacts on public health

 Applications in this topic represented public health research, social science and environmental health research, among others. An example of a research theme in this topic is long covid.

Topic 8: Materials science and technology

• The most common field of research in this topic was materials science and technology. Research themes in this topic included antiviral and antimicrobial materials, for example.



Comparison of topics from 2020 and 2021

When comparing topics from applications in 2020 and 2021, we noted the following:

- Research themes in Covid-19-related applications have remained similar. In both years, biosciences was the most prominent field of research in the largest topic. Also prominent in both years were clinical medicine, public health research and environmental health research.
- In 2020, the second largest topic was related to citizenship, and social sciences was the most prominent field of research in this topic. The second largest topic in 2021 had to do with societal functions, and economics had a strong multidisciplinary role in many research plans.

	Topics in 2020	Topics in 2021		
	1. Covid-19 and biosciences	1. Bioscieces and medicine		
	2. Covid-19 and citizenship	2. Societal functions		
	3. Impacts of Covid-19 on work and business	3. Politics and governance		
-	4. Impacts of Covid-19 on public health	4. Social dimensions of the pandemic		
	5. Covid-19 and public administration	5. Mathematics and computational science		
	6. Clinical Covid-19 research and environmental health	6. Language and culture		
	7. Covid-19 and computer and computational science	7. Impacts on public health		
	8. Covid-19, genetics and mental health	8. Materials science and technology		
	9. Covid-19 and materials- and nanoscience			



Summary 1/2

- The main observation is that the vocabulary and focus of covid-19-related research plans shifted between 2020 and 2021, even though the main topics were still similar.
 - In 2020, many of the research questions were related to the structure, function and spread of the SARS-CoV-2-virus itself and to developing pharmaceuticals. In 2021, the focus shifted to broader themes such as the societal impacts of the pandemic and the restrictions that were enforced.
 - At the same time the scope of the research questions broadened to include also other societal crises than pandemics. In many applications in 2021, Covid-19 was only one of the case examples among other crises.
 - The change is visible in both the most common keywords and the fields of research of Covid-19related applications.
 - In Covid-19-related applications, the proportion of applications with biosciences and pharmacy as a field of research decreased compared to 2020. Conversely, applications with economics, public health research or social sciences as a field of research increased.
 - The occurrence of keywords "coronavirus", "biology" and "evolution" decreased, whereas "mobility", "media", "public health" and "pandemics" became more common.



Summary 2/2

- Another main observation is that the number of applications with Covid-19 as a central theme decreased.
 - One potential reason for this is the fact that in 2021 the Academy of Finland opened only one thematic research funding call with a theme related to pandemics. In 2020 there were three such calls.
 - > Conversely, the number of Covid-19-related applications in the autumn call, where research subjects are not restricted to a certain theme, remained at the same level.
 - The thematic research calls in 2020 attracted a lot of applications related to biomedicine. This can be a factor in the shift of focus in the research questions of Covid-19-related applications.



Appendix 1. Calls included in the analysis

- Autumn call:
 - Academy Research Fellows, Postdoctoral Researchers, Academy Research Projects and Clinical Researchers
- Other calls:
 - Academy of Finland NIH joint call: thematic areas of the Finnish Research Flagships
 - Academy of Finland NSF joint call pilot: artificial intelligence and wireless communication technologies
 - Academy Programme: Critical Materials in Circular Economy of Cities
 - Finnish Centres of Excellence in Research 2022–2029 (invited applicants)
 - FIRI 2021 call: Non-roadmap research infrastructures
 - FIRI 2021 call: Research infrastructures on 2021–2024 roadmap and Finland's international RI memberships
 - Flagship Programme call for 2nd four-year term for Flagships selected in 1st and 2nd Flagship Programme calls
 - Research, Development and Innovation Programme ICT 2023: Frontier AI Technologies
 - Research, Development and Innovation Programme ICT 2023: Security and Privacy in Decentralised and Distributed Systems
 - Special funding for EuroHPC, quantum computing and high-performance computing
 - Special funding for research on key areas of green and digital transition 2021
 - Strategic research programme: Demographic Changes Causes, Consequences and Solutions (DEMOGRAPHY), invited applicants
 - Strategic research programme: Environmental and Social Links to Biodiversity Loss (BIOD), invited applicants
 - Strategic research programme: Pandemics as a Challenge for Society (PANDEMICS), invited applicants