Yields of the pandemic year:
Covid-19-based analysis of research funding applications in 2020
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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 www.aka.fi/en/research-funding/programmes-and-other-funding-schemes/academy-programmes/resilience

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Background

- In 2020, the Academy of Finland opened more than twenty different research funding calls, through which a total of EUR 400 million was channelled to research.

- The Covid-19 pandemic and its consequences emerged as a research topic in 2020. Internationally, researchers have been interested in studying both the virus itself as well as its effects on health, economy and society.

- This raised the question:

"How have Finnish researchers and the research funding field reacted to the pandemic and its consequences?"

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Task

- We decided to map how the Covid-19 pandemic appeared in the applications submitted to the Academy of Finland and in the funding granted. We wanted to examine the different perspectives and themes emerging within this research topic.

- We analysed the applications submitted both to the Academy's September call and to special calls in 2020.

  - In the September call, funding can be applied for without thematic restrictions.

  - Special calls are used to grant funding that the 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.

- This report does not include the special funding call related to the Covid-19 pandemic and its mitigation, for which a separate summary has been published (in Finnish): www.aka.fi/resilience

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Method

- In order to identify applications submitted to the Academy of Finland where Covid-19 is a central research topic, we utilised a multi-method approach combining automated and qualitative methods.

- Applications that passed both automated and qualitative screens were selected for analysis.

Automated screen:

1. The application's title, summary or keywords contain one of the following words: Covid-19, SARS-CoV-2, Corona virus.

2. The application contains at least 11 hits from these Covid-19 glossaries

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?

- Multimethodology enabled both a faster process and a more creative qualitative analysis.

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Results

- Covid-19 was a key research topic in 3.2% of all applications. The topic inspired both beginners and more experienced researchers.

- The largest number of applications on topics related to Covid-19 was received from the fields of **biomedicine, social sciences and microbiology**.

- Research topics highlighted areas such as vaccine and drug development, security of supply and crisis preparedness, the impact of the pandemic on work and employees in critical sectors, social inequality, mental health and welfare, and Covid-19 disinformation.

- The Academy of Finland funded these Covid-19 applications with a total of approximately **EUR 20 million**, and the funding focused in particular on drug development and research on societal resilience.

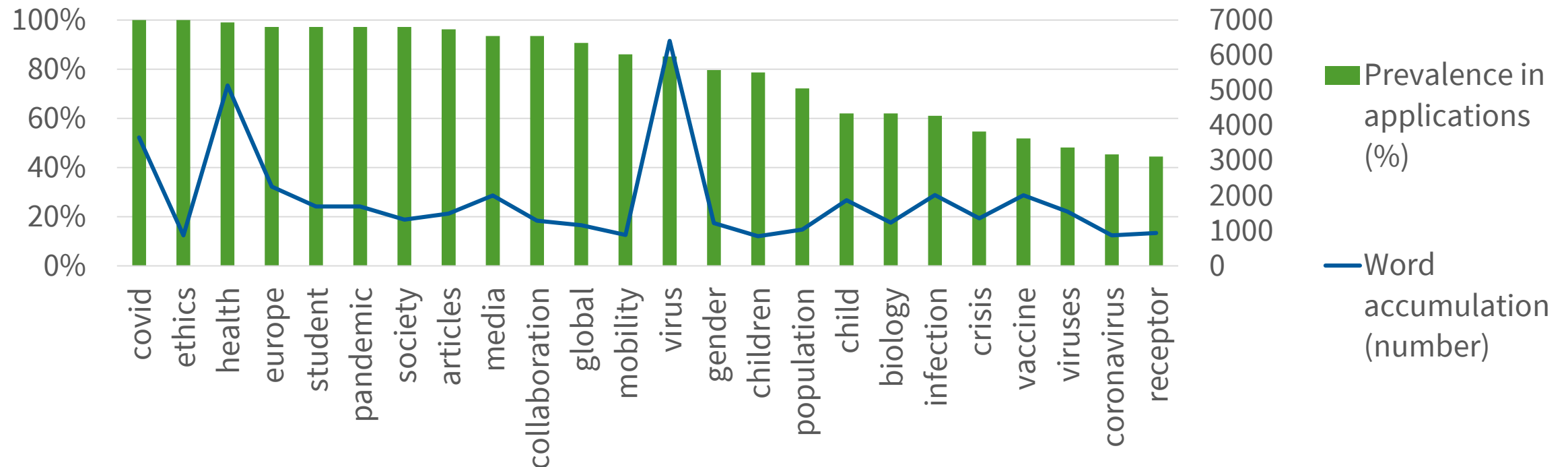- The results are presented in more detail on pages 7-24.

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

Call	All applications (number)	Covid-19 as a central theme (%)
All calls together	**3418**	**3.2%**
Semptember Call	**2887**	**1.9%**
Research Council for Biosciences, Health and the Environment	893	1.8%
Research Council for Culture and Society	895	3.7%
Research Council for Natural Sciences and Engineering	1099	0.6%

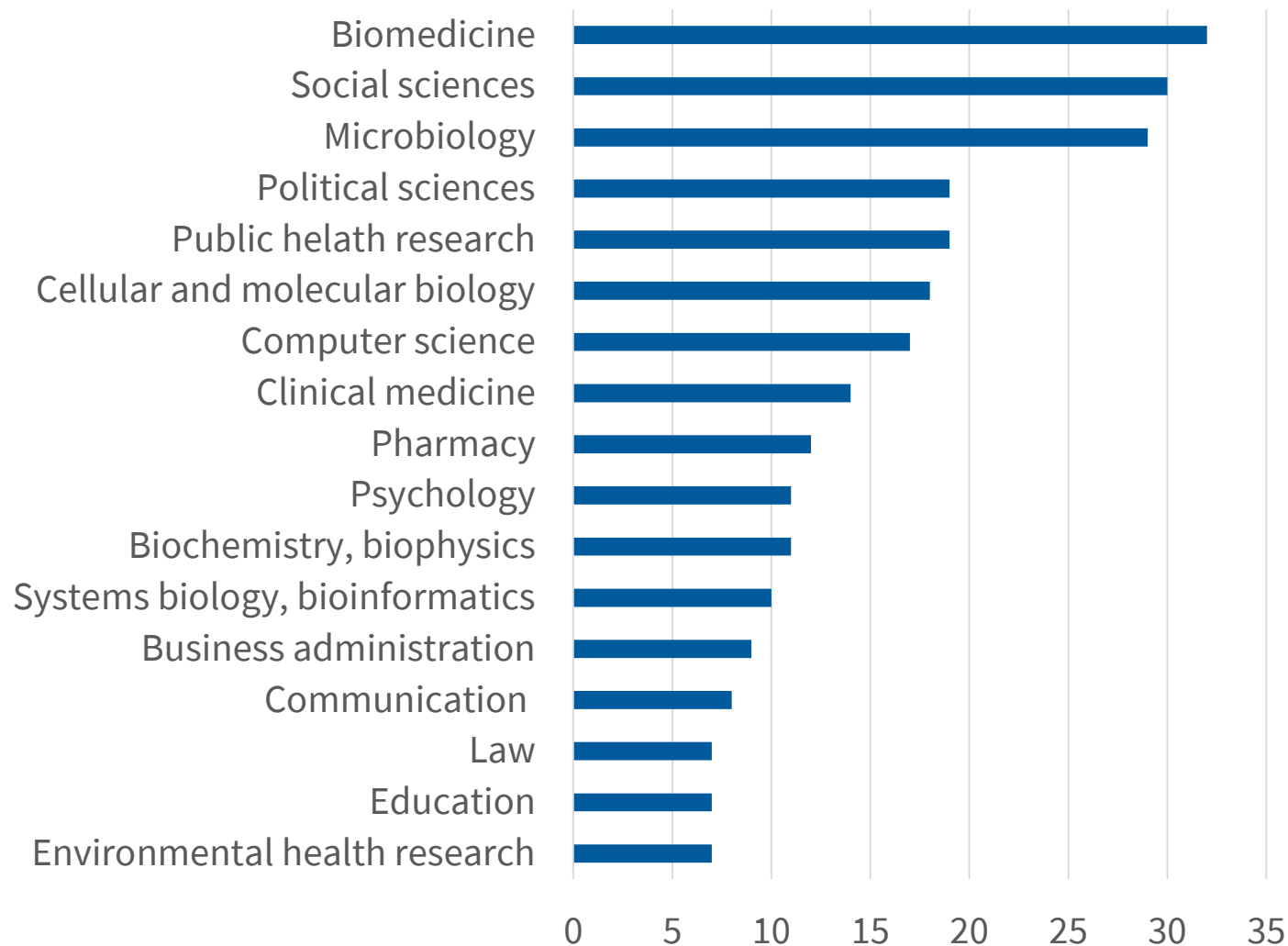| Call	All applications (number)	Covid-19 as a central theme (%)
Other calls together *	**531**	**9.8%**
Special funding for research into COVID-19 vaccines and pharmaceutical development	31	100.0%
FIRI: Research infrastructures as collaborative platforms	54	1.9%
FIRI 2020 call – roadmap for national research infrastructures	56	0.0%
Finnish Centres of Excellence in Research 2022–2029 (first stage)	185	0.5%
Special funding for system-level research into climate change mitigation and adaptation	51	0.0%
Special funding for research into crisis preparedness and security of supply	65	27.7%
Special funding for RDI partnership networks	71	0.0%
Finnish Flagship Programme 2020	18	5.6%

*) Excludes special funding for research on the COVID-19 epidemic and the mitigation of its effects

Most common keywords in Covid-19 applications

- Identification of the most frequently occurring words in the Covid-19 applications was automated.
- Each application contains the word 'covid', and it has been used more than 3,500 times between them.
- The most common word in the applications is 'virus', which is mentioned almost 6,500 times and occurs in 85% of applications.

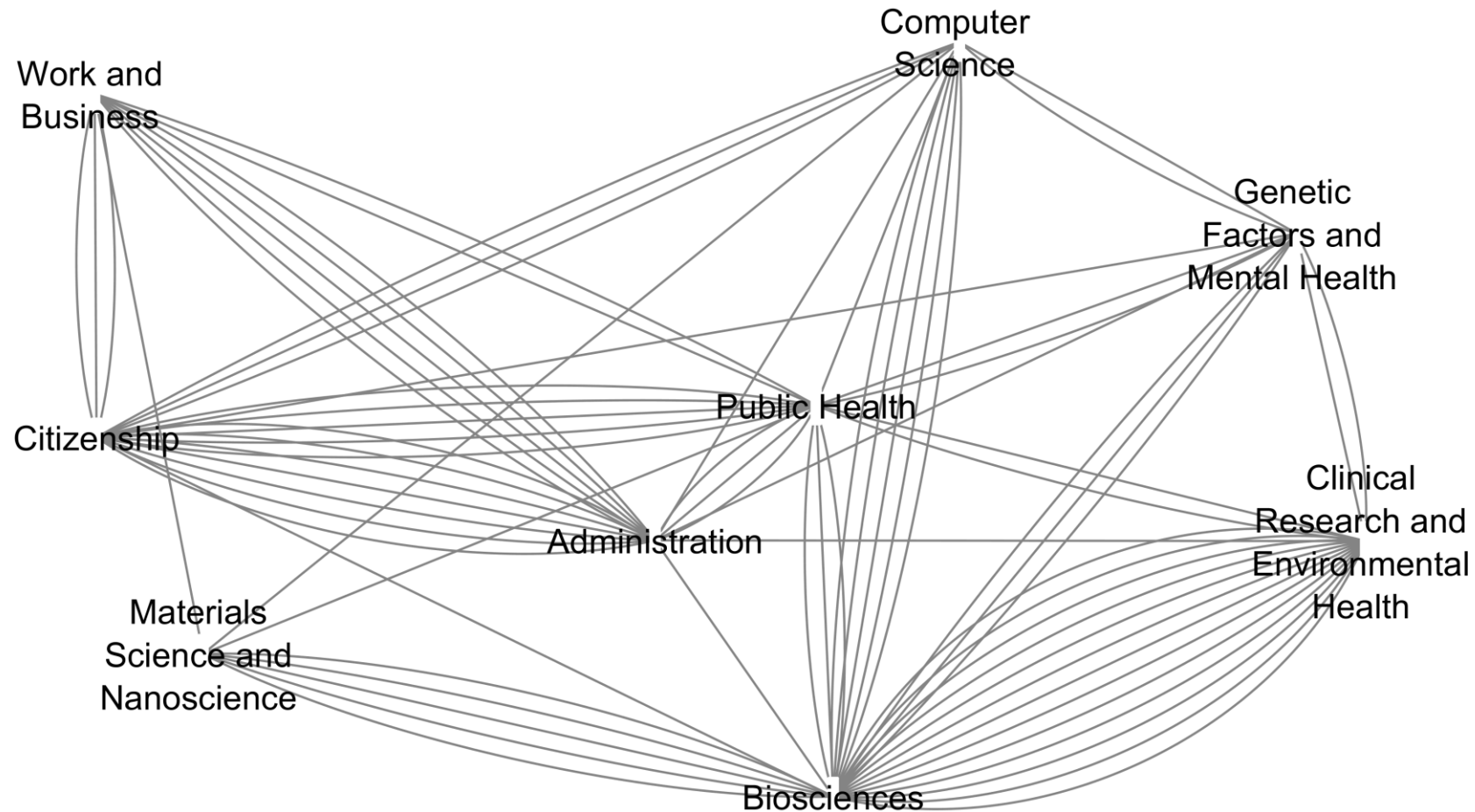# Fields of research in Covid-19 applications

- Biomedicine, social sciences and microbiology are the most common research fields in the Covid-19 applications.
- In each application, the applicant was allowed to report one to five research fields.

Topics of Covid-19 applications and themes that combine them

- We wanted to analyse more extensively what kinds of perspectives and research areas researchers have applied in the Covid-19-related research. The aim was to identify themes shared between the applications, i.e. research topics that multiple researchers have considered important.

- For the analysis, we created an automated network based on the applications' research field classifications and text mining results.

- We grouped the network automatically, and then identified topics from the groups formed (Figure on page 11).

  - We identified nine different topics, the largest of which are presented on pages 12-20.

- A set of applications linking two topics is labelled a theme.

  - Three themes that combine different topics will be analysed in more detail on pages 21-24.

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Topics of Covid-19 research

- The figure presents a simplified version of the network of topics and themes.
- Each line represents one application that combines two topics.

Topics of Covid-19 research

- The research questions that can be identified within the six most important Covid-19 themes and the keywords describing them are presented in more detail in the next section.

- The descriptions allowed us to form an understanding of the research questions that Finnish researchers identified and considered most important at the beginning of the pandemic.
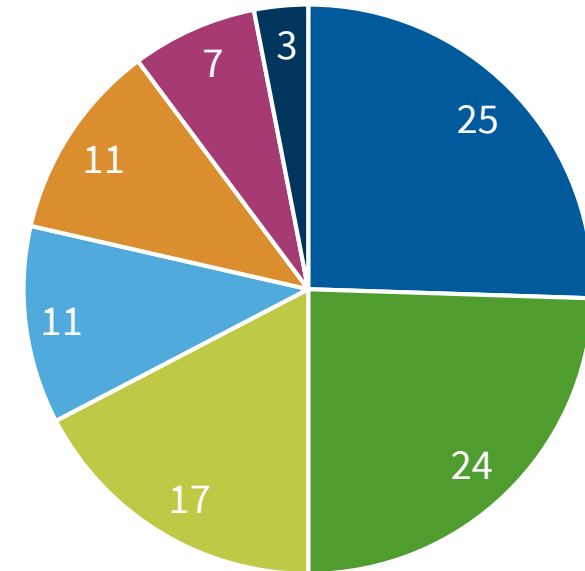
Topic	Applications
1. Covid-19 and biosciences	33
2. Covid-19 and citizenship	15
3. Impacts of Covid-19 on work and business	12
4. Impacts of Covid-19 on public health	10
5. Covid-19 and public administration	10
6. Clinical Covid-19 research and environmental health	9
7. Covid-19, computer science and computation	8
8. Covid-19, genetic factors and mental health	6
9. Covid-19, materials science and nanoscience	4

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Topic 1: Covid-19 and biosciences

- 33 applications in total

- Topics:
  - Immune response
  - Covid-19 test development
  - Vaccine and drug development
  - SARS-CoV2 virus incidence

- Emerging keywords:
  - viruses
  - biology
  - infection
  - pathogen
  - inhibitor
  - structural
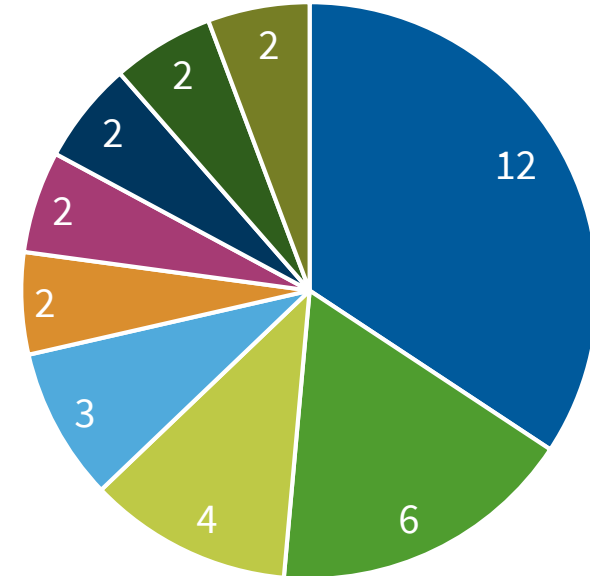 - antibodies
  - replication

- Fields of research:

Pie chart values: 25, 24, 17, 11, 11, 7, 3

- Biomedical sciences
- Microbiology
- Cellular and molecular biology
- Biochemistry, biophysics
- Pharmacy
- Systems biology, bioinformatics
- Chemistry

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Topic 2: Covid-19 and citizenship

- 15 applications in total
- Topics:
  - Inequality
  - Political polarisation
  - Agency
  - Trust in institutions
- Examples of keywords:
  - pandemic
  - society
  - politics
  - gender
  - media
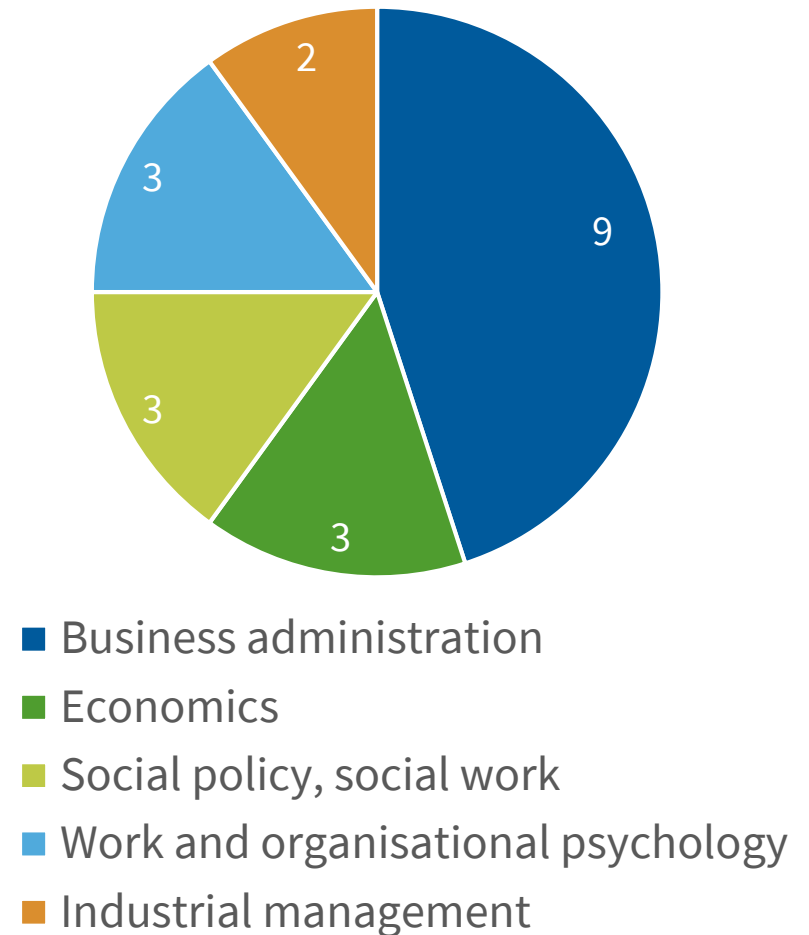 - trust

- Fields of research:

- ■ Social sciences
- ■ Political Sciences
- ■ Media and communication research
- ■ Women and gender studies
- ■ Anthropology and ethnology
- ■ Human geography
- ■ Informatics

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Topic 3: Impacts of Covid-19 on work and business

- 12 applications in total
- Topics:
  - Work changes
  - Crisis tolerance of the economy
- Emerging keywords:

  - crisis
  - entrepreneurship
  - communities

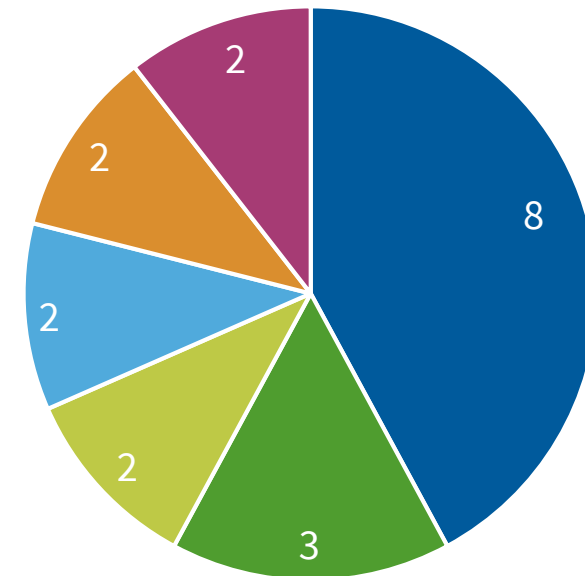 - strategy
  - social work
  - motivation

- Fields of research:

- ■ Business administration
- ■ Economics
- ■ Social policy, social work
- ■ Work and organisational psychology
- ■ Industrial management

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Topic 4: Impacts of Covid-19 on public health

- 10 applications in total
- Topics:
  - Welfare of different age groups, patient groups and occupational groups
  - Mental health, particularly the development and mental health of children and youth
- Emerging keywords:
  - health
  - child
  - public health
  - population
  - student
  - mental health
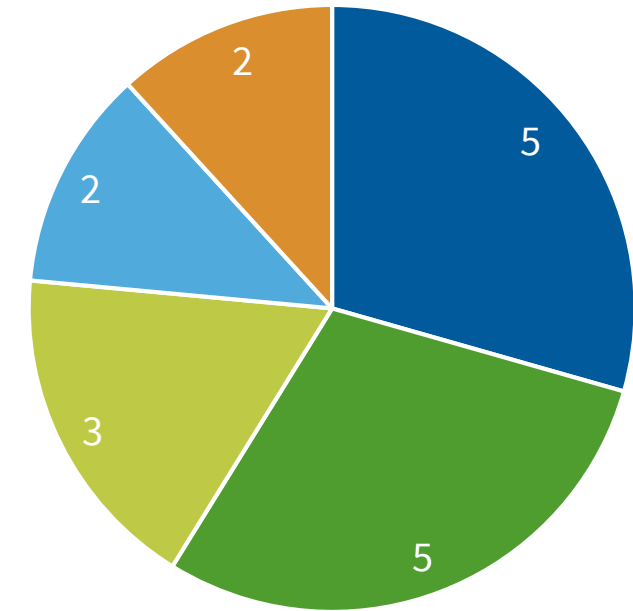
- Fields of research:

- Public health research
- Developmental and educational psychology
- Education
- General education and teacher education
- Sport science
- Nursing science

Topic 5: Covid-19 and public administration

- 10 applications in total
- Topics:
  - Resilience in economics and foreign trade
  - Administrative legal certainty, legitimacy, efficiency and flexibility
  - Health care system resilience
- Emerging keywords:
  - Europe
  - governance
  - economy
  - politics
  - resilience
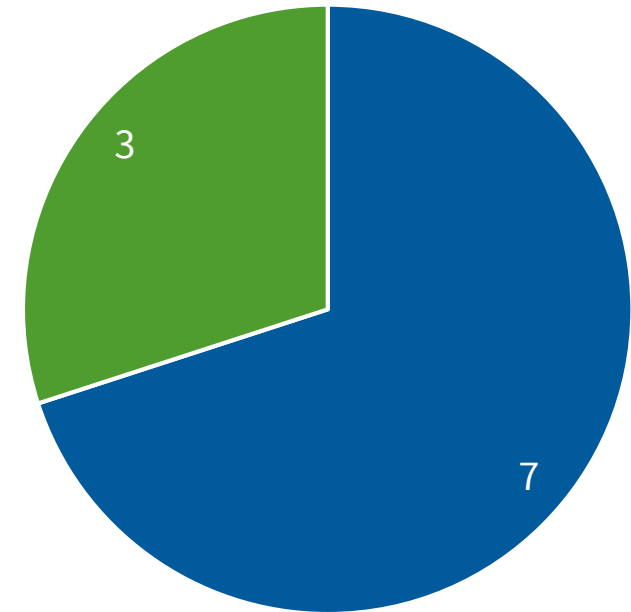 - climate

- Fields of research:

- ■ Public administration
- ■ Law
- ■ Practical philosophy
- ■ Information systems science
- ■ International relations

Topic 6: Clinical Covid-19 research and environmental health

- 9 applications in total

- Topics:
  - Hospital resources
  - Covid-19 and different patient groups
  - Covid-19 medicines and drug development
  - SARS-CoV-2 and the environment (waste water, UV radiation, aerosols etc.)

- Emerging keywords:

  - epidemiology
  - care
  - mortality
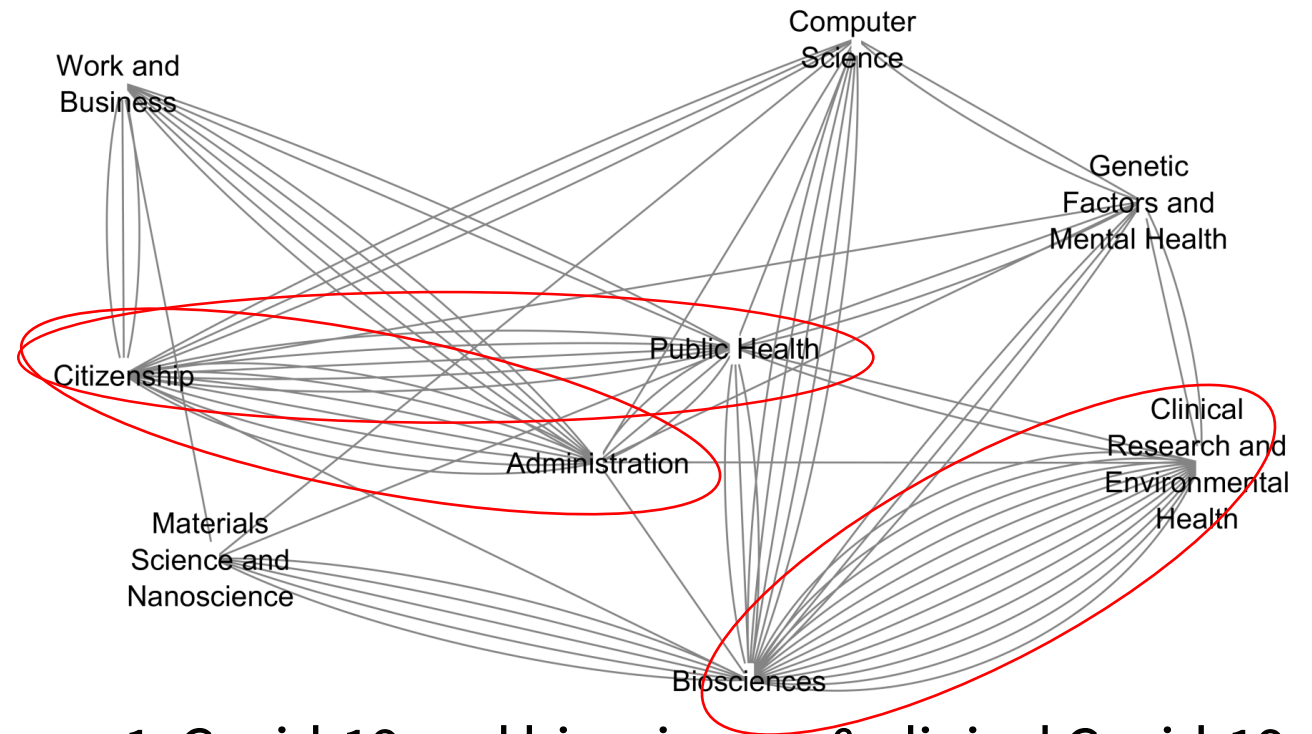 - infectious disease
  - surgery

- Fields of research:

- Clinical medicine
- Environmental health research

Themes that combine topics

- A theme consists of applications that connect topics to each other

- The themes describe the multidimensional nature of Covid-19 applications

- However, few applications can be categorised purely under a single topic

1. Theme 1: Covid-19 and biosciences & clinical Covid-19 research and environmental health

2. Theme 2: Covid-19 and citizenship & Covid-19 and public administration

3. Theme 3: Covid-19 and citizenship & impacts of Covid-19 on public health

Theme 1: Covid-19 and biosciences & Clinical Covid-19 research & Covid-19 and environmental health

- 12 applications in total
- Topics:
  - Hard and soft infrastructure
  - One health
  - Clinical medicine
  - Drug and vaccine development

- Examples of keywords:
  - virus
  - vaccine
  - infection
  - receptor
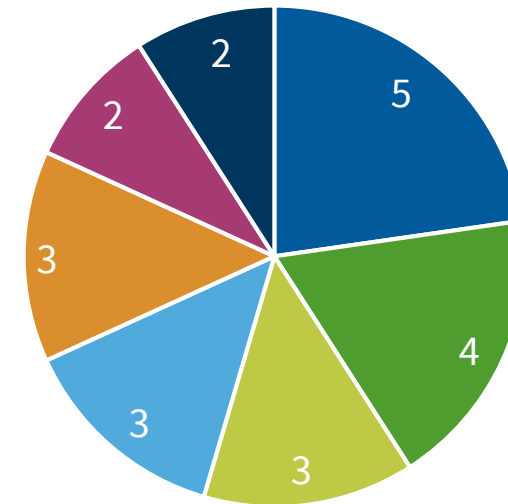 - gene therapy

- Fields of research:

- Biomedical sciences
- Clinical medicine
- Microbiology
- Environmental health research
- Cellular and molecular biology
- Pharmacy
- Systems biology, bioinformatics

Theme 2: Covid-19 and citizenship & Covid-19 and public administration

- 7 applications in total

- Topics:
  - System-level challenges
  - The role of scientific expertise in society
  - Structural changes

- Examples of keywords:
  - Europe
  - health
  - gender
  - global
  - politics
  - governance

- Fields of research:

- ■ Public administration
- ■ Social sciences
- ■ Economics
- ■ Law
- ■ Political Sciences
- ■ International relations
- ■ Practical philosophy

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Theme 3: Covid-19 and citizenship & Effects of Covid-19 on public health

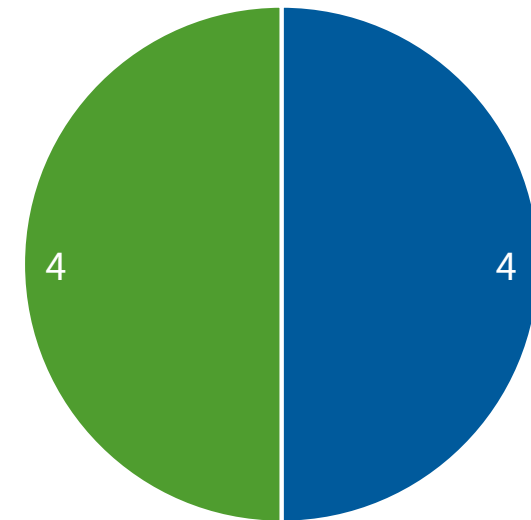- 5 applications in total
- Topics:
  - Comprehensive health and welfare
  - Digitalisation
  - Inequality
  - Good living

- Examples of keywords:
  - health
  - child
  - pandemic
  - society
  - mental health
  - public health

- Fields of research:

- Public health research
- Social sciences

Summary

- The Covid-19 pandemic has inspired researchers to study both the disease itself as well as the virus that causes it and the numerous impacts of the pandemic. This is an overview of the various topics that have emerged in the applications submitted to the Academy of Finland during the beginning of the pandemic in 2020.

- Science is rapidly reforming, and a comprehensive understanding of the subject can only be reliably established after some years when the long-term effects of the pandemic become visible.

- In addition to mapping the diversity of Covid-19 pandemic research, the aim of this study has been to develop a multi-method model, which can continue to be used in analysing themes occurring in the Academy of Finland's calls.