

1. Investigating pandemic long-term effects in four research areas

1.1. Basic and translational research on post COVID

Severe fatigue with all its consequences for the quality of life of those affected is not a clinical picture that has recently emerged with the SARS-CoV-2 pandemic. Chronic fatigue syndromes are known as a consequence of many infectious diseases, e.g., EBV infections, but also as a consequence of autoimmune diseases. However, due to the high number of cases of COVID-19 disease, this condition has become a phenomenon with a substantial impact on health care.

Research into pathomechanisms

In spite of decades of research, there is still only rudimentary knowledge on the pathogenesis of chronic fatigue syndrome. There is no therapeutic option to date; up until now, not even randomized controlled pathophysiology-driven trials have been completed. Complicating matters further, fatigue is the most important symptom of post COVID disease, but not the only one. Exercise intolerance, memory, concentration and sleep disturbances, taste and olfactory disturbances, dyspnea, and various forms of cardiac arrhythmias also play a role. It is likely that different pathomechanisms underlie different symptomatology, requiring different therapeutic approaches.

Better characterization of the disease and identification of targets for therapeutic approaches

Therefore, this project call aims to advance pathogenetic and immunological research on well-characterized patient cohorts in order to achieve a better characterization of post COVID disease on the one hand and to find targets for therapeutic approaches on the other. Therapeutic studies are eligible for funding within the scope of proof-of-concept studies with demonstrated feasibility in the specified project timeframe.

Preclinical model research with high translational potential

Experimental, preclinical model research for a better pathophysiological understanding of post COVID and with a high translational perspective are encouraged as well.

1.2. Health services research with regard to the long-term impacts of the pandemic

With long COVID and post COVID a new disease pattern has emerged in the course of the SARS-CoV-2 pandemic, which poses enormous challenges to the German health care system. In addition, the pandemic has led to changes in the area of health care. The subject of health services research is the “last step” of the health care system, which means that it is characterized by its particular proximity to everyday patient care. In the context of research on long/post COVID and other long-term impacts resulting from the pandemic, the following research questions are to be systematically addressed - methodologically diverse and interdisciplinary connected:

Health care needs, health care situation and patient pathways

With regard to the care of patients with long/post COVID or with regard to other pandemic-related long-term impacts, it is necessary to go beyond epidemiological and biomedical studies and collect data on healthcare needs and preferences as well as the experiences of patients and their relatives or the family and social environment concerning the long-term impacts and the provided healthcare. Epidemiological studies can also contribute to describing the health care situation and deriving needs for action. In particular, the dissemination and use of evidence-based findings on the diagnosis and treatment of e.g. long/post COVID in everyday health care and the design of patient-oriented patient pathways across disciplines (e.g., general medicine, pediatrics, neurology, child and adolescent psychiatry, and youth welfare) and sectors (e.g., primary care, acute inpatient care, rehabilitation) are

of great interest. In this context, questions of securing health care close to home, if necessary with the help of digital technologies, are also relevant.

Medical sociological and medical psychological aspects

Medical sociological and medical psychological aspects of long/post COVID care, but also of care for other pandemic-related long-term impacts, are also largely unexplored. This includes studies on health inequalities according to socioeconomic status (housing situation, employment status, migration background) with regard to disease risks, disease severity, and chances of recovery as well as with regard to utilization behavior and access to care (access barriers, etc.). Furthermore, communication between physicians and patients is particularly challenging in the presence of large uncertainty regarding evidence-based diagnostic and treatment recommendations, especially in long/post COVID. While the information needs of patients are maximally high, the competences and information situations on the part of the caregivers are often low at the same time. The associated challenges and communication strategies are largely unexplored.

Social acceptance and health literacy-sensitive communication

Additionally, a lack of acceptance of longer term and persistent courses of the disease is observed within the health care system, at the workplace, in educational and training institutions, as well as in the social environment. Moreover, as in comparable cases of chronic illness, there is a risk of stigmatization, especially in cases of diagnosed long/post COVID. Strategies and interventions of societal education are needed that use existing scientific knowledge of health and risk communication. In terms of health literacy-sensitive communication, communication strategies need to be aligned with target groups.

How healthcare facilities deal with the high demand for health care

Finally, it is also highly relevant to look at the professions within the health care system itself that are involved in providing health care. In principle, this applies to all the professions that work jointly in this field. Their work situation or work environment, but also their individual competencies and their professional understanding of the profession play a central role in providing high-quality healthcare to a large and growing number of patients with long/post COVID or other pandemic-related diseases. The best care infrastructure loses value if there is a lack of people who can use and develop it in a high-quality and professional manner. This situation also becomes more acute in quantitative terms when healthcare facilities have to deal with a shortage of staff in times of high demand for health care.

1.3. Interdisciplinary research on pandemic long-term impacts on living and working conditions

For the sociological assessment and analysis of the pandemic in general and for research on the social impacts of long/post COVID in particular, as well as the further long-term impacts, there is a lack of sociologically relevant and meaningful data sets on a local, national, and global scale. This is a significant deficit, and it is essential to collect relevant data with respect to work and life environments, to workplaces, and neighborhoods, to family relationships, and to generational relationships by using standardized or more open qualitative methods.

Therefore, a comprehensive strategy of data collection is needed in the context of research on the long-term impacts of the pandemic in order to be able to draw a larger, (socio-)medical as well as societal picture - both with a retrospective view on the course of the pandemic and with a view on the "societal future" (incl. estimation of follow-up costs) of long/post COVID and the further long-term impacts. There is no doubt that, in addition to the medical aspect of the disease, social aspects also

play a central role in the lives of affected individuals, in the everyday lives of their relatives, and also in the professional environment of their colleagues or employers.

Interdisciplinary research dimensions

The following research questions are to be addressed systematically, methodologically diverse, and connected in an interdisciplinary way:

- How conducive or obstructive are specific social contexts to chronification of e.g. long/post COVID or to its cure/mitigation? Where does illness begin and end, or where does health end and begin?
- What do the SARS-CoV-2 pandemic, long/post COVID and other pandemic-related long-term impacts imply for companies and employees in general? Which groups of employees and status groups, which sectors and branches of the economy have to struggle with long-term impacts in a particular way?
- Can the effects of COVID-19 or long/post COVID and other pandemic-related long-term impacts be more accurately described and typified to also be able to answer the question whether common patterns with other chronic conditions in the workforce can be identified?
- The question of transfer and communication (see also the remarks in 1.2 health services research) of scientific knowledge plays a central role. How can we, on the part of the scientific community, communicate long/post COVID or other diseases and long-term impacts resulting from the pandemic, for example to employees, trade unions and employers, but also in social contexts of migration?

Challenges for the social sciences

In summary, this means for this field of research: the role of the social sciences is firstly to generate and process data extensively and in a quality-assured manner in order to shed light on as many aspects of the disease as possible on the basis of a solid database. Secondly, the social background of COVID-19 or long/post COVID as well as other long-term impacts must be systematically recorded in order to develop social and medical knowledge from the pandemic. Thirdly, significantly improved communication tools are needed. Preference should be given to projects that combine these three tasks. These may include projects that link to existing data sets, cohorts, and qualitative case studies. In this way, a complex understanding of e.g. long/post COVID can emerge through collaborative interdisciplinary research. In this way, research projects aim to address health as a high social and public good in times of profound social transformations.

1.4. Mental health of children and adolescents and their families

Children and adolescents are one of the groups that have been, and continue to be, particularly affected by the global mental health impact of the SARS-CoV-2 pandemic, which is a cause for concern. Initial systematic reviews suggest a significant increase in suicide attempts, depressive disorders, eating disorders, and anxiety disorders in the age group up to 18 years (up to a 30% increase compared to pre-pandemic levels) as well as lack of learning progress during the lockdowns (loss of about 3 percentile points). In addition, some studies show that children and adolescents from households with lower levels of education are even more affected. In addition, many parents face unusual challenges and stress during the pandemic. High levels of parental stress may also adversely affect children's physical and mental health, as parents are not sufficiently available as regulators. The overall impact

of the pandemic on children and adolescents may be long-lasting and may have long-term adverse effects on further social, cognitive, and psychological development.

Designing (preventive) intervention to improve mental health based on strong empirical evidence

In order to understand which factors negatively and positively influence children's mental health, learning behavior, and social skills during and after the pandemic, strong empirical evidence is needed. Only then particularly vulnerable (or particularly resilient) subgroups can be identified and appropriate interventions (including preventive ones) can be designed to improve the mental health of children and adolescents in crisis situations. To date, most studies have focused on adults. The few studies on the mental health of children and adolescents, often do not take into account different developmental stages, data are usually collected only with the help of (online) questionnaires using (online) questionnaires and from only one source of information, usually an external medical history and the psychosocial circumstances of the family, the school situation, and information on previous illnesses are often not included.

Systematic approach to research questions

The following research questions need to be addressed systematically:

- **How has child and adolescent mental health evolved during the pandemic and what are important moderators and mediators?** Carefully designed studies with larger samples that include diverse, well-characterized subgroups and taking into account the course of the SARS-CoV-2 pandemic (pre-post, at multiple time points) are needed. Data collection via interviews and standardized surveys, health service utilization, and access to health care **as well as intra- and extra-familial psychosocial stress need to be investigated.**
- **How should the impact of the SARS-CoV-2 pandemic on the mental health of mothers and fathers on the longitudinal development (psychological, cognitive, social) of their children be assessed?** Developmental trajectories over multiple time points need to be considered. The intergenerational effects of the SARS-CoV-2 pandemic on physical and mental health need to be assessed.
- **How can we develop and implement effective surveillance and screening programs to identify children at risk early and strategically?**
- **How can we design relevant support programs including prevention/early intervention, telemedicine interventions to reach them at an early stage in order to strengthen the resources especially of socially disadvantaged children and their families and to help them to cope with their mental, social, and school-related problems?**