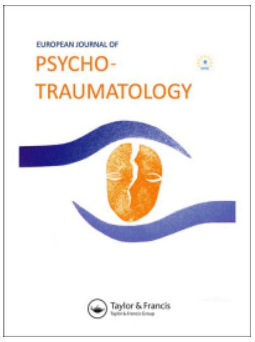

European Journal of Psychotraumatology

ISSN: 2000-8066 (Online) Journal homepage: www.tandfonline.com/journals/zept20

Co-RESPOND: a federated network of cohorts on mental health and adversity during the COVID-19 pandemic. Challenges, solutions and recommendations for retrospective data harmonization

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To cite this article: Papoula Petri-Romão, Jutta Stoffers-Winterling, Charlotte Doerschner, Jocelyne Jurgeit, Philipp Gödde, Irwin Hecker, Maria Melchior, Diana Czepiel, Anke Witteveen, Els van der Ven, Marit Sijbrandij, Roberto Mediavilla, José Luis Ayuso-Mateos, Pierre Smith, Vincent Lorant, Anna Monistrol Mula, Josep Maria Haro Abad, Katalin Gémes, Ellenor Mittendorder-Rutz, Matteo Monzio Compagnoni, Antonio Lora, Giulia Caggiu, Claudia Conflitti, Raffael Kalisch & Klaus Lieb (2025) Co-RESPOND: a federated network of cohorts on mental health and adversity during the COVID-19 pandemic. Challenges, solutions and recommendations for retrospective data harmonization, European Journal of Psychotraumatology, 16:1, 2517920, DOI: 10.1080/20008066.2025.2517920

To link to this article: https://doi.org/10.1080/20008066.2025.2517920

EUROPEAN JOURNAL OF PSYCHOTRAUMATOLOGY
2025, VOL. 16, NO. 1, 2517920
https://doi.org/10.1080/20008066.2025.2517920

SHORT COMMUNICATION

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Co-RESPOND: a federated network of cohorts on mental health and adversity during the COVID-19 pandemic. Challenges, solutions and recommendations for retrospective data harmonization

Papoula Petri-Romão [a*], Jutta Stoffers-Winterling [a*], Charlotte Doerschner[a], Jocelyne Jurgeit[a], Philipp Gödde[a], Irwin Hecker[b], Maria Melchior[b], Diana Czepiel[c], Anke Witteveen[c], Els van der Ven[c], Marit Sijbrandij[c], Roberto Mediavilla[d,e,f], José Luis Ayuso-Mateos[d,e,f], Pierre Smith[g,h], Vincent Lorant[h], Anna Monistrol Mula[i,e], Josep Maria Haro Abad[j,e], Katalin Gémes[k], Ellenor Mittendorder-Rutz[k], Matteo Monzio Compagnoni[l], Antonio Lora[m], Giulia Caggiu[l,m], Claudia Conflitti[l], Raffael Kalisch[a,n] and Klaus Lieb[a]

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ABSTRACT

Background: The SARS-Cov-2 pandemic was associated with a substantial rise in trauma and stressor exposure. The Co-RESPOND consortium (part of the EU horizon 2020-funded RESPOND project) has been initiated to study the impact on mental health, using longitudinal data of separate international cohorts.

Aims: The Co-RESPOND initiative aims to retrospectively harmonize mental health and resilience data of ongoing longitudinal cohort studies at the individual participant level; to create an interoperable network of cohorts within a secure environment; to manage these data along with harmonization products (e.g. transformation procedures and variable dictionaries) according to the FAIR principles; and to keep this network live in order to add new data waves or to be joined by new cohorts.

Methods: Data were harmonized retrospectively according to the Maelstrom guidance. A federated data network (FDN) was created using the OBiBa software suite.

Results: To date, Co-RESPOND consists of nine European cohorts and one global cohort, including 50,885 individual participants. This paper presents Co-RESPOND as a case study for retrospective harmonization of decentralized data where teams collected and transformed data without prior coordination, facing methodological as well as regulatory challenges. The process of this project is outlined in detail, so it could be applied by other researchers for future projects. Its outcomes and the resulting data harmonization products are presented.

Conclusions and outlook: The harmonized data are now ready to be shared with external partners for analyses, and Co-RESPOND is open for more partners to join. Lessons learned throughout the project will be reported, and established classification standards will be recommended for use to generate data sets that are available for joint analyses from the start.

Trial registration: ClinicalTrials.gov identifier: NCT04556565.

Co-RESPOND: Una red federada de cohortes sobre salud mental y adversidad durante la pandemia COVID-19. Desafíos, soluciones y recomendaciones para la armonización de datos retrospectivos

Antecedentes: La pandemia de SARS-Cov-2 se asoció con un alza importante de la exposición a trauma y factores estresantes. El consorcio Co-RESPOND (parte del proyecto RESPOND

ARTICLE HISTORY
Received 16 October 2024
Revised 27 May 2025
Accepted 2 June 2025

KEYWORDS
Mental health; adversity; stressors; resilience; COVID-19; retrospective data harmonization; cohort study; federated data network; data sharing; FAIR publication

PALABRAS CLAVE
Salud mental; adversidad; estresores; resiliencia; COVID-19; armonización de datos retrospectivos; estudio de cohorte; red federada de datos; intercambio de datos; datos FAIR

HIGHLIGHTS

- Longitudinal cohort data collected during the COVID-19 pandemic hold an extraordinary opportunity to study the impact of elevated trauma and stressor prevalence on trauma and mental health.
- This project aims to retrospectively harmonize, i.e. transform, already collected data of originally separate cohorts in a way

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/20008066.2025.2517920

financiado por la UE en el marco del programa horizonte 2020) se ha puesto en marcha para estudiar el impacto en la salud mental, utilizando datos longitudinales de distintas cohortes internacionales.

Objetivo: La iniciativa Co-RESPOND tiene como objetivo armonizar retrospectivamente los datos de salud mental y resiliencia de los estudios de cohortes longitudinales en curso a nivel de participante individual; crear una red interoperable de cohortes dentro de un ambiente seguro; gestionar estos datos junto con los productos de armonización (ej., procedimientos de transformación y diccionarios de variables) de acuerdo a los principios FAIR; y mantener esta red activa para agregar nuevas oleadas de datos o para que se unan a nuevas cohortes.

Métodos: Los datos se armonizaron retrospectivamente de acuerdo con la guía Maelstrom. Se creo una red de datos federada (FDN por sus siglas en ingles) utilizando el paquete de software OBiBa.

Resultados: Hasta la fecha, Co-RESPOND consta de nueve cohortes europeas y una cohorte mundial, con 50.885 participantes. Este artículo presenta Co-RESPOND como un caso estudio de armonización retrospectiva de datos descentralizados, donde los equipos recopilaron y transformaron los datos sin coordinación previa, afrontando desafíos metodológicos y regulatorios. El proceso de este proyecto se describe en detalle para que otros investigadores puedan aplicarlo en proyectos futuros. Se presentan sus resultados y los productos de armonización de datos resultantes.

Conclusiones y perspectivas: Los datos armonizados ya están listos para ser compartidos con pares externos para su análisis y Co-RESPOND está abierto a la incorporación de más socios. Se informará sobre las lecciones aprendidas a lo largo del proyecto y se recomendarán los estándares de clasificación establecidos para generar conjuntos de datos disponibles para análisis conjuntos desde el inicio.

that it can be analysed jointly on the individual-participant level, and to manage data sustainably in a fair (findable, accessible, interoperable, and reusable) way.

- Ten cohort studies covering mental health outcomes of more than 50.000 individuals have been harmonized so far. The data sets are available within a federated data network and can be accessed upon request for further analyses.

1. Background

The COVID-19 pandemic has been associated with a substantial rise in trauma and stressor exposure (O'Donnell & Greene, 2021). Though traumatic events in a narrower sense, such as defined by DSM-5 criterion A (e.g. sudden severe illness of or loss of loved ones, or being exposed to sudden deaths of people) were more prevalent in exposed populations such as health care workers, the general population was exposed to pandemic-related stressors such as increased care responsibilities due to school or childcare closures, or limited access to social resources due to distancing measures. Exposure to traumatic events and stressors in general varied greatly within the general population: women were disproportionally affected by domestic violence or caring for children or elderly in need of care as compared to men, and young people were specifically affected by the consequences of school and university closures, to name only a few of the many groups which were majorly impacted (Stoffers-Winterling et al., 2025; Witteveen et al., 2023). Such differential exposure to stressors has partly explained the variation in mental health outcomes in the general population (COVID-19 Mental Disorders Collaborators, 2021; Sun et al., 2023). However, there is also evidence of differential responses to adversity within similarly exposed populations (Javakhishvili et al., 2022; Schäfer et al., 2022). To better understand the impacts that the pandemic had on mental health, it is important to take a trauma and resilience perspective, so individual, social and societal factors could be identified that have an impact on an individual's response to adversity in terms of traumatic and/or general stressors (O'Donnell & Greene, 2021), and to study how negative outcomes could best be addressed and positive outcomes fostered.

Researchers across the world studied the immediate and long-term effects of the COVID-19 pandemic and mitigation measures on mental health (Ahmed et al., 2023). Longitudinal mental health data collected throughout the pandemic offer a unique opportunity to study the effect of population-level and individual level adversity on mental health worldwide (Sun et al., 2023). However, to harness these datasets fully, and to compare data from different populations and areas in the world, it is vital to combine longitudinal studies and increase their sustainability, accessibility and transparency so that they can be utilized for future research in joined analyses. Harmonizing and linking data of separate longitudinal cohorts holds diverse advantages (Fortier et al., 2017): First, the collaborative analysis of several cohorts together increases statistical power simply by enlarging the overall sample size. This offers opportunities for big data analysis with sophisticated statistical analysis strategies (e.g. machine learning approaches) and the identification of more subtle effects or smaller high-risk groups that cannot be detected in smaller samples. For instance, if not representative, surveys tend to include fewer participants of lower socio-economic status, as well as older adults (Sun et al., 2023; Veer et al., 2021). Second, several cohorts provide a better generalizability (or external validity) of findings, as broader contexts and more diverse person groups are represented. At the same time, the exposure heterogeneity is enhanced, i.e. the chance to detect relevant predictors of mental health and resilience trajectories is better. Still, the use of several cohorts allows for cross-validation or replication of findings across datasets and making comparisons between different populations and regions. Third, a curated dataset that is overseen by a consortium can be more efficient and will promote FAIR (Wilkinson et al., 2016) (Findable, Accessible, Interoperable, and Reusable) publication and data sharing for third parties, since there will be only one focal point for obtaining access to the data. The FAIR guiding principles for scientific data management and stewardship have been developed to enhance the reuse of scientific data, thus improving research efficiency. The collaboration of researchers is fostered, since FAIR publication helps to make research and existing data visible to others, thus avoiding redundant efforts but encouraging reuse and testing for the reproducibility of existing findings. At the same time, interdisciplinary, innovative research is stimulated. FAIR data publication and stewardship has become more and more accepted within the scientific community and is expected by agencies and publishers as well as funding agencies. Fourth, if sustainable research collaborations are built, future research agendas could take a more integrative perspective by using available data resources, building on already available findings and avoiding research waste (Glasziou et al., 2014). In the long-term, fostering the sustainability of research findings is both an ethical as well as an economic necessity and increases a timely evolvement of reliable evidence on populations at risk for increased COVID-19 related distress that informs different kinds of stakeholders and consumers (Fortier et al., 2012; Fortier et al., 2017).

The RESPOND project (RESPOND project, 2022) (EU Grant Agreement No 101016127) was initiated with the aim of generating such evidence and improving the preparedness of health systems to reduce mental health and psychosocial concerns that resulted from the COVID-19 pandemic. Aiming to identify risk and resilient groups in terms of mental health using individual-level data, the Co-RESPOND project was started as an initiative of researchers involved in longitudinal cohort research.

The Co-RESPOND group agreed on the following targets: To retrospectively harmonize mental health and resilience data of ongoing longitudinal cohort studies; to create an interoperable network of cohorts within a secure environment; and to manage these data along with harmonization products (e.g. transformation procedures and variable dictionaries) according to the FAIR principles (Wilkinson et al., 2016) sustainably and transparently; and to keep this network live in order to add new data waves or to be joined by new cohorts.

Beyond improving preparedness for future pandemics, the Co-RESPOND IPD dataset could reveal insights into mental health during sustained periods of adversity. Combining several datasets enlarges the variance of studied populations and contexts and allows for analyzing subgroups that are underrepresented in individual cohorts, thus having too little statistical power to detect effects. The expansion of study contexts, e.g. in terms of countries and mitigation regulation, allows for analyzing moderating effects, which cannot be done if only individual data sets are considered. In the aftermath of the pandemic, policy makers and decision-makers now recognize that mental health must be prioritized in efforts for future pandemic preparedness. Longitudinal data on mental health that has been collected throughout the pandemic and is now essential to create reliable evidence that informs decision and policy makers about adequate measures to be taken in preparation for or during future pandemics, foster resilience and allocate resources to vulnerable groups.

This paper presents the Co-RESPOND initiative, a case study for retrospective harmonization of decentralized data where teams collected and transformed data without prior coordination in the European General Data Protection Regulation (GDPR) era (REGULATION (EU), 2016/ 679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL – of 27 April 2016), facing methodological as well as regulatory challenges. The process of this project is outlined in detail, so it could be applied by other researchers for future projects, and its outcomes and the resulting data harmonization products which are now ready to be shared with external partners are presented. Lessons learned will be reported, and established classification standards will be recommended as they should be applied for data collection to generate data sets that are available for joint analyses from the start.

2. Methods

2.1. Data privacy and security: Implications of data protection regulations

The European General Data Protection Regulation (GDPR) is the binding legal privacy and security law that had to be considered (REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 27 April (2016). ‘Data concerning health’ are listed as one of eight special categories of personal data which are related to fundamental rights and freedoms of an individual and merit higher protection (REGULATION (EU), 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL – of 27 April 2016, article 9.1). Before the concrete data harmonization process could be initiated, data sharing agreements, as well as data security and protection issues were discussed and agreed upon.

Each data owner consulted their local data protection officers and reviewed their original ethics approval as well as the original data privacy statements that the participants had signed as they entered the studies. The data owners also made sure with their local data protection officers if any national regulations had to be considered in addition to GDPR. It was agreed that the use of pseudonymized data would have required the specific, unambiguous consent from all cohort participants to process their individual data for the purpose of the Co-RESPOND project (Marcon et al., 2021). Following these consultations, it was decided that sharing anything other than anonymized data would require renewed informed consent from each individual participant included in the respective cohorts, which was deemed unfeasible. Therefore, all data were fully anonymized for privacy protection before sharing.

2.2. Anonymization

Appropriate anonymization irreversibly prevents all parties (including the partner who performed the anonymization procedure) from singling out an individual person within a dataset, meaning that it is impossible to isolate some or several records which might identify an individual in the data set. In general, anonymization prevents the inference of any information concerning an individual, like deducing, with some probability, the likely value of an attribute from the value of other information included within the data set. Likewise, anonymization needs to ensure that linking two records within a data set or between separate data sets is impossible, whether or not these linked records could be associated with a specific individual or not. In contrast to pseudonymization, any anonymization of data is irreversible, whereas pseudonymized data could in general still be assigned to an individual data subject by use of additional information, even if this information is kept separately and unavailable to external users. Once anonymized, personal data cannot be linked to a natural person anymore and the GDPR no longer applies.

Data owners anonymized their data sets on-site following a standard operating procedure (SOP) created by the RESPOND coordinator (VU University Amsterdam; Supplementary Material S1). In concordance with the GDPR, the minimization of data use was an underlying rationale, so only data that had been identified as necessary for the Co-RESPOND project (s. 2.4) were considered. After identification and removal of information, which was not needed for the purpose of Co-RESPOND, it was made sure that no direct identifiers (e.g. personal information such as name, e-mail address etc.) were included within the data sets that could uniquely identify individuals. Also, any quasi-identifiers that could be used to identify individuals if used in combination (e.g. geographic information, socio-economic data, disorder-related information) were critically checked to be unspecific enough to prevent any singling out of an individual. Particularly, geographic data was recoded into larger categories of at least 150.000 inhabitants, corresponding to EU NUTS-level 3 (NUTS = nomenclature of territorial units for statistics (Overview - Eurostat, 2024). Date of birth was recalculated into age at inclusion, and any age above 89 years was merged into a single category of ‘90 or older’. Using generalization, i.e. after recoding data into broad intervals by rounding or aggregating them, any data was checked to be generic enough to prevent the identification of an individual. Last, the original study IDs which were used within the study cohorts to assign different data points to an individual data subject were replaced by new, random sequence identification numbers.

2.3. Technical implementation

2.3.1. Documents relating to harmonization

All documents relating to the anonymization and harmonization procedure were made available as living documents to the collaborating partners and remained continuously accessible to the collaborating partners. Within these documents, any questions arising during the data transformation process were collected on a dashboard and solutions posted. Issues were also solved in online meetings. Data dictionaries, SOPs, questionnaires and additional advisory (e.g. a binding sequence of questionnaire items, standard classifications of sociodemographics) were documented to avoid inconsistent transformation, or coding of data.

2.3.2. Data sharing

In order to ensure data protection and avoid concrete data sharing, a federated data analysis network (FDN) was established. Instead of conventional data repositories which centrally archive data, FDNs consist of an IT infrastructure of linked local data servers. The data remains on the local servers of the data owners who may not be allowed to share the data due to data protection regulations (e.g. GDPR). Instead of sharing individual participant data (IPD), the owning partners could allow collaborating sites to run computations using these IPD, while only the results of these analyses, i.e. aggregated, non-disclosive data is received. Thus, data privacy is granted, but data can still be used by external partners (Gaye et al., 2014). An FDN usually consists of a star-like infrastructure of local servers. Central access is hosted by the leading institution (LIR), while this point is linked to individual local nodes which are hosted by the individual collaborating institutions. These collaborating institutions might or might not themselves be linked to other partners directly, depending on the project. An FDN allows for applying agile methods of analysis on the participant level without directly sharing the data. The FDN was facilitated with the OBiBa (https://www.obiba.org/) software suite (Marcon et al., 2021), providing interoperable, open-access tools for establishing such a federated client-server infrastructure for data management, harmonization and dissemination. Three of these tools were used in the context of Co-RESPOND: Opal, Mica and Agate.

Opal (https://www.obiba.org/pages/products/opal)19 is the data repository, where each collaborating partner on-site stores their data. Each partner runs their own local Opal instance (with MongoDB, Maria DB, PostgreSQL and/or MySQL as back-end engines) where individual-level data are imported. The Opal warehouse allows for storing data of any type. Most partners uploaded their data sets as csv, or SPSS files. Any individual-level data will stay on the local servers constantly and will not leave or physically be shared. Due to its integration with the R software, complex statistical analyses can be performed.

Mica (https://obiba.org)19 is a tool that allows for extraction of meta-data from Opal dataset dictionaries, such as summary values. It can be used as a data web application providing non-confidential meta-data within a searchable data catalogue, such as geographical coverage of the available data set, summary descriptives like minimum, maximum, mean, standard deviation, or counts, participant inclusion criteria, sample sizes or data collection timelines. Therefore, Mica could be used to identify cohorts or participants with several characteristics, e.g. including a particular age range, or assessing a particular outcome in association with certain risk factors. Mica could therefore be used as a 'window' to the harmonized data sets for external researchers, who could retrieve non-confidential meta-information about the included data and be helpful for researchers to identify datasets that might be relevant to their research question.

Agate (https://www.obiba.org/pages/products/agate/) is used for user management. It is the central authentication server which allows for creating user profiles and password management. Access settings can be individually tailored, from access to study site servers down to the level of individual data set items, Agate can also be used to manage e-mail communication with members, i.e. notifying them about site policies, or news relevant to all of them or only defined member groups.

From our experience, the installation and set-up of the local OBiBa infrastructure requires close collaboration with IT departments but can then usually be administered by researchers without advanced IT knowledge. There is thorough guidance freely available (https://www.obiba.org), and a very responsive Google group that also the OBiBa developers are participating in (https://groups.google.com/g/obiba-users?pli=1). From our experience, any problems were solvable using this channel.

2.4. Retrospective harmonization of data

We followed the Maelstrom guidelines (Fortier et al., 2017) which describe a framework for data retrospective harmonization of observational data. According to this guidance, the harmonization process followed six steps: definition of project objectives and research questions, collection of information about candidate cohorts and final section of relevant studies, definition of target variables and evaluation of the concrete harmonization potential across cohorts, data processing, quality checks, and finally dissemination and preservation of the final harmonization products (Fortier et al., 2017).

2.4.1. Cohort eligibility

The overall objective of Co-RESPOND was to harmonize longitudinal data on mental health collected during the COVID-19 pandemic, allowing us to investigate the impact of the pandemic on the mental health and well-being of the general population and vulnerable groups, and to identify relevant traumatic stressors. Candidate cohorts were identified by partners of the RESPOND consortium (RESPOND project, 2022), resulting in an ad-hoc sample of 10 cohorts.

To be included, cohorts had to assess adult participants (age 18 or over) for whom at least two peri-pandemic data points were or would soon become available as the Co-RESPOND-project was started (May 2021). Notably, Co-RESPOND is intended to be a living cooperation and is open for more cohorts reporting longitudinal data from the COVID-19 pandemic to join (see section 4.1, p. 35). Cross-sectional studies were not eligible. Pre-pandemic baseline data were not an inclusion criterion, but if a cohort had already been running before the pandemic, the researchers were asked to provide at least one pre-pandemic baseline assessment.

2.4.2. Procedure

For each contributing cohort, a research expert as well as an IT expert were requested. Two kinds of workshops were facilitated with the two types of experts: data harmonization workshops with research experts, and technical workshops with IT experts of each site. Not every site was able to provide an extra IT expert, but the researchers on-site managed to proceed with the help of shared expertise and experience of the remaining IT experts.

Harmonization was discussed in a set of four workshops led by JSW, PPR and CD with researchers of the

Co-RESPOND partners' network. In these, the harmonization potential of data sets was assessed against the overarching target of the Co-RESPOND project (see Table 1). During the workshops, the harmonization strategy and concrete procedures were elaborated, and performed by each study site between workshops. The topics of the technical workshops were decided by current issues.

Initially all contributors were asked to add their variables of interest to an overview, so that each data owner could identify what variables needed to be included in the shared data set. Original codebooks were also made available so that external contributors could see if there were any additional variables of interest in the studies.

The agreed harmonization procedure was made available in Excel spreadsheets and each cohort added their implementation in a new tab. In total there were 20 variables that had agreed harmonization instructions (Supplementary Material S2). All validated questionnaires were put into the format of their published versions. Further formatting requirements were outlined in the data transformation handbook, a living document that was updated and amended as needed, including a dashboard where current issues could be posted, and recent updates were summarized (Supplementary Material S3).

For each cohort, a single data set was prepared in long format.csv tables, meaning that any data or data attributes were presented as columns. After the

Table 1. Data harmonization workshops.

Workshop number	Topic	Outcome
1	• Kick-off workshop • Introduction of partners and cohorts • Presentation of preliminary research questions of individual Co-RESPOND partners • Assembly of information and selection of studies • Draft of data Schema: definition of variable domains (e.g. sociodemographic) and individual variables (e.g. gender) of interest • Evaluation of harmonization potential • Introduction to OBiBa • Discussion of anonymization • Outline of timeline	• Codebooks of all studies made available to all partners • Preliminary data scheme of target variable domains and individual variables drafted • Participants invited to assure, refine or add individual research question against the data schema
2	• Presentation by workshop-leaders • Evaluation and summary of between-session feedback of partners regarding research question updates • Data dictionaries for variables to be completed by individual partners during the workshop • Discussion of anonymization • Hands-on completion of data dictionaries of individual partners in parallel during the workshop Sociodemographic variables • Mental health outcomes • Assessment timepoints	• Harmonization potential within all domains evaluated • Completion of variable dictionaries (holding the labels of the new harmonized variables along with variable levels) by data owners for the first three variable domains
3	• Discussion of harmonization potential of psychometric variables (i.e. questionnaire data) • Discussion of enrichment of the data set by addition of new context variables	• Pilot harmonization • Identification of new variables to be added to datasets: • Strictness of local current mitigation measures: • Oxford stringency indices • Google mobility data • EU geographical reference codes that allow linking data to any Eurostat indicator sets (Nomenclature of territorial units for statistics, NUTS code) • UN geographical reference for non-EU located participant data (Standard Country or Area Codes for Statistical Use, Series M, No. 49, UN M49 code) • Income quintiles/quartiles according to World Bank statistics
4	• Introduction to the concept of possible stressor items • Dataset preparation • Provision of English questionnaire versions for each scale, to be used as an obligatory reference for numbering questionnaire items (esp. if non-English questionnaire translations had been used) • Finalization of the anonymization SOP • Discussion of potential mistakes • Introduction to Opal and technical environment • Introduction to upcoming quality checks • Manual data checks by data-providing partners • Central quality checks by alternate partners • Automated quality checks using the R package 'dataReporter' (Petersen & Ekström, 2019)	• Agreement for structure of data access request • Agreement of data quality check procedure • Creation of variable list

anonymization procedure was completed, the data sets were exported in comma-separated variables (csv) format, so they could be imported into common software packages like Microsoft Excel or analysis programs like R.

Technical requirements were discussed in a series of meetings with IT experts. After an initial kick-off workshop, follow-up meetings were scheduled as needed, and a living document was made available explaining any procedures and including a dashboard of upcoming questions and updates of the document.

2.4.3. Mental health variables

All types of standardized psychometric data on mental health were considered for harmonization, including diagnoses, scales assessing depression, anxiety, general mental health, mental distress, suicidality, trauma-related symptoms and well-being. Notably, the coordinating teams pursued different objectives and research questions. Therefore, diverse facets and concepts of mental health were investigated, some overlapping, some not. It was agreed to include item-level information instead of already aggregated data (e.g. subscale scores), to keep the harmonized data as much in its original state as possible, and available for any new analyses.

2.4.4. Social, coping and other trait variables

Study sites were asked to specify any variables included in their studies that related to factors that could be considered potential resilience factors. The following constructs were identified as being relevant and having harmonization potential: emotion regulation, appraisal, loneliness, coping, optimism, personality, self-efficacy, social support, social participation, locus of control, resilience scales.

2.4.5. Sociodemographics

Sociodemographic variables that were assessed for their harmonization potential were: gender, age, place of residence, migration status, education, profession, employment type, employment status, relationship status, household size children, children in household, income, degree of urbanization. For each variable a potential harmonization instruction was created that each study site could implement. Wherever possible, International Classification standards were used for coding, such as the International Standard Classification for Education (ISCED) (International Standard Classification of Education (ISCED), 2024), or data categories used by EU statistics on income and living (EU-SILC) (Eurostat, 2022) or the sociodemographic survey (ESS) (About ESS | European Social Survey, 2024) were used (see section 3.4 for final categories used).

2.4.6. Identification of adversity events (stressors)

Stressors were defined broadly as an ‘event that is in conflict with one’s personal goals and needs’ (Petri-Romão et al., 2024), such as potentially traumatizing events, but also inconveniences and smaller distressing events. Of interest was primarily the occurrence of an event, rather than its impact or evaluation (‘I separated from my partner’ rather than ‘I am depressed because I separated from my partner’).

In order to facilitate harmonization, stressor candidates were classified into three types: life events, general stressors and COVID-19 pandemic-related stressors. Life events were broadly defined as events that are rarer and have a potentially large negative impact, for example items included in the Canli life event list (Canli et al., 2006). General stressors on the other hand would be micro stressors, that are daily or minor inconveniences or mildly distressing events (Chmitorz et al., 2020). Lastly, pandemic-related stressors are micro stressors that were specified to the pandemic. The classification of an item as a stressor is not definitive but rather is meant to guide future researchers to easily identify stressor candidates.

Those studies that already used stressor lists based on previous publications (Veer et al., 2021; Chmitorz et al., 2020) that are in line with the above stressor definition and were included as they were.

The codebooks of the studies that had not applied stressor classification as defined above were carefully read to identify candidate items that ask about exposure to stressors. PPR created a list of stressors for each study created and sent it to the data owners to be cross-checked. The data owners were given a list of previously published stressors lists (Chmitorz et al., 2020; Veer et al., 2021) and a descriptive definition of stressors, so that they would be able to identify new items and confirm suggested items.

2.4.7. COVID-related context variables

The Oxford Stringency, Containment and Health indices are composite measures of pandemic mitigation measures taking values between 0 and 100 (Hale et al., 2021). The indices are available on a daily basis for each date at national and at times, subnational level. The indices were added to each study for each date at the lowest available geographical level.

The Google COVID-19 Community Mobility Reports collected data on movement by region during the initial years of the pandemic (until 15 October 2022). Its values are in comparison to pre-pandemic number of visitors to, or time spent in location (median value in the baseline period 3 January to 6 February 2020).

When available, studies also included adherence to mitigation measures in the harmonized data set, such as wearing of facial masks or applying distancing rules.

2.4.8. Time points

Data owners were asked to include at least one pre-pandemic baseline assessment (if available) and all available collection events up to May 2023. For each participant it was agreed to recode the assessment date as calendar week and year to increase comparability between studies and preserve anonymity of participants.

2.4.9. Missing data

Missing data was recoded with three codes: not assessed (−991), refused to answer (−992), missing (default; −993). This was done to ensure transparency about the nature of missing data, to identify whether data might be missing at random or not, and to rule out the possibility that any data was lost during transfer or re-coding.

2.5. Quality checks

Quality checks on the datasets were performed in three stages. Firstly, data owners followed and completed a list of checks (Supplementary Material S4) before data were uploaded to local OPAL servers (cf. Technical infrastructure). This checklist asked data owners to confirm that each outlined step as documented in the data transformation handbook was followed. Secondly, after data upload central data checks were performed by one of the partners (INSERM) on all uploaded data sets. In particular, checks were done for the completeness of datasets, presence of missing data, and completeness of documentation.

A third set of checks was performed by LIR using the automatic dataReporter package in R (Petersen & Ekstrøm, 2019), which highlights variables that have potential outliers, impossible values or are otherwise suspicious. The check reports were sent to each data owner so that they could confirm which values could be classified as outliers or impossible values or check the correctness of suspicious data against their original data sets.

3. Results

3.1. Description of studies

In total there are 10 cohorts included in the IPD dataset, with 50,885 unique participants (see Table 2). The cohorts include: The COVID-19 Mental Health Survey (COMET; VU University Amsterdam), COVID and I (Université catholique de Louvain), the DynaMORE longitudinal study on psychological resilience to the mental health consequences of the COVID-19 pandemic (DynaCORE-L; Leibniz institute for Resilience Research), Edad con Salud (Universidad Autónoma de Madrid), two datasets from the COVID-19 HEalth caRe wOrkErS study (HEROES-NL, Vrije Univerisiteit Amsterdam; HEROES-ES, Universidad Autónoma de Madrid), the Longitudinal Resilience Assessment (LORA; Leibniz Institute for Resilience Research), the Mainz Resilience Project (MARP; Leibniz Institute for Resilience), Mind COVID (Fundació Sant Joan de Déu) and the Trajectoires ÉpidéMiologiques en Population study (TEMPO; Pierre Louis Institute of Epidemiology and Public Health). Four studies had pre-COVID assessments (see Figure 1). Two of these studies had extra assessments for a subsample during the COVID pandemic (LORA COVID and MARP Reality). The latest collection timepoints were April 2023. At baseline 48% of all participants were in Belgium and 23% in Spain. COMET included participants all over the world (largest sub-populations: 18% Italy, 10% Macau SAR, 9% Australia, Turkey and France, each, 8% Germany, The Netherlands, Indonesia and South Africa, each, 5% Spain, 4% Sweden). COVID and I included participants in Belgium (94%), France (3%), The Netherlands (<1%) and United Kingdom (<1%), as well as other countries that were anonymized (<2%). DynaCORE-L included participants from Germany, Israel, Italy, The Netherlands, Poland. All participants of Edad con Salud and MINDCOVID were in Spain. HEROES-NL only included participants from the Netherlands, and HEROES-ES only from Spain. LORA and MARP only included participants in Germany. All of TEMPO's participants are in France. See Figure 2 for a short overview of main baseline age, gender, education and employment of studies.

3.2. Mental health variables

All studies include at least one measure of mental health (see Table 3). Six studies used a version of the General Health Questionnaire (GHQ; Sterling, 2011; Wojujutari et al., 2024), either with 12 or 28 items. GAD-7 (Spitzer et al., 2006) was included in three studies, and five studies included a version of PHQ (Kroenke et al., 2001, 2009). Ten studies included information on suicidality. Post-traumatic stress symptoms were measured in four studies, two of which used the Posttraumatic Stress Disorder Checklist for DSM-5, 4-item version (Price et al., 2016), and the other two studies the Primary Care PTSD Screen for DSM-5 (Prins et al., 2016). The mental health measures were included 'as is' in the datasets and not further harmonized.

3.3. Social, coping and other trait variables

Studies included a diverse set of additional variables (Table 4), depending on the original purpose of the study (Table 2). Social support and loneliness were assessed in most studies with information being available in 10 and 9 studies, respectively, using a variety of different questionnaires. For instance, five studies

Table 2. Overview and Description of cohorts.

Study acronym	Original study focus	Partners	First – Last assessment (number of waves)	Participants at baseline (*n*)	Unique participants at all time points (*n*)	Participants with at least two assessments	Sample	Recruitment	Data collection mode
COMET (Moulin et al., 2023)	Global mental health during the COVID-19 pandemic	Vrije Universiteit Amsterdam (VUA), Netherlands	May 2020 – April 2021 (5)	8013	8016	5425	General population worldwide; min. age 18	Subjects were recruited through a snowball sampling strategy using university mailing lists and various social media platforms	Online survey using Survalyzer
COVID and I (Lorant et al., 2021)	Psychological distress in the Belgian population during the pandemic: changes during the pandemic and associated factors	Université Catholique de Louvain (UCL), Belgium	March 2020 – December 2021 (5)	27857	27857	13431	General Belgian population; min. age 18	Promoted on radio and television, social media and the major national newspapers	Online web surveys
DynaCORE-L (Bögemann et al., 2023)	dynamic modelling of relationships and weekly dynamics between resilience factors and stressor reactivity	Leibniz Institute for Resilience Research (LIR), Mainz, Germany	April 2020 – August 2020 (6)	208	208	208	General population, min. age 18. Study sites: Germany, Israel, Italy, Netherlands, Poland.	Online snowball sampling via social media and mailing lists	Smartphone app-based assessments using the m-Path app. Participants completed 1 baseline questionnaire and 5 weekly follow-up questionnaires over a total of 6 time points. The study was conducted in 6 different languages
Edad con Salud (Ayuso-Mateos et al., 2021; Lara et al., 2022)	Ageing trajectories of health-related outcomes and their key determinants among the Spanish population	Universidad Autónoma de Madrid (UAM), Spain	June 2019 – March 2021 (2)	3002	3002	1853	Community-living adults (i.e. 18 + years old, with participants of aged 50 or older oversampled) from the regions of Madrid and Barcelona, Spain.	Participants were recruited using a multistage stratified design that included the following steps: (i) selecting a random sample of municipalities with a sampling probability proportional to their population size, (ii) choosing a random sample of census units within each selected municipality, (iii) randomly selecting households within each census unit, and then assigning participants to one of two age groups: 18–49 or 50+ (with the latter group being oversampled). Individuals from each household in the assigned age group were invited to participate	Home-based interview (pre-pandemic); Telephone interview (during pandemic)
HEROES-NL (Czepiel et al., 2024; Mascayano et al., 2022)	Longitudinal trajectories of mental health symptoms and disorders among health care workers at different phases of the pandemic	Vrije Universiteit Amsterdam (VUA), Netherlands	March 2020 – April 2023 (3)	684	2587	495	Health care worker in the Netherlands. min. age 18	Healthcare workers with both clinical and non-clinical roles employed across a broad spectrum of outpatient and inpatient healthcare facilities in either public or private settings	Online survey disseminated either directly through the healthcare centre at which they were employed or through health organization networks.
HEROES-ES (Mediavilla et al., 2021;		Universidad Autónoma de Madrid (UAM), Spain	April 2020 – May 2022 (3)	2422	3441	1014	Health care worker in Spain; min. age 18	Healthcare workers from outpatient and inpatient healthcare facilities, both with and without clinical roles,	Online interview distributed by email and the WhatsApp messenger

(*Continued*)

Table 2. Continued.

Study acronym	Original study focus	Partners	First – Last assessment (number of waves)	Participants at baseline (*n*)	Unique participants at all time points (*n*)	Participants with at least two assessments	Sample	Recruitment	Data collection mode
Ortiz-Calvo et al., 2022)								and not necessarily involved in the direct care of COVID-19 patients.	
LORA (Chmitorz et al., 2020b)	Longitudinal assessment of resilience in healthy subjects	Leibniz Institute for Resilience Research (LIR), Mainz, Germany	February 2017 – April 2022 (25)	1191	1191	1186	Adults aged 18–50, without severe psychiatric or somatic condition, living in the Rhine-Main area, Germany.	Public advertisements (at local universities, university medical centres, libraries, shops, gyms) and on the project webpage	Combination of online and on-site assessments
LORA COVID (Ahrens et al., 2021)[a]	*Higher-frequence assessments in volunteering individuals included in LORA*		*April 2020 – August 2021 (28)*	*485*	*535*	*535*	*A subsample (n = 535?) of participants from the ongoing LORA study.*	*Through the existing pool of participants in the ongoing LORA study. All LORA study participants were asked to voluntarily participate in this additional COVID-19 related assessment*	*Weekly online questionnaires/ surveys using an online monitoring system*
MARP (Kalisch et al., 2020)	Longitudinal assessment of resilience in young adults who have experienced critical life events	Leibniz Institute for Resilience Research (LIR), Mainz, Germany	July 2016 – April 2022 (27)	176	181	179	Healthy adults aged 18–20 years at the time of inclusion who had experienced at least three significant adverse life events prior to inclusion.	Non-representative sampling, participants were recruited through online and print advertisement	Combination of online and on-site assessments
MARP Reality[a]	*Higher-frequence assessments in volunteering individuals of the MARP sample*		*April 2020 – May 2022 (35)*	*68*	*90*	*90*	*A subsample (n = 90) of participants from the ongoing Mainzer Resilience Project (MARP) in Germany.*	*MARP study participants were asked to voluntarily participate in this additional COVID-19 related assessment*	*Initially weekly online assessment, switched to monthly assessments from August 2020*
Mind COVID Alonso 2022; Mortier et al., 2021)	Mental health impact of the pandemic on individuals quarantined or isolated due to a possible infection, health care workers, and the general population	Fundació Sant Joan de Déu (FSJD), Barcelona, Spain	June 2020 – November 2021 (3)	3500	3500	2237	General Spanish population, min. age 18.	Dual-frame random digit dialing, including both mobile and landline telephone numbers. A sample of Spanish mobile numbers was generated by an automated system. Subsequently, landline numbers were selected from an internal database from the survey company to ensure representativeness of all geographical areas.	Computer-assisted telephone interviews conducted by professional interviewers
TEMPO (Hecker et al., 2022; Mary-Krause et al., 2021)	Risk and protective factors of trajectories of psychological difficulties or problems due to alcohol, cannabis orother illicit drugs	Pierre Louis Institute of Epidemiology and Public Health (INSERM), Paris, France	March 2020 – July 2021 (9)	752	904	816	The TEMPO cohort consists of adults who are children of GAZEL cohort participants; French population.	Grown-up children participants of the GAZEL cohort study; contact was made via the parents	Online survey, postal questionnaires and telephone interviews

Note: [a] LORA COVID is a subsample of LORA, and MARP Reality of the MARP sample, respectively. These subsamples took part in extra assessments during the COVID-19 pandemic. These studies are described in italics.

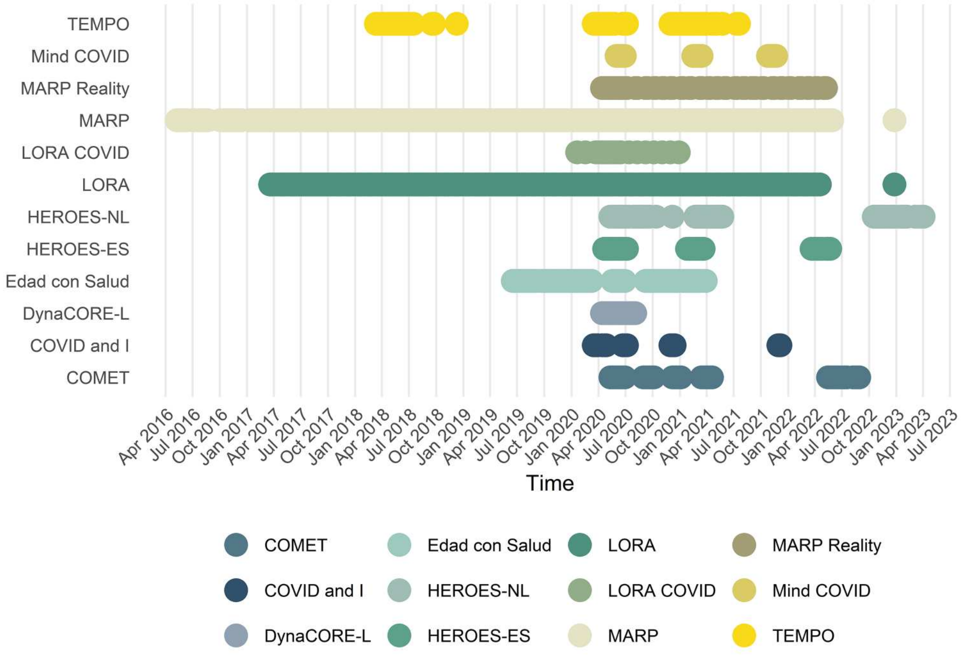

Figure 1. Collection periods of cohorts.

included the Oslo social support scale (Kocalevent et al., 2018) and UCLA Loneliness Scale (Austin, 1983; Hughes et al., 2004). Resilience scales were included in seven studies, six of which included Brief resilience scale (Smith et al., 2008) and two of which Connor-Davidson Resilience Scale (Connor & Davidson, 2003). Emotion regulation variables are available in five studies, four studies using the Brief Cope (Carver, 1997). Four studies assessed social participation using a variety of ad-hoc items. Optimism, self-efficacy, appraisal and locus of control variables are available in three or less studies using different types of questionnaires. The harmonization potential of each of the domains was not further assessed.

3.4. Sociodemographics

For all considered variables, cohort data were able to be included and harmonized (see Table 5). However, sometimes a study provided relevant data that could, not be harmonized as it had applied incompatible data formats (e.g. if data categories were overlapping and could not be resolved and streamlined with the remaining cohorts contributing data for this variable. An example would be overlapping income categories).

3.4.1. General demographics

Each variable was harmonized to retain the most information, that is the ‘smallest common denominator’ across studies. Gender was harmonized into the categories male, female and other. In addition to continuous age, a new variable of categorical age was created (<18, 18–44, 45–64, 65–94, >95 years old). Relationship status was recoded into seven levels (single; married/in a civil union; in a relationship and living together; in a relationship and living apart; divorced/separated; widowed; other). Whether someone has or cares for children was stored in a dichotomous variable. A categorical variable to record how many children a person has was created with four levels (no children; one child; two or three children; four or more children).

Two variables were created indicating the participant’s income quartile and quintile (Eurostat, 2022) (based on their country of residence).

3.4.2. Residence, migration, living conditions

Place of residence was recoded into European NUTS codes (Overview - Eurostat, 2024) and the United Nations Standard Country or Area Codes for Statistical Use (M49) country code (UNSD — Classification Detail, 2024). When available, migration status was defined as being resident in a country other than the country of birth.

Household size (including oneself) was recoded into five levels (one person; two persons; three or four persons; five or more persons; live in an institution). Additionally, a dichotomous variable indicating if a person lived alone was created. A further dichotomous variable recoding whether children lived in the household was created.

3.4.3. Education and work

Education was recoded in accordance with the International Standard Classification of Education (ISCED) classification (International Standard Classification of Education (ISCED), 2024) Occupation was harmonized into 14 categories (undergoing education;

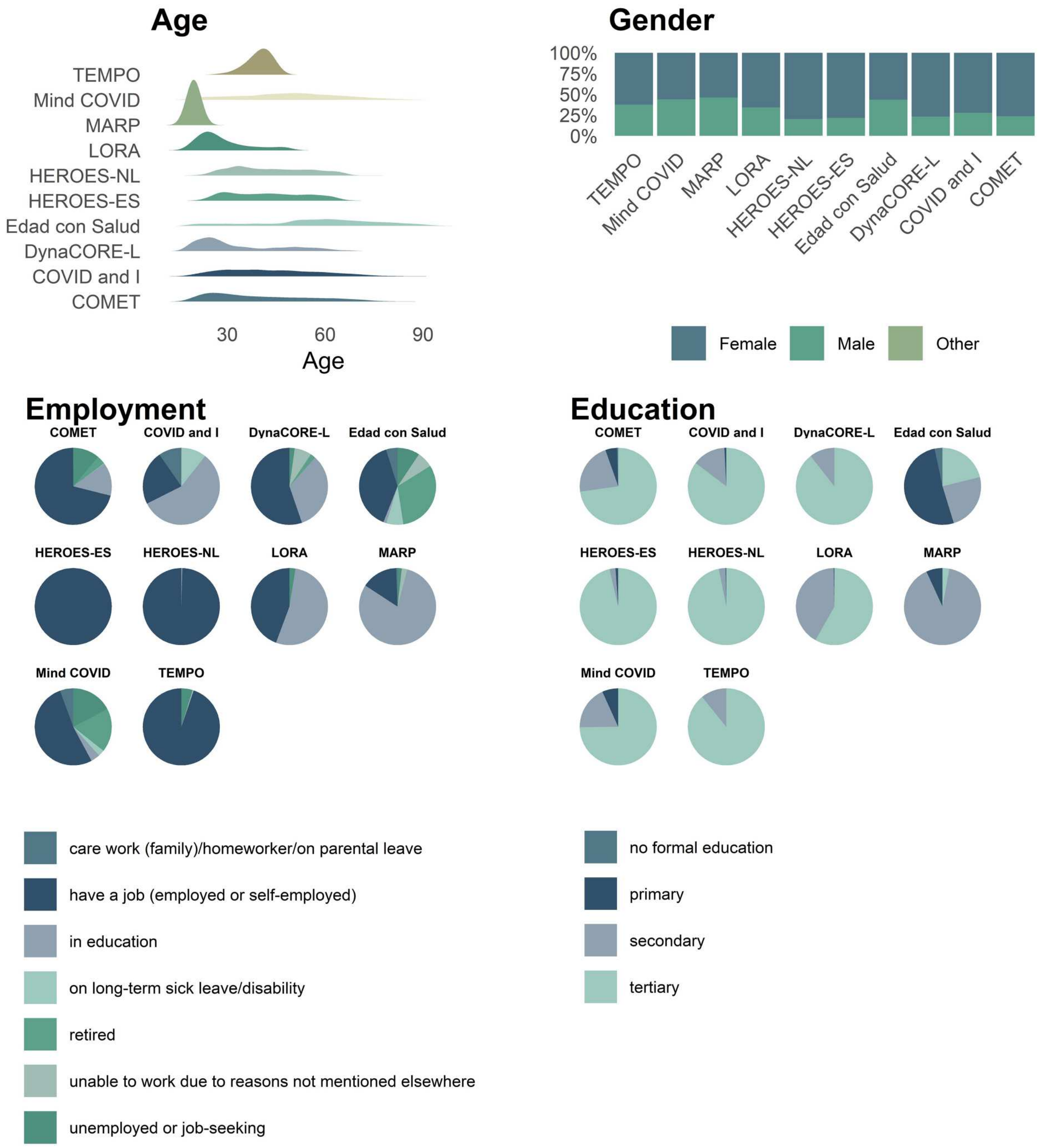

Figure 2. Overview of selected baseline characteristics of study participants.

education and research; arts, entertainment, sports and media; healthcare; first responder (paramedic/firefighter/police); military; civil services, politics; finance and economy; industry; sales and services (incl. restaurants and bars); transport (goods and people); installation, maintenance, cleaning and repairs; currently not working; other). An additional variable indicated if someone worked in healthcare or not.

Employment type recorded the type of work (full-time; part-time; no paid work; other) someone had. A further variable indicated if a contract is permanent, temporary, self-employed or other. Employment status was recoded into seven levels (have a job (employed or self-employment); in education; care work (family/homeworker/on parental leave); on long-term sick leave/disability; unable to work due to reasons not mentioned elsewhere in this list; unemployed or job-seeking; retired).

3.5. Adversity and stressors

In each study 27–90 stressors candidates were identified. Each of the items were classified according to their type (life event, general stressor or COVID-19-related stressor). Each item was labelled as a stressor in Opal, allowing the researcher to identify those of interest. An initial assessment identified nine topics of stressors, though researchers are invited to categorize stressors as suitable to their research question. The nine topics and their sub-topics are: work/employment related (work environment and job structure; work-life balance and boundary management; safety and health

Table 3. Available mental health variables.

Study	General Mental health (dimensional)	Well-being	Depression	Anxiety	Post traumatic symptoms	Suicidality	Substance use
COMET	PHQ-ADS[1]	–	PHQ-9[2]	GAD-7[3]	PCL-5[4]	PHQ-9 suicidality item	4 single items
COVID and I	GHQ-12[5]	1 single item	GHQ-depression items	GHQ-anxiety items	–	-	–
DynaCORE-L	GHQ-12[5]	–	GHQ-depression items	GHQ-anxiety items	–	-	-
Edad con Salud	27 items	Cantril ladder[6] WHODAS[7]	CIDI[8] depression items	–	–	1 single item	5 single items
HEROES-NL	GHQ-12[5] PHQ-ADS[1]	1 single item	GHQ-depression items PHQ-9[2]	GHQ-anxiety items GAD-7[3] (from 3rd wave on)	PC-PTSD-5[9]	PHQ-9 suicidality item 4 single items	7 single items
HEROES-ES	GHQ-12[5] PHQ-ADS[1]	1 single item	GHQ-depression items PHQ-9[2]	GHQ-anxiety items GAD-7[3] (from 3rd wave on)	PC-PTSD-5[9]	PHQ-9 suicidality item 4 items of the C-SSR[15]	-
LORA	GHQ-28[10] PHQ-D[11]	WHO5	GHQ-depression subscale PHQ-D depression items (PHQ-9)[2]	GHQ-anxiety subscale PHQ-D items	-	GHQ-items PHQ-D item	AUDIT[13] 25 single items
LORA COVID[a]	*GHQ-28*[10] *PHQ-4*[12]	–	*GHQ-depression subscale* *PHQ-4 depression subscale*	*GHQ-anxiety subscale* *PHQ-4 anxiety items*	–	*GHQ-items*	–
MARP	GHQ-28[10]	WHO5	GHQ-depression subscale	GHQ-anxiety subscale	–	GHQ-items	5 items
MARP Reality[a]	*GHQ-28*[10] *PHQ-4*[12]	–	*GHQ-depression subscale* *PHQ-4 depression subscale*	*GHQ-anxiety subscale* *PHQ-4 anxiety items*	-	*GHQ-items*	–
Mind COVID	PHQ-ADS[1]	EQ5D[14]	PHQ-8[2] Single item rating	GAD-7[3]	PCL-5[4]	C-SSR[15]	CAGE-AID[16]
TEMPO	ASR[17] total	1 single item	ASR subscale	ASR subscale	–	ASR items	22 single items

Note:[a]LORA COVID is a subsample of LORA, and MARP Reality of the MARP sample, respectively. These subsamples took part in extra assessments during the COVID-19 pandemic. The variables included in these assessments are shown in italics. [1] Patient Health Questionnaire Anxiety and Depression Scale (Kroenke et al., 2016); [2] Patient Health Questionnaire 9-item depression scale (Kroenke et al., 2001); [3] 7-item Generalized Anxiety Disorder scale (Spitzer et al., 2006);[4] Posttraumatic Stress Disorder Checklist for DSM-5, 4-item version (Blevins et al., 2015; Price et al., 2016); [5]General Health Questionnaire 12 items (Goldberg & Hillier, 1979; Wojujutari et al., 2024);[6] Cantril Ladder (Cantril 1965); [7] WHODAS (Ustun et al., 2010); [8] Composite International Diagnostic Interview (Wittchen 1994); [9] Primary Care PTSD Screen for DSM-5 (Prins et al., 2016); [10] General Health Questionnaire 28 items (Sterling 2011); [11]Patient Health Questionnaire (Spitzer et al., 1999; Spitzer et al., 2000);[12] Patient Health Questionnaire for Depression and Anxiety 4-item scale (Kroenke et al., 2009);[13] Alcohol Use Disorders Identification Test (Saunders et al., 1993); [14] EuroQuol 5 Dimension scale (Herdmann et al., 2011); [15] Columbia Suicide Severity Rating Scale (Posner et al., 2011)); [16] CAGE Adapted to Include Drugs (Brown & Rounds, 1995; Hinkin et al., 2001); [17]Adult Self Report (Achenbach, 2017).

concerns at work); financial (financial difficulties; change in finances); health and COVID-19 exposure (contact; infection; isolation; symptoms; hospitalization); family and household dynamics (death; separation/divorce/moving; care responsibilities; living arrangements and environment; family relationships and dynamics); worries about the pandemic (worries about health; worries about health of others; other worries); social and recreational activities (restrictions and changes); violence and crime (domestic violence); healthcare work; and Other. Overall, there were 48 items identified in COMET, 33 in COVID and I, 35 in Edad con Salud, 28 in HEROES-NL, 27 in HEROES-ES, 34 in MindCOVID, and 90 in TEMPO. LORA and MARP both used the 58-item Mainz Inventory of Microstressors (Chmitorz et al., 2020a) and a 28 or 27-item life event list (Canli et al., 2006; Chmitorz et al., 2020b), respectively. Additionally, LORA-COVID and MARP Reality used a 33 and 32-item list of COVID-related stressors, respectively (Ahrens et al., 2021). DynaCORE-L had a 27-item list of COVID-related stressors and 11-item list of general stressors (Bögemann et al., 2023). See Table 6 for an overview. These classifications are based on an initial assessment by LIR and the items can be re-classified according to the research question and analysis.

3.6. COVID-related context variables

All studies included the Oxford stringency and response indices. Nine studies included the google mobility indices, as well. Variables relating to adherence to measures were available in six datasets.

37. Accessibility of data

Access to the IPD datasets can be requested using a standardized data access request form available as Supplementary Material S5. Researchers need to specify which datasets they want to have access to

Table 4. Social, coping and other trait variables.

Study	Social support	Loneliness	Emotion regulation	Resilience scale	Optimism	Self-efficacy	Appraisal	Locus of control	Social participation	Personality
COMET	OSS-3$^{1)}$	1 single item (from OSS-3^{1})	Brief Cope$^{2)}$	-	-	-	-	-	-	-
COVID and I	OSS-3^{1})	3 UCLA$^{3)}$	-	-	-	-	-	-	15 single items	-
DynaCORE-L	F-SozU	-	Brief Cope items$^{2,6)}$, CERQ items$^{5,6)}$	BRS$^{7)}$	1 single item	GSE$^{9)}$	PASS-process$^{10)}$	-	-	BFI (neuroticism subscale) $^{11)}$
Edad con Salud	OSS-3$^{1)}$	3 single items	1 single item	BRS$^{7)}$	-	1 single item	-	-	8 single items	Eysenck Subscale extraversion, neuroticism$^{12)}$
HEROES-NL	3 single items	1 single item	-	BRS$^{7)}$	-	-	-	-	1 single item	PVQ$^{8)}$
HEROES-ES	3 single items	1 single item	-	BRS$^{7)}$	-	-	-	-	1 single item	-
LORA	F-SozU$^{4)}$	3 UCLA$^{3)}$	Brief Cope$^{2)}$ CERQ-short$^{5)}$	BRS$^{7)}$ CDRISC$^{13)}$	LOT-R$^{14)}$	GSE$^{9)}$	PASS-content$^{15)}$ PASS-Process$^{10)}$	IEC$^{16)}$	-	BFI$^{11)}$
LORA COVID)	F-SozU$^{4)}$	3 UCLA$^{3)}$	Brief Cope$^{2)}$, CERQ-short$^{5)}$	-	–	–	Reappraisal items (5 items) Pandemic related reappraisal (4 items)	-	-	–
MARP	OSS-3$^{1)}$ F-SozU$^{4)}$	–	Brief Cope$^{2)}$, CERQ-short$^{5)}$	BRS$^{7)}$ CDRISC$^{13)}$	LOT-R$^{14)}$	GSE$^{8)}$	PASS-content$^{15)}$ PASS-Process$^{10)}$	IEC$^{16)}$	–	Neo-FFI-30$^{17)}$
MARP Reality)	F-SozU$^{4)}$	3 UCLA$^{3)}$	Brief Cope$^{2)}$	–	-	-	Reappraisal items (5 items) Pandemic related reappraisal (4 items)	-	-	-
Mind COVID	OSS-3$^{1)}$	3 UCLA$^{3)}$	-	CDRISC$^{13)}$	-	-	-	-	-	-
TEMPO	4 single items	3 UCLA$^{3)}$ 1 single item	-	-	-	-	-	Locus of control 28 items$^{18)}$	-	-

Note:$^{a)}$LORA COVID is a subsample of LORA, and MARP Reality of the MARP sample, respectively. These subsamples took part in extra assessments during the COVID-19 pandemic. The variables included in these assessments are shown in italics. $^{1)}$Oslo social support scale (Kocalevent et al., 2018); $^{2)}$Brief Cope (Carver, 1997); $^{3)}$UCLA Loneliness Scale (Austin, 1983; Hughes et al., 2004); $^{4)}$Social support questionnaire (Fydrich et al., 2009); $^{5)}$Cognitive Emotion Regulation Questionnaire short version (Garnefski & Kraaij, 2006; Loch et al., 2011); $^{6)}$ 10 items from the Brief Cope, 12 items from the CERQ-short (Garnefski & Kraaij, 2006); $^{7)}$Brief resilience scale (Smith et al., 2008); $^{8)}$ Portrait Value Questionnaire (Schwartz & Cieciu, 2022) $^{9)}$Generalized self-efficacy scale (Schwarzer et al., 1995); $^{10)}$perceived Positive Appraisal Style scale, process-focused (Petri-Romão et al., 2024); $^{11)}$10-item short version of the Big Five Inventory (Rammstedt & John, 2007); $^{12)}$Eysenck's extroversion subscale (Bech et al., 2012); $^{13)}$Connor-Davidson Resilience Scale (Connor & Davidson, 2003); $^{14)}$Life orientation test Revised version Glaesmer et al., 2012); $^{15)}$perceived Positive Appraisal Style scale, content-focused (Petri-Romão et al., 2024); $^{16)}$Internal-External Locus of Control Scale (Rotter, 1966); $^{17)}$NEO-Five-Factor Inventory: the 30-Item-Short-Version (Körner et al., 2008); $^{18)}$Locus of Control 28 items (Eren et al., 2023).

Table 5. Sociodemographics and COVID-related context variables.

Harmonized Variables	COMET	COVID and I	DynaCORE-L	Edad con Salud	HEROES-NL	HEROES-ES	LORA (LORA COVID)	MARP (MARP Reality)	Mind COVID	TEMPO
Gender	C	C	C	C	C	C	C (I^{NA})	C (I^{NA})	C	C
Age (categorical)	C	C	C	C	C	C	C (I^{NA})	C (I^{NA})	C	C
Age (continuous)	C	C	C	C	C	C	C (I^{NA})	C (I^{NA})	C	C
Place of residence	C	C	C	C$^{1)}$	C$^{1)}$	C$^{1)}$	C$^{1)}$ (I^{NA})	C$^{1)}$ (I^{NA})	C$^{1)}$	C
Migration	C$^{2)}$	I^{NA}	C$^{2)}$	C$^{2)}$	C	I^{NA}	C$^{2)}$ (I^{NA})	C^{anon} (I^{NA})	C$^{2)}$	I^{NA}
Employment status	C	C	C	C	C	I^{NA}	C (C)	C (C)	C	C
Contract	C	I^{NA}	I^{NA}	C	I^{NA}	I^{NA}	C (C)	C (C)	C	C
Employment type	C	I^{NA}	I^{NA}	C	I^{NA}	I^{NA}	C (C)	C (C)	I^{NA}	I
Health Care worker	C	C	C	I^{NA}	C$^{1)}$	C$^{1)}$	I^{NA} (C)	C (C)	I^{NA}	I^{NA}
Profession	C	I^{NA}	C	C	C	C	I^{NA} (C)	C (C)	I^{NA}	I
Education	C	C	C	C	C	C	C (I^{NA})	C (I^{NA})	C	C
Relationship status	C	I^{NA}	C	C	C$^{3)}$	I^{NA}	C (C)	C (C)	C	C
Children	C	C	C	C	C	C	C (C)	C (C)	C	C
Children living in household	C	C	C	C	C	C	I^{NA} (C)	I^{NA} (C)	I^{NA}	C
Number of children	C	C	C	C	C	C	C (C)	C^{anon} (C)	C	C
Living alone	C	C	C	C	C	C	C (C)	C (C)	I	C
Household size	C	I^{NA}	C	C	C	C	C (C)	C (C)	I	C
Income quartiles	C	I^{NA}	C	C	I^{NA}	I^{NA}	C (I^{NA})	C (I^{NA})	C	C
Income quintiles	C	I^{NA}	C	C	I^{NA}	I^{NA}	C (I^{NA})	C (I^{NA})	C	C
Adherence to measures	C	C	C	I^{NA}	I^{NA}	I^{NA}	I^{NA} (C)	I^{NA} (C)	I^{NA}	C
Google mobility index	C	I^{NA}	C	C	C	C	C (C)	C (C)	C	C
Oxford COVID-19 index	C	C	C	C	C	C	C	C	C	C

Note: C = Harmonization complete; I = Harmonization impossible. ^{NA}: not assessed; $^{1)}$ based on inclusion criteria; $^{2)}$ by comparing the variables nationality and country of residence; $^{3)}$ available for wave 3. ^{anon}: anonymized due to data protection. $^{\mathbf{1)}}$LORA COVID is a subsample of LORA, and MARP Reality of the MARP sample, respectively. These subsamples took part in extra assessments during the COVID-19 pandemic. Information about the variables available in these subsamples is given in brackets.

and describe their research question. All requests are handled by the RESPOND Research consortium. Upon initial approval the requests are forwarded to the respective data owners and consortia. If all approvals are given the researcher is added to the individual servers and granted access to the data. All permissions are time-limited but can be renewed.

4. Discussion

Co-RESPOND is a harmonized individual and longitudinal participant data set of mental health and stressor exposure information collected during the main phases of the COVID-19 pandemic (2020–2023). In this paper we reported on the harmonization process, presented the harmonization products and briefly described the dataset. We further set out recommendations for future studies.

4.1. Co-RESPOND: strengths and limitations

Co-RESPOND has paved the way to mine the wealth of 10 existing observational cohorts in order to make optimal use of mental health data collected during an extraordinary period, i.e. the COVID-19 pandemic. This creates new opportunities to study the impact of micro – and macro-stressors on mental health in diverse samples. Through harmonization a substantially larger, individual-level data pool is now available for research, allowing for advanced statistical methods. Not all included cohorts provided pre-COVID baseline data, but for some, pre-pandemic data at least two years before start of the pandemic could be included (Edad con Salud, LORA, MARP, TEMPO). Notably, the period covered so far (up to May 2023) exceeds common time spans of COVID research, which oftentimes only covered the first pandemic year.

There are many potential ways that researchers could harmonize the longitudinal Co-RESPOND mental health data further for their individual research question. This could involve a binarization of the outcome in terms of better, same or worse in comparison to a chosen baseline or whether a score is above or below a cut-off (see Saunders et al., 2023). The preservation of the original scores, however, also allows for a more complex analysis, such that are used in the field of resilience research, where researchers are able to plot trajectories after stressor exposure for different outcomes (Infurna & Luthar, 2016) or operationalize an outcome-based resilience score by regressing mental health against stressor exposure (Bögemann et al., 2023). Likely, these approaches will require a two-step IPD meta-analysis.

As retrospective data harmonization projects do, also this project required many efforts and dedication from researchers involved in the project, which was and still is much appreciated and has never been taken for granted.

To keep everybody dedicated, we tried to create a collaborative atmosphere from the start. An early buy-in in terms of regular meetings helped

Table 6. Count of items that ask about adversity and stressors per cohort.

	Type			Topics								
	Life events	General	COVID-19 related	Work/ employment	Finances	COVID-19 exposure	Family and household dynamics	Worries, Health, Wellbeing	Social and recreational activities	Violence and crime	Healthcare work related	Other
COMET	4	11	33	4	5	6	7	2	18	4	0	0
COVID and I	2	13	18	3	1	9	5	6	9	0	0	0
DynaCORE-L	2	9	29	9	2	4	6	5	12	1	0	1
Edad con Salud	6	18	11	3	9	5	7	9	0	2	0	0
HEROES-NL	4	8	16	9	0	3	6	7	0	0	3	0
HEROES-ES	4	7	16	9	0	3	6	6	0	0	3	0
LORA (*LORA*	28	58	32	14	6	0	35	12	0	5	0	13
COVID)[1]	*27*	*58*		*23*	*7*	*4*	*38*	*16*	*12*	*6*	*0*	*13*
MARP (*MARP*	27	58		14	6	0	35	12	0	5	0	13
Reality)[1]	*27*	*58*	32	*23*	*7*	*4*	*38*	*15*	*12*	*6*	*0*	*13*
Mind COVID	7	10	17	3	2	8	8	10	0	3	0	0
TEMPO	9	45	36	19	11	7	13	17	9	14	0	0

Note: The categorizations of the stressor candidates are merely illustrative of the topics covered by the items. Some items fit in more than one category or topic but are only counted once. Researchers are encouraged to assess items based on their research questions. [1]LORA COVID is a subsample of LORA, and MARP Reality of the MARP sample, respectively. These subsamples took part in extra assessments during the COVID-19 pandemic. The numbers of stressors in these additional assessments are given in italics.

to build trust and motivation between partners. Co-RESPOND also profited from a very benevolent, supporting RESPOND leadership that firmly and repeatedly expressed their interest in the Co-RESPOND project. Clear communication and a co-operative atmosphere were essential to address concerns, share experiences and find solutions and workarounds to issues raised. The project was also presented and discussed at conferences at a very early stage, which generated helpful thoughts and suggestions from the scientific community. We also aimed at stating clearly operationalized targets and tasks that the partners would agree to aim for. Last, the central, accessible document library including manuals and dashboards for incoming questions along with hands-on solutions were helpful for keeping the project running.

Co-RESPOND is an ad-hoc sample of cohorts, which was created during the COVID pandemic by collaborators who were willing to share their research data. Not all cohorts include pre-pandemic data, as some were only set up as the pandemic started. Importantly, the studies include a variety of mental health measures that are not always directly harmonizable. The original aims of the studies were manifold, which is reflected in the types of additional measures covering psychological concepts such as personality, coping and social support. The participating cohorts were not identified by systematic searches, and the data set cannot be regarded as comprehensive. However, it is open for more cohorts to join. After transforming existing data according to the transformation handbook, any new cohorts could be linked to the federated data analysis network (FDN). Extensive and transparent documentation is made available to facilitate this process. Since only anonymous data are included, the network is available to any new cohorts globally as long as the anonymization SOP is followed pre-upload. In order to grant access to the data sustainably, the central data management officer of our institute (Leibniz Institute for Resilience Research Mainz) is involved in the project and will take stewardship for the OBiBa infrastructure ex officio. Co-RESPOND has and is going to be promoted and made known to potential new partners and consumers by this flag paper and ongoing publications based on the Co-RESPOND data but also by presentations at international conferences. In concordance with the Maelstrom guidance (Fortier et al., 2017), thorough methods have been applied in a three-step approach to ensure the quality of the harmonized data, including manual data checks by the data-owners, cross-checks by external Co-RESPOND partners, and automated data checks and data cleaning as recommended for larger-scale data sets (dataReporter) (Petersen & Ekstrøm, 2019).

As with any retrospective data harmonization projects, it was not possible to harmonize data across all data sets, and harmonization sometimes included some data loss due to the need to group data into 'least-common-denominator' categories. Still, some information loss is inevitable when generalizing data in order to put it non linkable to existing individual subjects.

A limitation of the harmonized data set is the fact that it only holds anonymous data. This was necessary to prevent data protection violations, which would have taken place if pseudonymized data had been used, given that cohort participants had originally not explicitly consented to use their individual-level data for this purpose. However, anonymization, which, by definition, rules out the identification of individual subjects, prevents adding new data waves to the data sets. If any new data is available, a completely new data set including all data waves so far must be created.

By including anonymous data only, however, the OBiBa-based FDN did not have to make use of DataSHIELD. DataSHIELD ensures that a remote client (i.e. an external, collaborating researcher) who sends statistical commands to be performed on the local server of the data-owning site would only receive non-disclosive information, such as aggregate data (Marcon et al., 2021; Puskaric et al., 2024). The data protection officers within the consortium determined that this in itself would constitute processing of personal data and therefore fell within the GDPR. Therefore, only fully anonymized data was uploaded on Opal.

A unique feature of the harmonized data set is the post-hoc identification and labelling of adversity and stressor exposure (including major life events and minor inconveniences). This allows for new and advanced research into adversity and the effect of stressor exposure on mental health.

We believe the use of Co-RESPOND data has the potential to inform policy and decision makers internationally regarding measures to be taken for pandemic preparedness by providing large-scale data that were collected during COVID-19.

4.2. Recommendations and outlook

Like many other research groups (Abbasizanjani et al., 2023; Gómez et al., 2024; Hufstedler et al., 2024; Tacconelli et al., 2022; Wey et al., 2021), we learned that data harmonizing is work-intensive, and that legal regulations regarding data protection are challenging when it comes to the practical data sharing, or, making them available to partners in a GDPR-compliant way. To our experience, the OBiBa software, i.e. Agate, Opal and Mica, provided a practicable solution to make this feasible, though some help by IT departments will be necessary for epidemiologic researchers, especially when it comes to installing the OBiBa infrastructure. Though GDPR regulations are sometimes challenging, it is helpful at the same time that all partners (who all were EU-based) applied to them.

In order to minimize retrospective data harmonization efforts for future projects, standard assessment of mental health, as well as classification of codes included in basically all studies would be desirable. Researchers should aim to include frequently used and standardized mental health scales, to facilitate harmonization across studies. While the standard measure will differ between fields, if feasible a general short measure such as the General Health Questionnaire (Goldberg & Hillier, 1979; Wojujutari et al., 2024) could be added so that the study could be included in harmonized datasets. Furthermore, coding sociodemographics such as gender, age, place of residence, education and profession could be done in a more standard way from the start. Methods of well-established international surveys could be used for orientation, e.g. the EU statistics on income and living (EU-SILC) (Eurostat, 2022) or the sociodemographic survey (ESS) (About ESS | European Social Survey, 2024). If analogous codings are used, newly collected data could be linked to this survey data providing contextual information, which means an enormous enrichment of the information in many perspectives. Disorders and diseases should be coded using the DSM or ICD system. The Maelstrom guidance offers hands-on advice, which was, however, not fully applicable to mental health studies, being too generic as regards the categorization of psychological variables (Bergeron et al., 2018). Indeed, it is very difficult, if not impossible, to provide recommendations on categorization, or cataloguing of variables that would be applicable for all kinds of research. Depending on the main research focus, more advanced categories etc. might be necessary for individual topics. There have been efforts already to define universal data standards to increase the interoperability of primary research, for example, the Clinical Data Interchange Standards Consortium (CDISC) (CDISC | Clear Data, 2024) for clinical trial data and the Observational Medical Outcomes Partnership (OMOP Common Data Model) (Data Standardization – OHDSI, 2024) which is dedicated to observational health data. Currently, several such data standards exist, and researchers involved in primary research might find it difficult to decide which one should be used. FAIRsharing https://fairsharing.org) is a searchable database of available standards, databases, repositories and data policies related to diverse sciences, and includes guidelines related to reporting, terminology, structured information formats and unique identification of research. At https://www.global-psychotrauma.net/fair-tools, the Global Collaboration on Traumatic Stress provides a toolkit of helpful

Table 7. Suggested classification systems.

Domain	Classification system
Self-identified gender	No standard classification available. WHO recognizes that gender is a social construction and recommends considering more options than only female and male
Health	WHO International Classification of Functioning, Disability and Health (ICF) (International Classification of Functioning, Disability and Health (ICF), 2024) WHO International Classification of Diseases (ICD) (ICD-11, 2024)
Income	EuroStat: EU-SILC (European Union Statistics on Income and Living Conditions) income quartiles/quintiles (Eurostat, 2022)
Education	International Standard Classification of Education (ISCED) classification (International Standard Classification of Education (ISCED), 2024)
Occupation	International Standard Classification of Occupations (ISCO) (International Standard Classification of Occupations (ISCO), 2024)
Geographical information	Europe: Eurostat NUTS codes, compatible to Eurostat indicators (Overview - Eurostat, 2024); Worldwide: UN M49 country codes (UNSD - Classification Detail, 2024)

resources that support FAIR data practices, with a focus on trauma research. The Mission of the Data Curation Network (https://datacurationnetwork.org/about-the-dcn/), however, is the training in and application of best practices of data curation by connecting researchers and experts across institutions as well as providing tools and education resources.

Table 7 includes some classification standards that we found helpful for re-coding data, and which could be regarded as 'the least common multiple'.

Apart from semantic interoperability, there are some basic principles of good research practice that we regard extremely helpful for retrospective data harmonization and evidence synthesis:

- Study protocols should be available. While clinical trials require an *a priori* publication of study protocols in trial registries, this is not the case for observational research. However, study protocols should be held current, and amendments should be detailed.
- If applicable, data standard forms should be used to ensure interoperability of data but also minimize efforts relating to the designing of studies. FAIR-sharing could be used to identify relevant guidance and tools.
- Study participants' consent to process and share their data for individual-level evidence synthesis after the primary research has been concluded should be requested in a way that it could be made available in a pseudonymized way on the individual subject level. For ongoing longitudinal research, this would allow to update existing data sets by adding more recent data waves, which is only possible if data can be made available in a pseudonymized format on the individual participant level.
- Codebooks should be kept available and up to date. The recording of any modifications, along with data when they took place, is vital to keep data transparent. Ideally, an external person should be able to trace and comprehend any edits.
- The proper documentation of any data transformation steps taken (such as calculation of sum scores) is vital to ensure reliability and validity of the integrated data, ensuring data quality, reproducibility, and transparency.
- The funding of data managers is vital. Sustainable and FAIR stewardship of data should be a prerequisite of research, both to avoid redundancy and for ethical reasons. This is especially the case for large-scale research, such as observational cohorts.
- Similarly, IT positions must be adequately considered in research grants.

In sum, decision-makers and researchers must be aware of the effects needed to (mostly manually) transform existing data, and adequate financial as well as human resources must be available to produce harmonized data sets that could not only be used by those who have done the transformation process. Other researchers who had not been involved must be able to understand how the data sets have been generated, and any steps taken must be transparent and reproducible (Tacconelli et al., 2022). Any funding must include adequate funding and allow for sufficient periods of time to conduct the harmonization project.

In conclusion, Co-RESPOND hopes to harness the valuable and unique data gathered during the COVID-19 pandemic and open possibilities for more advanced researchers. Co-RESPOND has harmonized mental health, stressor exposure and other psychological trait variables of 10 cohorts including 50,885 participants. Documentation is transparent and harmonization procedures can be applied to additional, new datasets. In doing so we have created sustainably operable individual participant data, accelerating research and supporting evidence integration and synthesis. This is even more important in times of global challenges such as climate change or pandemics, which will require timely response.

Acknowledgements

We thank the participants and the consortia of all the collaborating studies. The Co-RESPOND initiative uses OBiBa (www.obiba.org), a software suite developed by Maelstrom Research (www.maelstrom-research.org).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This project has received funding from the European Union's Horizon 2020 Research and Innovation program under grant agreement numbers 101016127 (RESPOND project) and 777084 (DynaMORE project).

Data availability statement

Access to the harmonized data sets is available upon request, see data access request in Supplement 5.

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References

Abbasizanjani, H., Torabi, F., Bedston, S., Bolton, T., Davies, G., Denaxas, S., Griffiths, R., Herbert, L., Hollings, S., Keene, S., Khunti, K., Lowthian, E., Lyons, J., Mizani, M. A., Nolan, J., Sudlow, C., Walker, V., Whiteley, W., Wood, A., … CVD-COVID-UK/COVID-IMPACT Consortium. (2023). Harmonising electronic health records for reproducible research: Challenges, solutions and recommendations from a UK-wide COVID-19 research collaboration. *BMC Medical Informatics and Decision Making*, *23*(1), 8. doi:10.1186/s12911-022-02093-0

About ESS | European Social Survey. (2024). https://www.europeansocialsurvey.org/about-ess. Accessed October 9, 2024.

Achenbach, T. M. (2017). Achenbach System of Empirically Based Assessment (ASEBA). In J. Kreutzer, J. DeLuca, & B. Caplan (Eds.), *Encyclopedia of clinical neuropsychology* (pp. 1–7). Springer International Publishing. doi:10.1007/978-3-319-56782-2_1529-3

Ahmed, N., Barnett, P., Greenburgh, A., Pemovska, T., Stefanidou, T., Lyons, N., Ikhtabi, S., Talwar, S., Francis, E. R., Harris, S. M., Shah, P., Machin, K., Jeffreys, S., Mitchell, L., Lynch, C., Foye, U., Schlief, M., Appleton, R., Saunders, K. R. K., … Johnson, S. (2023). Mental health in Europe during the COVID-19 pandemic: A systematic review. *The Lancet Psychiatry*, *10*(7), 537–556. doi:10.1016/S2215-0366(23)00113-X

Ahrens, K. F., Neumann, R. J., Kollmann, B., Brokelmann, J., von Werthern, N. M., Malyshau, A., Weichert, D., Lutz, B., Fiebach, C. J., Wessa, M., Kalisch, R., Plichta, M. M., Lieb, K., Tüscher, O., & Reif, A. (2021). Impact of COVID-19 lockdown on mental health in Germany: Longitudinal observation of different mental health trajectories and protective factors. *Translational Psychiatry*, *11*(1), 1–10. doi:10.1038/s41398-021-01508-2

Alonso, J. (2022). MIND/COVID-19: Mental health impact and NeeDs associated with covid-19: A comprehensive national evaluation in Spain. clinicaltrials.gov. https://clinicaltrials.gov/study/NCT04556565. Accessed October 9, 2024.

Austin, B. A. (1983). Factorial structure of the UCLA loneliness scale. *Psychological Reports*, *53*(3), 883–889. doi:10.2466/pr0.1983.53.3.883

Ayuso-Mateos, J. L., Morillo, D., Haro, J. M., Olaya, B., Lara, E., & Miret, M. (2021). Changes in depression and suicidal ideation under severe lockdown restrictions during the first wave of the COVID-19 pandemic in Spain: A longitudinal study in the general population. *Epidemiology and Psychiatric Sciences*, *30*, e49. doi:10.1017/S2045796021000408

Bech, P., Lunde, M., & Møller, S. B. (2012). Eysenck's Two Big personality factors and their relationship to depression in patients with chronic idiopathic pain disorder: A clinimetric validation analysis. *ISRN Psychiatry*, *2012*, 140458. doi:10.5402/2012/140458

Bergeron, J., Doiron, D., Marcon, Y., Ferretti, V., & Fortier, I. (2018). Fostering population-based cohort data discovery: The maelstrom research cataloguing toolkit. *PLoS One*, *13*(7), e0200926. doi:10.1371/journal.pone.0200926

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): development and initial psychometric evaluation. *Journal of Traumatic Stress*, *28*(6), 489–498. doi:10.1002/jts.22059

Bögemann, S. A., Puhlmann, L. M. C., Wackerhagen, C., Zerban, M., Riepenhausen, A., Köber, G., Yuen, K. S. L., Pooseh, S., Marciniak, M. A., Reppmann, Z., Uściłko, A., Weermeijer, J., Lenferink, D. B., Mituniewicz, J., Robak, N., Donner, N. C., Mestdagh, M., Verdonck, S., van Dick, R., … Kalisch, R. (2023). Psychological resilience factors and their association With weekly stressor reactivity during the COVID-19 outbreak in Europe: Prospective longitudinal study. *Jmir Mental Health*, *10*, e46518. doi:10.2196/46518

Brown, R. L., & Rounds, L. A. (1995). Conjoint screening questionnaires for alcohol and other drug abuse: Criterion validity in a primary care practice. *Wisconsin Medical Journal*, *94*(3), 135–140.

Canli, T., Qiu, M., Omura, K., Congdon, E., Haas, B. W., Amin, Z., Herrmann, M. J., Constable, R. T., & Lesch, K. P. (2006). Neural correlates of epigenesis. *Proceedings of the National Academy of Sciences*, *103*(43), 16033–16038. doi:10.1073/pnas.0601674103

Cantril, H. (1965). The pattern of human concerns. Published online 1965.

Carver, C. S. (1997). You want to measure coping but your protocol' too long: Consider the brief cope. *International Journal of Behavioral Medicine*, *4*(1), 92–100. doi:10.1207/s15327558ijbm0401_6

CDISC | Clear Data. (2024). Clear Impact. https://www.cdisc.org/. Accessed September 10, 2024.

Chmitorz, A., Kurth, K., Mey, L. K., Wenzel, M., Lieb, K., Tüscher, O., Kubiak, T., & Kalisch, R. (2020a). Assessment of microstressors in adults: Questionnaire development and ecological validation of the Mainz Inventory of Microstressors. *Jmir Mental Health*, *7*(2), e14566. doi:10.2196/14566

Chmitorz, A., Neumann, R. J., Kollmann, B., Ahrens, K. F., Öhlschläger, S., Goldbach, N., Weichert, D., Schick, A., Lutz, B., Plichta, M. M., Fiebach, C. J., Wessa, M., Kalisch, R., Tüscher, O., Lieb, K., & Reif, A. (2020b). Longitudinal determination of resilience in humans to identify mechanisms of resilience to modern-life stressors: The longitudinal resilience assessment (LORA) study. *European Archives of Psychiatry and Clinical Neuroscience*, *271*(6), 1035–1051. doi:10.1007/s00406-020-01159-2

Connor, K. M., & Davidson, J. R. T. (2003). Development of a new resilience scale: The Connor-Davidson Resilience

Scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82. doi:10.1002/da.10113

COVID-19 Mental Disorders Collaborators. (2021). Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *The Lancet*, *398*(10312), 1700–1712. doi:10.1016/S0140-6736(21)02143-7

Czepiel, D., McCormack, C., da Silva, A. T. C., Seblova, D., Moro, M. F., Restrepo-Henao, A., Martínez, A. M., Afolabi, O., Alnasser, L., Alvarado, R., Asaoka, H., Ayinde, O., Balalian, A., Ballester, D., Barathie, J. A. L., Basagoitia, A., Basic, D., Burrone, M. S., Carta, M. G., … van der Ven, E. (2024). Inequality on the frontline: A multi-country study on gender differences in mental health among healthcare workers during the COVID-19 pandemic. *Glob Ment Health (Camb)*, *11*, e34. doi:10.1017/gmh.2024.18

Data Standardization – OHDSI. (2024). https://www.ohdsi.org/data-standardization/. Accessed September 4, 2024.

Doiron, D., Marcon, Y., Fortier, I., Burton, P., & Ferretti, V. (2017). Software application profile: Opal and Mica: Open-source software solutions for epidemiological data management, harmonization and dissemination. *International Journal of Epidemiology*, *46*(5), 1372–1378. doi:10.1093/ije/dyx180

Eren, F., Kousignian, I., Wallez, S., Melchior, M., & Mary-Krause, M. (2023). Association between individuals' locus of control and mental health during the COVID-19 pandemic. *Journal of Affective Disorders Reports*, *14*(100678), doi:10.1016/j.jadr.2023.100678

Eurostat. (2022). Mean and median income by household type - EU-SILC and ECHP surveys. Published online 2022.. doi:10.2908/ILC_DI04

Fortier, I., Doiron, D., Wolfson, C., & Raina, P. (2012). Harmonizing data for collaborative research on aging: Why should We foster such an agenda? *Canadian Journal on Aging / La Revue Canadienne du Vieillissement*, *31*(1), 95–99. doi:10.1017/S0714980811000729

Fortier, I., Raina, P., Van den Heuvel, E. R., Griffith, L. E., Craig, C., Saliba, M., Doiron, D., Stolk, R. P., Knoppers, B. M., Ferretti, V., Granda, P., & Burton, P. (2017). Maelstrom research guidelines for rigorous retrospective data harmonization. *International Journal of Epidemiology*, *46*(1), 103–105. doi:10.1093/ije/dyw075

Fydrich, T., Sommer, G., Tydecks, S., & Brähler, E. (2009). Fragebogen zur sozialen Unterstützung (F-SozU): Normierung der Kurzform (K-14). [Social Support Questionnaire (F-SozU): standardization of short form (K-14).]. *Zeitschrift für Medizinische Psychologie*, *18*(1), 43–48

Garnefski, N., & Kraaij, V. (2006). Cognitive emotion regulation questionnaire – development of a short 18-item version (CERQ-short). *Personality and Individual Differences*, *41*(6), 1045–1053. doi:10.1016/j.paid.2006.04.010

Gaye, A., Marcon, Y., Isaeva, J., LaFlamme, P., Turner, A., Jones, E. M., Minion, J., Boyd, A. W., Newby, C. J., Nuotio, M. L., Wilson, R., Butters, O., Murtagh, B., Demir, I., Doiron, D., Giepmans, L., Wallace, S. E., Budin-Ljøsne, I., Oliver Schmidt, C., … Burton, P. R. (2014). DataSHIELD: Taking the analysis to the data, not the data to the analysis. *International Journal of Epidemiology*, *43*(6), 1929–1944. doi:10.1093/ije/dyu188

Glaesmer, H., Rief, W., Martin, A., Mewes, R., Brähler, E., Zenger, M., & Hinz, A. (2012). Psychometric properties and population-based norms of the Life Orientation Test Revised (LOT-R): psychometric properties of the LOT-R. *British Journal of Health Psychology*, *17*(2), 432–445. doi:10.1111/j.2044-8287.2011.02046.x

Glasziou, P., Altman, D. G., Bossuyt, P., Boutron, I., Clarke, M., Julious, S., Michie, S., Moher, D., & Wager, E. (2014). Reducing waste from incomplete or unusable reports of biomedical research. *Lancet*, *383*(9913), 267–276. doi:10.1016/S0140-6736(13)62228-X

Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, *9*(1), 139–145. doi:10.1017/s0033291700021644

Gómez, G., Hufstedler, H., Montenegro Morales, C., Roell, Y., Lozano-Parra, A., Tami, A., Magalhaes, T., Marques, E. T. A., Balmaseda, A., Calvet, G., Harris, E., Brasil, P., Herrera, V., Villar, L., Maxwell, L., Jaenisch, T., & ReCoDID. (2024). Pooled cohort profile: ReCoDID consortium's harmonized acute febrile illness arbovirus meta-cohort. *JMIR Public Health Surveill*, *10*, e54281. doi:10.2196/54281

Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S., & Tatlow, H. (2021). A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nat Hum Behav*, *5*(4), 529–538. doi:10.1038/s41562-021-01079-8

Hecker, I., El Aarbaoui, T., Wallez, S., Andersen, A. J., Ayuso-Mateos, J. L., Bryant, R., Corrao, G., McDaid, D., Mediavilla, R., Mittendorfer-Rutz, E., Compagnoni, M. M., Park, A. L., Riepenhausen, A., Rigotti, T., Seeber, K., Sijbrandij, M., Smith, P., Tüscher, O., Walter, H., … Melchior, M. (2022). Impact of work arrangements during the COVID-19 pandemic on mental health in France. *SSM - Population Health*, *20*, 101285. doi:10.1016/j.ssmph.2022.101285

Herdman, M., Gudex, C., Lloyd, A., Janssen, M., Kind, P., Parkin, D., Bonsel, G., & Badia, X. (2011). Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Quality of Life Research*, *20*(10), 1727–1736. doi:10.1007/s11136-011-9903-x

Hinkin, C. H., Castellon, S. A., Dickson-Fuhrman, E., Daum, G., Jaffe, J., & Jarvik, L. (2001). Screening for drug and alcohol abuse Among older adults using a modified version of the CAGE. *The American Journal on Addictions*, *10*(4), 319–326. doi:10.1111/j.1521-0391.2001.tb00521.x

Hufstedler, H., Roell, Y., Peña, A., Krishnan, A., Green, I., Barbosa-Silva, A., Kremer, A., Blacketer, C., Fortier, I., Howard, K., LeRoy, B., Hafeza, E., Baorto, D., Swertz, M., Maxwell, L., & Jaenisch, T. (2024). Navigating data standards in public health: A brief report from a data-standards meeting. *Journal of Global Health*, *14*, 03024. doi:10.7189/jogh.14.03024

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys. *Research. on Aging*, *26*(6), 655–672. doi:10.1177/0164027504268574

ICD-11. (2024). https://icd.who.int/en. Accessed September 4, 2024.

Infurna, F. J., & Luthar, S. S. (2016). Resilience to major life stressors Is Not as common as thought. *Perspectives. on Psychological Science*, *11*(2), 175–194. doi:10.1177/1745691615621271

International Classification of Functioning, Disability and Health (ICF). (2024). https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health. Accessed September 4, 2024.

International Standard Classification of Education (ISCED). (2024). ILOSTAT. https://ilostat.ilo.org/methods/concepts-and-definitions/classification-education/. Accessed September 6, 2024.

International Standard Classification of Occupations (ISCO). (2024). ILOSTAT. https://ilostat.ilo.org/methods/concepts-and-definitions/classification-occupation/. Accessed September 10, 2024.

Javakhishvili, J. D., Arnberg, F., Greenberg, N., Kazlauskas, E., Lotzin, A., & Xavier, M. (2022). Dealing with the COVID-19 pandemic in Europe: Five lessons from the European society for traumatic stress studies. *European Journal of Psychotraumatology*, *13*(1), 2046330. doi:10.1080/20008198.2022.2046330

Kalisch, R., Köber, G., Binder, H., Ahrens, K., Basten, U., Chmitorz, A., Fiebach, C., Goldbach, N., Neumann, R., Kampa, M., Kollmann, B., Lieb, K., Plichta, M., Reif, A., Schick, A., Sebastian, A., Wessa, M., Yuen, K., Tuescher, O. & Engen, H. (2020). A generic solution for the operationalization and measurement of resilience and resilience processes in longitudinal observations: Rationale and basic design of the MARP and LORA studies. *Published Online March*, *29*. doi:10.31234/osf.io/jg238

Kocalevent, R. D., Berg, L., Beutel, M. E., Hinz, A., Zenger, M., Härter, M., Nater, U., & Brähler, E. (2018). Social support in the general population: Standardization of the Oslo social support scale (OSSS-3). *Bmc Psychology*, *6*(1), 31. doi:10.1186/s40359-018-0249-9

Körner, A., Geyer, M., Roth, M., Drapeau, M., Schmutzer, G., Albani, C., Schumann, S., & Brähler, E. (2008). [Personality assessment with the NEO-five-factor inventory: The 30-item-short-version (NEO-FFI-30)]. *Psychotherapie, Psychosomatik, Medizinische Psychologie*, *58*(6), 238–245. doi:10.1055/s-2007-986199

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9. *Journal of General Internal Medicine*, *16*(9), 606–613. doi:10.1046/j.1525-1497.2001.016009606.x

Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ–4. *Psychosomatics*, *50*(6), 613–621. doi:10.1016/S0033-3182(09)70864-3

Kroenke, K., Wu, J., Yu, Z., Bair, M. J., Kean, J., Stump, T., & Monahan, P. (2016). Patient Health Questionnaire Anxiety and Depression Scale: Initial validation in three clinical trials. *Psychosomatic Medicine*, *78*(6), 716. doi:10.1097/PSY.0000000000000322

Lara, E., Miret, M., Olaya, B., Caballero, F. F., Morillo, D., Moneta, M. V., Haro, J. M., & Ayuso-Mateos, J. L. (2022). Cohort profile: The Spanish longitudinal study on ageing and health (*edad Con salud*). *International Journal of Epidemiology*, *51*(4), e189–e199. doi:10.1093/ije/dyac118

Loch, N., Hiller, W., & Witthöft, M. (2011). Der cognitive emotion regulation questionnaire (CERQ): erste teststatistische Überprüfung einer deutschen adaption. *Zeitschrift für Klinische Psychologie und Psychotherapie*, *40*(2), 94–106. doi:10.1026/1616-3443/a000079

Lorant, V., Smith, P., Van den Broeck, K., & Nicaise, P. (2021). Psychological distress associated with the COVID-19 pandemic and suppression measures during the first wave in Belgium. *BMC Psychiatry*, *21*(1), 112. doi:10.1186/s12888-021-03109-1

Marcon, Y., Bishop, T., Avraam, D., EscribMarcon, Y., Bishop, T., Avraam, D., Escriba-Montagut, X., Ryser-Welch, P., Wheater, S., Burton, P., & González, J. R.a-Montagut, X., Ryser-Welch, P., Wheater, S., Burton, P., & González, J. R. (2021). Orchestrating privacy-protected big data analyses of data from different resources with R and DataSHIELD. *PLoS Computational Biology*, *17*(3), e1008880. doi:10.1371/journal.pcbi.1008880

Mary-Krause, M., Herranz Bustamante, J. J., Bolze, C., Galéra, C., Fombonne, E. J., & Melchior, M. (2021). Cohort profile: The TEMPO cohort study. *International Journal of Epidemiology*, *50*(4), 1067–1068k. doi:10.1093/ije/dyab026

Mascayano, F., van der Ven, E., Moro, M. F., Schilling, S., Alarcón, S., Al Barathie, J., Alnasser, L., Asaoka, H., Ayinde, O., Balalian, A. A., Basagoitia, A., Brittain, K., Dohrenwend, B., Durand-Arias, S., Eskin, M., Fernández-Jiménez, E., Freytes Frey, M. I., Giménez, L., Gisle, L., … HEROES group. (2022). The impact of the COVID-19 pandemic on the mental health of healthcare workers: Study protocol for the COVID-19 HEalth caRe wOrkErS (HEROES) study. *Social Psychiatry and Psychiatric Epidemiology*, *57*(3), 633–645. doi:10.1007/s00127-021-02211-9

Mediavilla, R., Fernández-Jiménez, E., Martínez-Alés, G., Moreno-Küstner, B., Martínez-Morata, I., Jaramillo, F., Morán-Sánchez, I., Minué, S., Torres-Cantero, A., Alvarado, R., Ayuso-Mateos, J. L., Mascayano, F., Susser, E., Bravo-Ortiz, M. F., & COVID-19 Health Care Workers (C19-HCW) Working Group. (2021). Role of access to personal protective equipment, treatment prioritization decisions, and changes in job functions on health workers' mental health outcomes during the initial outbreak of the COVID-19 pandemic. *Journal of Affective Disorders*, *295*, 405–409. doi:10.1016/j.jad.2021.08.059

Mortier, P., Vilagut, G., Ferrer, M., Alayo, I., Bruffaerts, R., Cristóbal-Narváez, P., Del Cura-González, I., Domènech-Abella, J., Felez-Nobrega, M., Olaya, B., Pijoan, J. I., Vieta, E., Pérez-Solà, V., Kessler, R. C., Haro, J. M., Alonso, J. & MINDCOVID Working group. (2021). Thirty-day suicidal thoughts and behaviours in the Spanish adult general population during the first wave of the Spain COVID-19 pandemic. *Epidemiology and Psychiatric Sciences*, *30*(e19), doi:10.1017/S2045796021000093

Moulin, F., Jean, F., Melchior, M., Patanè, M., Pinucci, I., Sijbrandij, M., van der Waerden, J., & Galéra, C (2023). Longitudinal impact of the COVID19 pandemic on mental health in a general population sample in France: Evidence from the COMET study. *Journal of Affective Disorders*, *320*, 275–283. doi:10.1016/j.jad.2022.09.142

O'Donnell, M. L., & Greene, T. (2021). Understanding the mental health impacts of COVID-19 through a trauma lens. *European Journal of Psychotraumatology*, *12*(1), 1982502. doi:10.1080/20008198.2021.1982502

Ortiz-Calvo, E., Martínez-Alés, G., Mediavilla, R., González-Gómez, E., Fernández-Jiménez, E., Bravo-Ortiz, M. F., Moreno-Küstner, B., & COVID-19 HEalth caRe wOrkErS – Spain (HEROES-SPA) Group. (2022). The role of social support and resilience in the mental health impact of the COVID-19 pandemic among healthcare workers in Spain. *Journal of Psychiatric Research*, *148*, 181–187. doi:10.1016/j.jpsychires.2021.12.030

Overview - Eurostat. (2024). https://ec.europa.eu/eurostat/web/nuts. Accessed August 22, 2024.

Petersen, A. H., & Ekstrøm, C. T. (2019). Datamaid: Your assistant for documenting supervised data quality screening in R. *Journal of Statistical Software*, *90*, 1–38. doi:10.18637/jss.v090.i06

Petri-Romão, P., Engen, H., Rupanova, A., Puhlmann, L., Zerban, M., Neumann, R. J., Malyshau, A., Ahrens, K. F., Schick, A., Kollmann, B., Wessa, M., Walker, H., Plichta, M. M., Reif, A., Chmitorz, A., Tuescher, O., Basten, U., & Kalisch, R. (2024). Self-report assessment of positive appraisal style (PAS): development of a process-focused and a content-focused questionnaire for use in mental health and resilience research. *PLoS One*, *19*(2), e0295562. doi:10.1371/journal.pone.0295562

Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., Currier, G. W., Melvin, G. A., Greenhill, L., Shen, S., & Mann, J. J. (2011). The Columbia–suicide severity rating scale: Initial validity and internal consistency findings from three multisite studies with adolescents and adults. *AJP*, *168*(12), 1266–1277. doi:10.1176/appi.ajp.2011.10111704

Price, M., Szafranski, D. D., van Stolk-Cooke, K., & Gros, D. F. (2016). Investigation of abbreviated 4 and 8 item versions of the PTSD checklist 5. *Psychiatry Research*, *239*, 124–130. doi:10.1016/j.psychres.2016.03.014

Prins, A., Bovin, M. J., Smolenski, D. J., Marx, B. P., Kimerling, R., Jenkins-Guarnieri, M. A., Kaloupek, D. G., Schnurr, P. P., Kaiser, A. P., Leyva, Y. E., & Tiet, Q. Q. (2016). The primary care PTSD screen for DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. *Journal of General Internal Medicine*, *31*(10), 1206–1211. doi:10.1007/s11606-016-3703-5

Puskaric, M., Chandramouli, B., Osmo, T., Gusinow, R., Dellacasa, C., Rossi, E., Cataudella, S., Górska, A., & Rinaldi, E. (2024). Privacy-Preserving workflow for the cross-border federated analysis of clinical data. *Studies in Health Technology and Informatics*, *316*, 1637–1641. doi:10.3233/SHTI240737

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, *41*(1), 203–212. doi:10.1016/j.jrp.2006.02.001

REGULATION (EU) 2016/ 679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 27 April. (2016). - on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/ 46/ EC (General Data Protection Regulation).

RESPOND project. (2022). RESPOND project. https://respond-project.eu/. Accessed April 11, 2022.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, *80*(1), 1–28. doi:10.1037/h0092976

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the alcohol Use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption–II. *Addiction*, *88*(6), 791–804. doi:10.1111/j.1360-0443.1993.tb02093.x

Saunders, K. R. K., Landau, S., Howard, L. M., Fisher, H. L., Arseneault, L., McLeod, G. F. H., & Oram, S. (2023). Past-year intimate partner violence perpetration among people with and without depression: An individual participant data (IPD) meta-mediation analysis. *Social Psychiatry and Psychiatric Epidemiology*, *58*(12), 1735–1747. doi:10.1007/s00127-021-02183-w

Schäfer, S. K., Kunzler, A. M., Kalisch, R., Tüscher, O., & Lieb, K. (2022). Trajectories of resilience and mental distress to global major disruptions. *Trends in Cognitive Sciences*, *26*(12), 1171–1189. doi:10.1016/j.tics.2022.09.017

Schwartz, S. H., & Cieciuch, J. (2022). Measuring the refined theory of individual values in 49 cultural groups: Psychometrics of the revised portrait value questionnaire. *Assessment*, *29*(5), 1005–1019. doi:10.1177/1073191121998760

Schwarzer, R., Jerusalem, M., Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). NFER-Nelson.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: Assessing the ability to bounce back. *International Journal of Behavioral Medicine*, *15*(3), 194–200. doi:10.1080/10705500802222972

Spitzer, R. L., & Kroenke, K. (1999). Williams JBW, and the Patient Health Questionnaire Primary Care Study Group. Validation and utility of a self-report version of PRIME-MDThe PHQ primary care study. *JAMA*, *282*(18), 1737–1744. doi:10.1001/jama.282.18.1737

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. doi:10.1001/archinte.166.10.1092

Spitzer, R. L., Williams, J. B. W., Kroenke, K., Hornyak, R., & McMurray, J. (2000). Validity and utility of the PRIME-MD patient health questionnaire in assessment of 3000 obstetric-gynecologic patients: The PRIME-MD patient health questionnaire obstetrics-gynecology study. *American Journal of Obstetrics and Gynecology*, *183*(3), 759–769. doi:10.1067/mob.2000.106580

Sterling, M. (2011). General health questionnaire – 28 (GHQ-28). *Journal of Physiotherapy*, *57*(4), 259. doi:10.1016/S1836-9553(11)70060-1

Stoffers-Winterling, J. M., Wiegand, H. F., Broll, J., Schäfer, S. K., Adorjan, K., Tüscher, O., & Lieb, K. (2025). [The COVID-19 pandemic in Germany: Mental health trajectories, resilient and vulnerable groups]. *Nervenarzt*, *96*(3), 266–271. doi:10.1007/s00115-025-01824-8

Sun, Y., Wu, Y., Fan, S., Dal Santo, T., Li, L., Jiang, X., Li, K., Wang, Y., Tasleem, A., Krishnan, A., He, C., Bonardi, O., Boruff, J. T., Rice, D. B., Markham, S., Levis, B., Azar, M., Thombs-Vite, I., Neupane, D., … Thombs, B. D. (2023). Comparison of mental health symptoms before and during the COVID-19 pandemic: Evidence from a systematic review and meta-analysis of 134 cohorts. *BMJ*, *380*, e074224. doi:10.1136/bmj-2022-074224

Tacconelli, E., Gorska, A., Carrara, E., Davis, R. J., Bonten, M., Friedrich, A. W., Glasner, C., Goossens, H., Hasenauer, J., Abad, J. M. H., Peñalvo, J. L., Sanchez-Niubo, A., Sialm, A., Scipione, G., Soriano, G., Yazdanpanah, Y., Vorstenbosch, E., & Jaenisch, T. (2022). Challenges of data sharing in European COVID-19 projects: A learning opportunity for advancing pandemic preparedness and response. *The Lancet Regional Health - Europe*, *21*, 100467. doi:10.1016/j.lanepe.2022.100467

UNSD — Classification Detail. (2024). https://unstats.un.org/unsd/classifications/Family/Detail/12. Accessed September 9, 2024.

Ustün, T. B., Chatterji, S., Kostanjsek, N., Rehm, J., Kennedy, C., Epping-Jordan, J., Saxena, S., von Korff, M., Pull, C., & WHO/NIH Joint Project (2010). Developing the World Health Organization Disability Assessment Schedule 2.0. Bulletin of the World Health Organization, 88(11), 815–823. https://doi.org/10.2471/BLT.09.067231

Veer, I. M., Riepenhausen, A., Zerban, M., Wackerhagen, C., Puhlmann, L. M. C., Engen, H., Köber, G., Bögemann, S. A., Weermeijer, J., Uściłko, A., Mor, N., Marciniak, M. A., Askelund, A. D., Al-Kamel, A., Ayash, S., Barsuola, G., Bartkute-Norkuniene, V., Battaglia, S., Bobko, Y., … Kalisch, R. (2021). Psycho-social factors associated with mental resilience in the corona lockdown. *Translational Psychiatry*, *11*(1), 1–11. doi:10.1038/s41398-020-01150-4

Wey, T. W., Doiron, D., Wissa, R., Fabre, G., Motoc, I., Noordzij, J. M., Ruiz, M., Timmermans, E., van Lenthe, F. J., Bobak, M., Chaix, B., Krokstad, S., Raina, P., Sund, E. R., Beenackers, M. A., & Fortier, I. (2021). Overview of retrospective data harmonisation in the MINDMAP project: Process and results. *Journal of Epidemiology & Community Health*, *75*(5), 433–441. doi:10.1136/jech-2020-214259

Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J. W., da Silva Santos, L. B., Bourne, P. E., Bouwman, J., Brookes, A. J., Clark, T., Crosas, M., Dillo, I., Dumon, O., Edmunds, S., Evelo, C. T., Finkers, R., … Mons, B. (2016). The FAIR guiding principles for scientific data management and stewardship. *Scientific Data*, *3*(1), 160018. doi:10.1038/sdata.2016.18

Wittchen, H. U. (1994). Reliability and validity studies of the WHO-composite international diagnostic interview (CIDI): A critical review. *Journal of Psychiatric Research*, *28*(1), 57–84. doi:10.1016/0022-3956(94)90036-1

Witteveen, A. B., Young, S. Y., Cuijpers, P., Ayuso-Mateos, J. L., Barbui, C., Bertolini, F., Cabello, M., Cadorin, C., Downes, N., Franzoi, D., Gasior, M., Gray, B., Melchior, M., van Ommeren, M., Palantza, C., Purgato, M., van der Waerden, J., Wang, S., & Sijbrandij, M. (2023). COVID-19 and common mental health symptoms in the early phase of the pandemic: An umbrella review of the evidence. *PLoS Medicine*, *20*(4), e1004206. doi:10.1371/journal.pmed.1004206

Wojujutari, A. K., Idemudia, E. S., & Ugwu, L. E. (2024). The evaluation of the General Health Questionnaire (GHQ-12) reliability generalization: A meta-analysis. *PLoS One*, *19*(7), e0304182. doi:10.1371/journal.pone.0304182