



A complex system approach towards RESilient and CONNECTED vulnerable European communities in times of change

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Abbreviations

EMA	Ecological Momentary Assessment
SES	Socio-economic status

1. Introduction

The RECONNECTED CEMA study aims to gain a better understanding of the relation between global societal developments and mental health in different vulnerable populations in Europe (e.g. those with low socio-economic status (SES), youth, migrant populations, elderly). To guide the study, an integrative conceptual framework was developed first (see Figure 1). This framework is based on an existing framework for urban mental health developed by one of the consortium partners (Van der Wal et al., 2021) and extended for the RECONNECTED project to include societal developments. The framework uses a complex system perspective which considers mental health as the outcome of the interplay between different risk and protective factors that can act at different levels of description ranging from the societal (meta), physical environmental (macro), social environmental (meso), and individual (micro) level. In line with a complex system perspective, the framework is based on four principles (Van der Wal et al., 2021): 1) the factors and outcomes involved operate as dynamically interacting elements within a complex system, 2) factors are affected by meta-factors at the societal level, 3) interactions between explanatory factors and common mental disorders occur over different time scales, and 4) outcomes can affect explanatory factors (feedback loops).

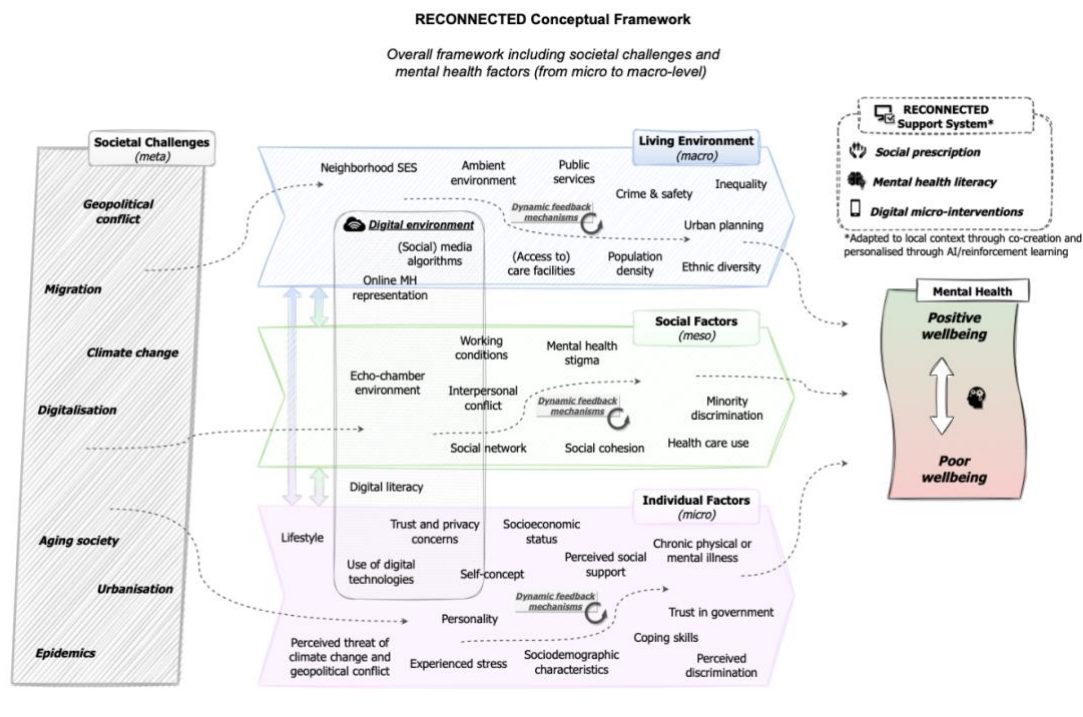


Figure 1 RECONNECTED Conceptual framework

In the CEMA study, we combine registry data, individual cross-sectional questionnaires, and ecological momentary assessment (EMA) to identify conditional relations between factors in the framework. Participants in nine European countries (see Table 1; n=350 per country) complete a survey followed by a two-week period of completing smartphone-based EMA-assessments 5 times a day over 14 days. The survey assesses a broad range of risk and protective factors such as participant characteristics (e.g. demographics), (global) levels of stress (e.g. amount and intensity of daily stressors), mental health outcomes (e.g. quality of life), individual attributes

(e.g. coping skills), and social factors (e.g. level of social isolation). The EMA assessments capture daily stress occurrences and mood fluctuations, coping strategies and social support availability, as well as lifestyle indicators like sleep patterns and physical activity. Postal codes will be used for registry data on urbanicity, pollution, access to mental health services, neighborhood SES, access to public health services, neighborhood diversity.

Specific research aims of the CEMA study are:

1. To describe stressors, other risk- and protective factors at different levels of description, and mental health and wellbeing of different vulnerable populations in Europe.
2. To examine -cross-sectionally- to what extent mental health and wellbeing are related to several risk- and protective factors at the individual-, social-, and environmental level.
3. To investigate the resilience process (stress-regulation strategy-outcome) dynamically in people's daily life using ecological momentary assessments (EMA) to identify adaptive and maladaptive regulation strategies to deal with daily life stressors

Table 1. Country-specific target populations and recruitment procedures.

Country	Target population	Recruitment
Denmark	Youth aged 16-25 from the general population	Posters at relevant educational institutions and social media posts.
Finland	Young adults aged 18-20 from the general population	Through educational institution mailing lists.
France	Adults aged 18 or older residing in low socioeconomic status (SES) geographical areas based on postal code on the outskirts of Paris	Open recruitment through announcements on social media and in local newspapers, public posters, and flyers distributed in targeted neighborhoods. These materials are also placed in strategic locations such as community and social centers, solidarity grocery stores.
Germany	Children aged 12-16 in secondary education in North-Rhine Westphalia, Germany	Mainly open school-based recruitment, additional open recruitment at youth sports clubs and youth recreational clubs.
Kosovo	Adults aged 18 or older, residing in various SES neighborhoods (in low and other SES neighborhoods) in Pristina municipality and surrounding area.	Open recruitment strategy via advertisement through social media, university libraries and social work centres, by distributing posters, flyers and landing page website link, to

		attract potentially interested participants.
The Netherlands	Adults aged 55 or older living in urban areas	Open recruitment strategy through social media, community centers, social work, and public libraries.
The United Kingdom	Non-western migrants aged 18 or older who live in the United Kingdom	Open recruitment via, community workers, email, social media posts, newsletters, university platforms and other local channels, such as cultural centres.
Spain	Migrants aged 18 or older from a Latin-American background in Spain	Open recruitment strategy through, among others, community centers, social workers, and mental health services.
Switzerland	German-speaking adults aged 55 or older from the general population who live in Switzerland	Open recruitment strategy through community centers, social workers, and mental health services, social media, newspaper interviews, among others.

2. Objective

The objective of this deliverable is to provide an overview of recruitment progress of the CEMA study, and to explain the incurred delays in recruitment and data collection.

3. Study progress

3.1 Planning

According to the original timeline, the CEMA study should have started in June 2024. The study experienced a delay, and the first patients was recruited on September 14th, 2024 in Germany (see Table 2). Due to an accumulation of reasons (i.e. absences during the summer, delays in getting some of the ethics approvals, the time it took for translation and the time needed to run all technical pilots in the remaining 8 countries), most countries were only able to start recruitment February/March 2025. In Spain there was an additional delay due the consequences of heavy rain and floodings (DANA) in the Valencia area; In Denmark there was an additional delay due to the PI moving institute and the legal requirements of the new Consortium partner. We anticipate a total delay of 6 months for this first study in most countries. However, we are confident that all sites will eventually meet the recruitment targets.

3.2 Ethical approval

All sites were granted approval by local ethics committees in 2024, in the following order: Denmark: *De Videnskabsetiske Komitéer for Region Syddanmark* – 15 January 2024; Germany received approval from the *Fakultät für Psychologie Ethikkommission* of RUHR University on 21 May 2024; Finland: *The Ethics Committee for Human Sciences at the University of Turku* - 27 June 2024; The Netherlands: *Vaste Commissie Wetenschap & Ethiek* - 11 July 2024; Switzerland: *Ethikkommission für die Forschung am Menschen* - 26 August 2024; France: *Comité de protection des personnes Ouest III* - 30 August 2024; The United Kingdom: *Ethics Committee at St Mary's University* - 28 October 2024; Spain: *Ethics Committee of Research in Humans of the Ethics Commission in Experimental Research, University of Valencia* - 21 November, 2024; Kosovo: *Ethics committee of AAB College* - 29.11.2024.

3.3 Recruitment progress

The first participant was recruited in Germany on September 13, 2024. This participant had a completion rate of 100% for 12 out of the 14 days, the exceptions being the fourth (19%) and fifth (74.7%) days. As of 31 March 2025, a total of 1,107 participants have been recruited, with an average EMA completion rate of nearly 80%. See Table 2 for a detailed overview of the recruitment by site. Filling out the survey at baseline is a requirement for starting the EMA assessment, thus the (cross-sectional) survey completion rate for enrolled participants is 100%.

Table 2. Overview of the CEMA recruitment progress.

COUNTRY	DATE OF FIRST RECRUITMENT	NUMBER OF PARTICIPANTS	AVERAGE DAILY EMA COMPLETION ⁱ
DENMARK	Not started		
FINLAND	March 13, 2025	107	81.56%
FRANCE	Feb 14, 2025	8	75.23%
GERMANY	Sept 14, 2024	319	84.56%
KOSOVO	March 8, 2025	182	81.78%
THE NETHERLANDS	March 7, 2025	11	69.65%
THE UNITED KINGDOM	Feb 4, 2025	296	72.23%
SPAIN	Not started		
SWITZERLAND	Feb 4, 2025	188	88.92%

4. Next steps

Recruitment will continue until a target of 350 participants per country is reached in all nine countries. Available data will already be used to train the algorithm that is developed in another part of the project.

¹Only data from participants who completed the study were included in the calculation of the average completion rate.