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

Horizon Europe HLTH-2022-STAYHLTH-01-two-stage

Grant agreement NO: 101081020

Deliverable information	
Project start date	01-06-2023
Duration of project	54 months
Due date	30-11-2023
Work package	D2.1
Lead partner for deliverable	UVA
Dissemination level	PU
Author(s)	Junus van der Wal Claudi Bockting Reinout Wiers Angelique Cramer
Reviewer(s)	Annet Kleiboer

Table of Contents

Abbreviations

AI	Articial Intelligence
CEMA	Cohort ecological momentary assessment
PU	Public
RSYD	Region Syddanmark
UVA	University of Amsterdam
VUA	Vrije Universiteit Amsterdam
WHO	World Health Organisation

1. Introduction

The RECONNECTED project's main objective is to provide vulnerable citizens in Europe with a secure, safe, and easy-to-use digital support system to promote resilience and connect citizens with the aim to protect their mental health during times of significant global societal developments such as climate change, digitalisation, geopolitical conflict, and a changing population due to migration, ageing, and urbanisation. Within RECONNECTED, we expect that all citizens will be affected by these developments, but in different ways dependent on their phase of life, personal characteristics, and social- and environmental circumstances.

To gain a better understanding of how global societal developments impact the mental health of various vulnerable populations in Europe, a first task in the project is to extend a recently developed integrative conceptual framework of urban mental health (see Figure 1) to include responses to global societal developments. The framework will guide further activities in the project that are aimed at a better understanding of the complex and dynamic interplay of individual (e.g. demographic characteristics, stress response; *micro level*), social (e.g. social participation, stigma; *meso level*), and environmental (e.g. urbanicity, access to care; *macro level*) factors that influence mental health in the context of current developments in society (*meta level factors*). These factors may be especially poignant for vulnerable populations, including individuals with low socioeconomic status, migrants, youth, and older adults.

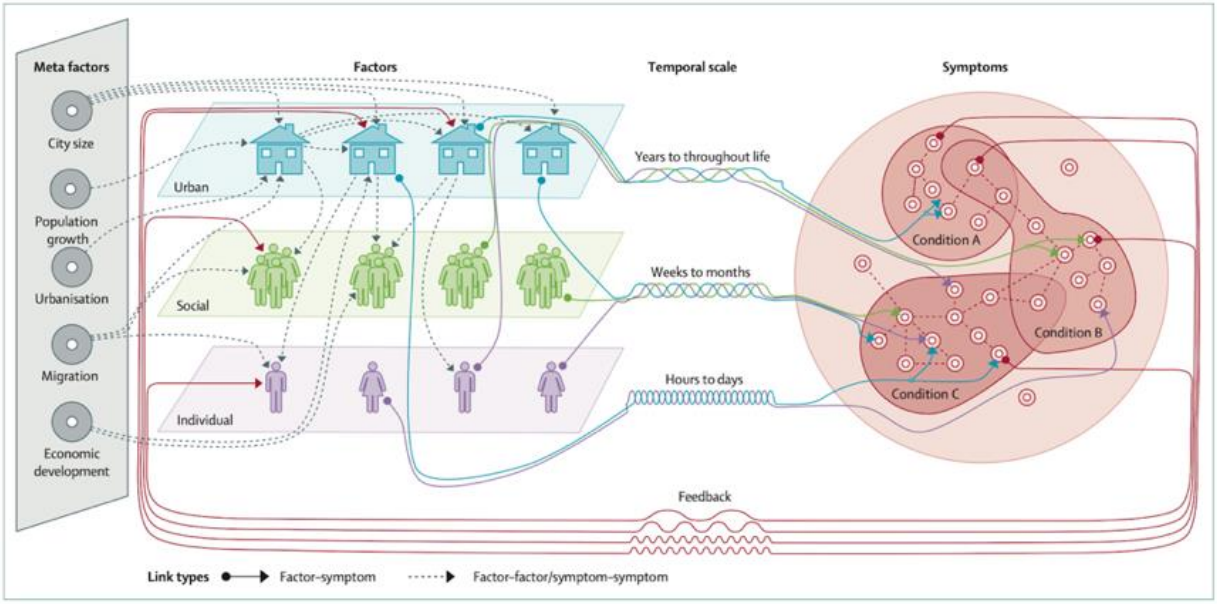


Figure 1 Example of an integrative conceptual model for urban mental health (Van der Wal, 2021)

2. Objective

The objective of the conceptual framework is to demonstrate how various **global societal developments** can elicit and sustain feedback loop mechanisms between mental health factors, from the individual (micro) to the environmental (macro) level, that drive **mental health outcomes** in various vulnerable populations in Europe. The conceptual framework guides other activities in the project such as the observational cohort study in various vulnerable populations in Europe (CEMA study WP2) and the development of the digital support system (WP3). Additionally, the framework will enable recommendations for solutions that can benefit citizens but are beyond the scope of this project (D2.6 'actionable target points' delivered in M24). The conceptual framework presented in this document will be updated and edited with new information when available and is, as such, not considered a final or a comprehensive version.

3. Development of the framework

The starting point for this framework was an existing framework for Urban Mental Health, previously developed by consortium partner UVA and published in Lancet Psychiatry (van der Wal et al. 2021). This framework, that uses a **complexity science perspective**, distinguishes between factors at the societal (*meta*), environmental (*macro*), social (*meso*), and individual (*micro*) level (see Figure 1). The framework is based on four principles: (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 timescales, and (4) outcomes can affect explanatory factors (feedback loops).

This Urban Mental Health framework was adapted to fit the RECONNECTED project and meet the abovementioned objectives. This was done through an iterative process of discussions within the UVA team, as well as with the other consortium members, using previously published systematic reviews and other literature to substantiate the included factors. During a consortium meeting in October 2023 (M5), a preliminary draft of the framework was presented, and feedback was collected to further enrich and refine the framework. Additionally, it was discussed how different components of the **RECONNECTED support system** could target these feedback loops in order to improve mental health (see appendix B and C and D for some applied examples).

Initially, we planned to involve stakeholders, including experts and citizens from different European countries, in the development of the framework during the first 6 months of the project. However, it was decided by the UVA and VUA teams that it would be more opportune to first develop a framework using the broad expertise within the consortium, and subsequently refine this framework with input from experts and citizens from European countries. As such, the current framework forms a sound basis for further refinement with qualitative (i.e., stakeholder panels and subsequent consortium meetings) and quantitative input (e.g., CEMA study, newly published literature, see section 4 'next steps').

3.1 Literature review

Relevant literature from different sources was used during the development of the framework, including a (rapid) review of reviews on risk factors for common mental disorders in an urban setting (van der Wal et al. 2021), as well as systematic reviews on social determinants for mental disorders in the context of the sustainable development goals (Lund et al. 2018), the impact of climate change on mental health (Clayton et al., 2021; Cuijpers et al., 2022), risks and opportunities of digitalisation (Mental Health Europe, 2022), and other relevant literature linking global societal developments to mental health (e.g. Krabbendam, 2020; Persaud, 2018; Ventriglio, 2021; Ventriglio, 2023). In addition, we scoped the literature on possibly relevant factors and mechanisms (i.e., related to the individual level, social level, or living environment) for mental health in vulnerable populations, as they emerged in the discussions during development of the framework (e.g. Benevolenza et al., 2019; Bolton et al., 2021; Witteveen et al., 2023).

In a nutshell, this literature generally distinguishes between direct and indirect effects of global societal developments on mental health (e.g. Clayton et al., 2021; Persaud et al., 2018). For example, natural disasters like flooding and earthquakes, hospitalisation due to serious health threats, and international conflicts, may directly threaten the mental health of citizens resulting in post-traumatic stress disorder or depression. However, these developments may also affect mental health more gradually by disrupting physical and social systems in society leading to for example increased inequality, economic uncertainty, and forced migration (e.g. Clayton et al., Persaud et al., 2018; Ventriglio et al., 2021). This may, in turn, cause environmental, social and individual stressors that impact mental health, especially in vulnerable populations. New stressors may also arise such as eco-anxiety related to climate change and fear of missing out related to digitalisation. In line with the objectives of the RECONNECTED project and its complex system approach, the conceptual framework is mainly focused on the indirect effects of global societal developments.

3.2 Consortium input

During a consortium meeting in October 2023 (M5), a preliminary draft of the framework was presented by the UVA team. Input for the framework was gathered during brainstorm sessions with all consortium members, led by members from the UVA and VUA team. Factors and possible mechanisms relevant for mental health in vulnerable populations in Europe were proposed in the different brainstorm groups, and further discussed in a plenary session. The UVA and VUA team then compiled all the input, grouped certain overlapping factors in broader concepts (e.g., socioeconomic status can include income as well as level of education), and categorized the proposed factors in accordance with their level of description (i.e., individual or social level or living environment). These factors were incorporated in the initial draft of the framework. Subsequent versions of the framework were sent around to other consortium members and were discussed during online follow-up meetings, to ascertain that members agreed with the way the input was used in the current framework.

3.3 Integration of intervention mechanisms

The RECONNECTED digital support system consists of three intervention components that aim to target various feedback loops in the framework in order to improve mental health and foster resilience. We supplemented the conceptual framework with several **applied examples** to demonstrate how the framework can be used to map how these different components of the RECONNECTED digital support system could target feedback mechanisms that drive adverse mental health (see appendix B, C, and D). The three pillars of the support system are: (I) mental health literacy, (II) social prescription, and (III) personalised micro-interventions. All three components aim to increase positive mental health. However, the underlying mechanisms are hypothesized to be different. Whereas mental health literacy increases mental health awareness and reduces stigma; social prescription targets amongst others social participation; and personalised micro-interventions target specific psychological and social processes at stake to alter the way that people think, feel, or behave in their daily life to improve psychological resilience.

The applied examples showcase that the framework offers a flexible method for describing, through a **complexity science perspective**, how different societal challenges can have an impact on the complex dynamics between different mental health factors that could drive poor mental health in different populations and in different contexts, and subsequently how interventions in the RECONNECTED support system can help to improve mental health by targeting these dynamics.

4. The RECONNECTED framework

Figure 1 in appendix A shows the RECONNECTED conceptual framework. The framework consists of several 'building blocks'. On the left-hand side, in a vertical grey column, are the global societal challenges that European citizens face (**meta factors**). These challenges have an impact on factors that can influence mental health (i.e., mental health factors), across three different levels. These levels are depicted by the three horizontal layers in the middle of the figure, and consist of living environment factors (**macro level**, upper blue layer), social factors (**meso level**, middle green layer), and individual factors (**micro level**, lower purple layer). The framework also contains an overlay that includes factors at the macro-, meso-, and micro level that are part of the digital environment specifically. Some of the factors such as social network are part of both the digital and non-digital environment.

The thick arrows between the three layers indicate that factors between these layers show reciprocal interaction. These factors in turn have an impact on mental health, which is in this framework defined in line with the definition of the WHO (2010) as a subjective state of mental wellbeing, depicted as a continuum on the right-hand side, ranging from positive to poor wellbeing. The different components of the RECONNECTED support system are depicted in the upper right corner, in a separate box.

The RECONNECTED conceptual framework is not meant to be comprehensive. It is developed to guide other activities in the RECONNECTED project and is limited by its objective to: (1) gain a better understanding of how global societal developments impact the mental health of various vulnerable populations in Europe using a complexity science perspective, (2) list actionable target points for intervention. Therefore, the determinants selected for the framework are mainly in the

here-and- now and do not include important factors such as genetics or specific factors related to past traumatic experiences. This can be considered as a shortcoming because these factors can interact with other factors in the framework to provide valuable information for further understanding and intervention.

5. Next steps

The current framework forms a sound basis for further refinement during the project. In the next 18 month period (M7 – M24), we will take the following steps:

Further input for the framework will be collected during the upcoming CEMA study coordinated by the RSYD team, which will provide data through questionnaires and ecological momentary assessment (EMA) in various populations of interest in different European countries. This will ensure refinement of the framework with up-to-date data from the target populations for the RECONNECTED support system, collected in real-time in an ecological setting.

Also, we will use input from an ongoing AI-assisted mega-meta-analyses that is currently being conducted by members in the UVA group, which will result in a list of the most important risk factors for common mental disorders as identified by 6,351 articles (Brouwer et al., preprint).

As previously stated, the framework will also be further refined using input from stakeholders, including domain experts and citizens from the various European countries. In addition, all consortium members will be asked for feedback during the process of refinement in order to achieve consensus on the framework and the list of actionable target points that will be delivered in month 24 (D2.6).

References

- Benevolenza MA, DeRigne L. The impact of climate change and natural disasters on vulnerable populations: a systematic review of literature. J Hum Behav Soc Environ. 2019;29(2):266–81. DOI: 10.1080/10911359.2018.1527739
- Bolton D, Bhugra D. Changes in society and young people's mental health1. Int Rev Psychiatry. 2021 Feb-Mar;33(1-2):154-161. doi: 10.1080/09540261.2020.1753968.
- Brouwer, M., Hofstee, L., van den Brand, S. A. G. E., Teijema, J. J., Ferdinands, G., de Boer, J., … van de Schoot, R. (2022, August 30). AI-aided Systematic Review to Create a Database with Potentially Relevant Papers on Depression, Anxiety, and Addiction. DOI:10.31234/osf.io/j6nqz.
- Clayton S. Climate Change and Mental Health. Curr Environ Health Rep. 2021 Mar;8(1):1-6. doi: 10.1007/s40572-020-00303-3.
- Cuijpers P, Miguel C, Ciharova M, Kumar M, Brander L, Kumar P, Karyotaki E. Impact of climate events, pollution, and green spaces on mental health: an umbrella review of meta-analyses. Psychol Med. 2023 Feb;53(3):638-653. doi: 10.1017/S0033291722003890.
- Krabbendam L, van Vugt M, Conus P, Söderström O, Abrahamyan Empson L, van Os J, Fett AJ. Understanding urbanicity: how interdisciplinary methods help to unravel the effects of the city on mental health. Psychol Med. 2021 May;51(7):1099-1110. doi: 10.1017/S0033291720000355. Epub 2020 Mar 11. PMID: 32156322.

- Lund C, Brooke-Sumner C, Baingana F, Baron EC, Breuer E, Chandra P, Haushofer J, Herrman H, Jordans M, Kieling C, Medina-Mora ME, Morgan E, Omigbodun O, Tol W, Patel V, Saxena S. Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews. Lancet Psychiatry. 2018 Apr;5(4):357-369. doi: 10.1016/S2215-0366(18)30060-9.
- Mental Health Europe (2022). Report on digitalization in mental health. https://www.mhe-sme.org/wp-content/uploads/2023/04/Mental-health-in-the-digital-age-Applying-a-human-rights-based-psychosocial-approach-as-compass.pdf
- Persaud A, Day G, Gupta S, Ventriglio A, Ruiz R, Chumakov E, Desai G, Castaldelli-Maia J, Torales J, Juan Tolentino E, Bhui K, Bhugra D. Geopolitical factors and mental health I. Int J Soc Psychiatry. 2018 Dec;64(8):778-785. doi: 10.1177/0020764018808548.
- Van der Wal JM, van Borkulo CD, Deserno MK, Breedvelt JJF, Lees M, Lokman JC, Borsboom D, Denys D, van Holst RJ, Smidt MP, Stronks K, Lucassen PJ, van Weert JCM, Sloot PMA, Bockting CL, Wiers RW. Advancing urban mental health research: from complexity science to actionable targets for intervention. Lancet Psychiatry. 2021 Nov;8(11):991-1000. doi: 10.1016/S2215-0366(21)00047-X.
- Ventriglio A. Geopolitical determinants of mental health: Towards a global perspective. Int J Soc Psychiatry. 2023 Feb;69(1):229-230. doi: 10.1177/00207640221112319.
- Ventriglio A, Torales J, Castaldelli-Maia JM, De Berardis D, Bhugra D. Urbanization and emerging mental health issues. CNS Spectr. 2021 Feb;26(1):43-50. doi: 10.1017/S1092852920001236.
- World Health Organization Europe. *User* empowerment in mental health – a statement by the WHO regional office for Europe. Geneva: World Health Organisation
- Witteveen AB, Young SY, Cuijpers P, Ayuso-Mateos JL, 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. COVID-19 and common mental health symptoms in the early phase of the pandemic: An umbrella review of the evidence. PLoS Med. 2023 Apr 25;20(4):e1004206. doi: 10.1371/journal.pmed.1004206.

Appendices

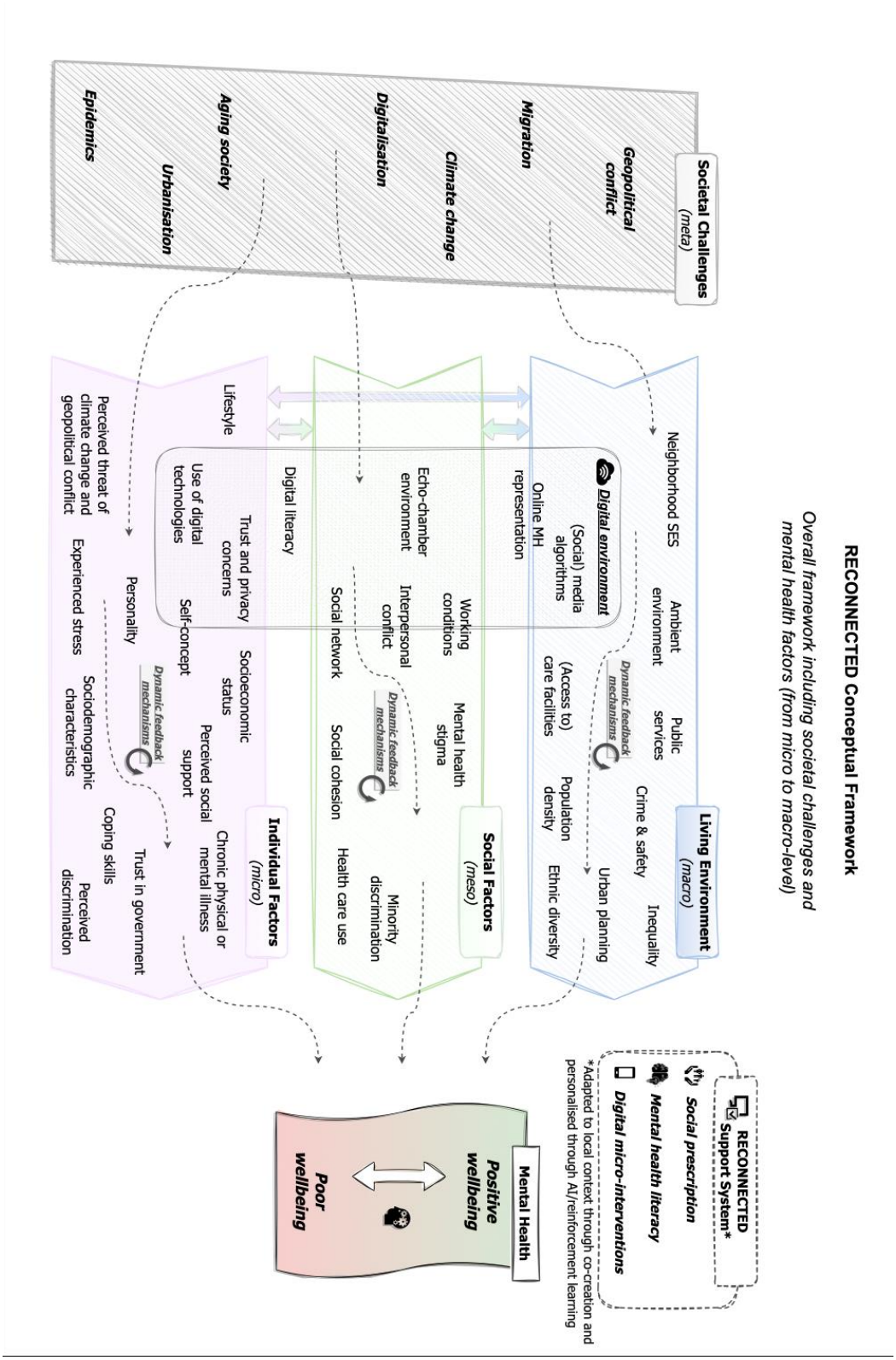
Appendix A RECONNECTED conceptual framework

Appendix B Example personalised micro-interventions

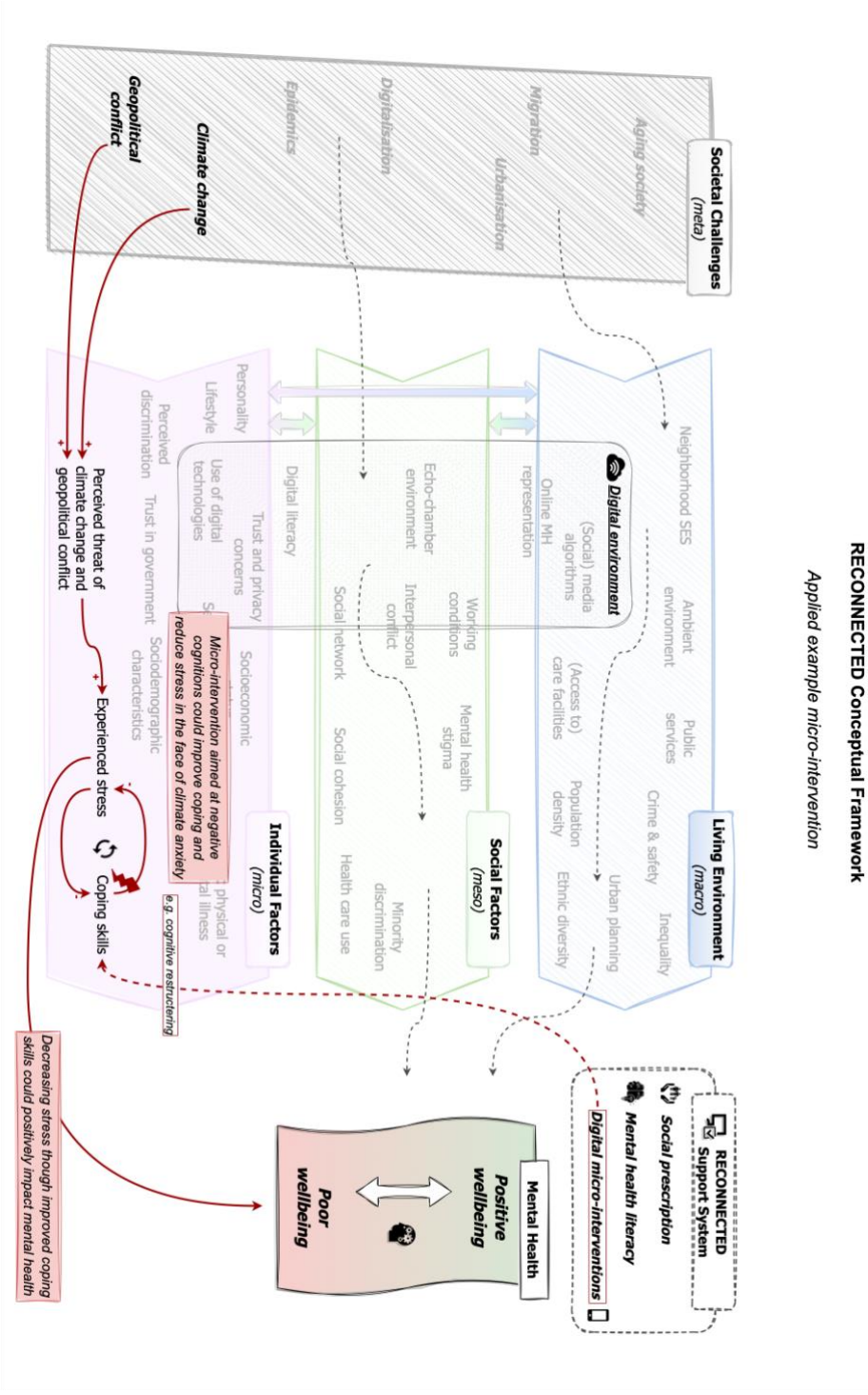
Appendix C Example social prescription

Appendix D Example personalised micro-interventions and social prescription

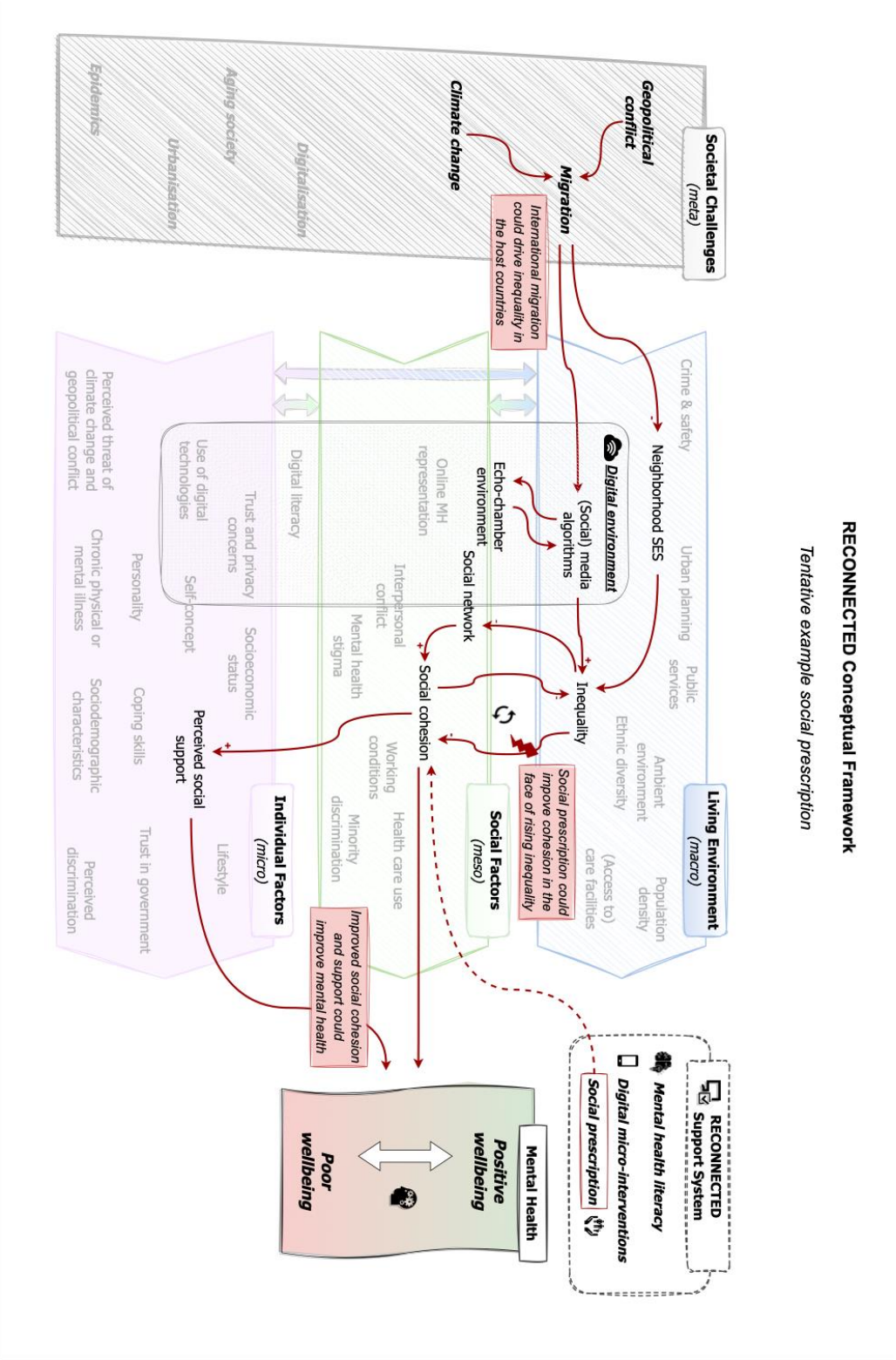
Appendix A RECONNECTED conceptual framework



Appendix B Example personalised micro-interventions



Appendix C Example social prescription



Appendix D Example personalised micro-interventions and social prescription