CRI Research Fellowship, Project Proposal Open health – from data-rich research to development of frugal software and hardware solutions (version 2 sent on 2019/02/17)
Célya Gruson-Daniel

EXploring Collective Care in Research: A pilot-study with PhD Students (#ExCCiR-PhD)

Abstract :

Within the academic community, several studies point out that working towards a PhD is a particularly sensitive time, causing significant stress for PhD students. While some actions are being implemented to support their mental and physical health, these resources are still limited and no program has been designed in order to implement different individual and collective support modules. This project aims to develop a well-being pilot-program for PhD students in a Participatory Action Research (PAR) perspective, The CRI ecosystem and the modules already proposed (MBSR, psychoeducation) will be at the heart of this pilot program. By using mixed-methods, this study will intricate different qualitative and quantitative phases and exploit the potential of digital technologies (hardware/software) to collect social, behavioral and physiological data. After a first qualitative phase aiming to co-design with various stakeholders the content of the program as well as the research protocol to assess it. The second phase will be mainly quantitative and will compare PhD students following modules of the program or not (control group) in order to assess the impact of such a program but also to identify new relevant markers. These results will be enriched by a last qualitative phase to reflect about the implementation and adaptation of this program in other context. In addition to the socio-pedagogical benefits, this study will explore innovative perspectives in cognitive sciences on mind/body interactions as well as in social sciences by developing interdisciplinary, open and data science practices grounded in strong ethical and social reflections.

Keywords : PhD students well-being, mixed-methods, participatory action research, body/mind interactions, digital technologies

1/ Introduction and background

"Shoemakers are the most poorly shod". This popular expression, when applied to the world of research and health, reminds us that people or future generations who work to improve the well-being of our societies sometimes struggle to take care of their own physical and mental health and to question the conditions necessary for a quality working environment. However, the promotion of mental health and well-being is a major theme highlighted in recent years by various international organizations on global health. The Lancet Commission (2018) reminded that **mental health is a crucial stake in the objectives of sustainable development** and results in **a need for prevention and promotion of well-being but also for interdisciplinary and multi-scale research** on this subject (from neuroscience to implementation science) [1]. Within the academic career, working towards a PhD is a particularly sensitive time, causing significant stress that affects the well-being of PhD students and their mental and physical health. Studies point out **that 51% PhD students experienced psychological distress** [2] and have 6 times higher rate to develop anxiety and depression compared to the general population [3]. Risk factors have been identified such as belonging to different sub-populations (women, international students, part-time jobs) or the perceived quality of supervision over their thesis. Physiological factors (quality of sleep or physical activity) also seem to play a role in the stress levels of PhD students and has an impact on their well-being [4, 5]. However, these studies highlight a lack of research on this specific population

and notes **the importance of setting up courses** such as positive psycho-education program (e.g SPARK program) or Mindfulness Based Stress Regulation techniques (eg. MBSR program) [5, 6]. On the other hand, **more systemic cultural transformations** related to the supervision of research and the involvement of "top-down" measures to promote mental health is highlighted [5, 6]. While some actions are being implemented to support PhD students in Higher Education Institutions (HEI) (thesis advisory committee, psychological monitoring), these actions and resources are still limited and **no program to our knowledge has been designed and proposed** in order to **implement** different individual and collective support modules as well as to **evaluate** the influence of such a program on PhD students well-being.

2/ Research question and hypothesis

This research project aims to answer these two exploratory questions:

1/ How can we build a support program for PhD students to ensure their individual well-being, both physical and mental, as well as a collective quality of life within the institutes in which they are members? 2/ What are the elements to be identified in order to evaluate the influence of such a program on the well-being of PhD students and to deploy it in different contexts?

To answer this question, we formulate three lines of research (rather than hypotheses) that are in accordance with the fundamental principles of open health. The objective is **to develop a pilot support program** for PhD students and **a research protocol** aimed at **identifying a set of social, behavioral and physiological factors** that will facilitate **its evaluation** and future **adaptation**.

1/ Benefit of participatory action research (PAR) and mixed-methods (qualitative/quantitative): The first strong axis is to develop a pilot program in a community-driven perspective. The **investigation of well-being** of PhD students and above all **the definition of this broader concept** is complex and dependent of socio-cultural context. It requires the identification and consideration of multiple stakeholders (PhD students, policy makers, doctoral school, laboratory and supervisors). Therefore including this study in a research paradigm as PAR [7] would help to **co-construct** a program meeting the needs formulated by the different stakeholders while taking into consideration the structural levers and obstacles highlighted. Moreover, the use of mixed-methods (qual/quant) [8] along the research with an exploratory qualitative first phase can help **defining more precisely what is well-being** for this specific population with an attention to cultural vs individual and contextual factors. It will then help to **adapt/enrich the following quantitative experimental settings**.

2/ Exploit the potential of assistive digital technologies: Currently, quantitative studies on PhD students well-being are usually based on printed questionnaires or online surveys. However, future studies would benefit from integrating **more ecological momentary assessments (EMAs),** which allow for example PhD Students to complete daily modules measuring their stress, levels of energy, sleep, eating habits, mood and other well-being indicators. We propose **to collect various streamed data** assisted by **web and mobile applications, wearable devices**, to analyze them with data science approaches while guaranteeing **the quality and reproducibility of the results** in health through open science practices [9, 10].

3/ Supporting the well-being of PhD students by exploring mind/body perspectives: In the pilot program, it will be relevant to implement modules that place at the heart of their therapeutic approach **the awareness of cognitive, emotional and physical patterns**. These reflect recent studies in cognitive science on mind/body interactions and **interoceptive theory** [11]. Portable sensors are increasingly being used to understand **how interoceptive processes play a role in emotional regulation and the development of some mental disorders** (anxiety, alexithymia, autistic disorder) [12]. The deployment of such modules (psycho-education, mindfulness) and the collection of social, behavioral and physiological data allows for innovative research avenues that identifies bio, environmental and social markers to measure the influence of such a program on the quality of life of PhD students.

3/ Detailed project description and methods

The project will be divided into **three principal qualitative and quantitative phases** with an embedded mixed-methods design summarized in part 4 and 5.

Preliminary phase - **An inventory of research on PhD Students well-being and a review of existing support programs (Year 1: 3 months):** A preliminary phase will consist of **a systematic review** of studies already conducted in France and abroad (meta-analysis), and their highlighted recommendations. Ongoing initiatives in higher education and research will be identify and classify by module types (thesis advisory committee, psycho-education or MBSR programs, online resources, psychological support, etc.). It will allow **a first contact with a network of stakeholders** involved in this action and constitute a group to co-design the pilot program and its implementation at the CRI.

Phase 1 (QUAL) - a/ Co-design of the pilot-program and the associated research protocol with the CRI as the cornerstone. (Year 1: 6 months): The co-design of the pilot study will be relied mainly on the CRI ecosystem. Indeed, the CRI with the FIRE PhD Program is composed of an interesting diversity of profiles (foreign students, STM students but also SSH students through the FAN program). In addition, the **CRI already offers a network of partners** (university, laboratories) to recruit broadly other participants. Last point, the CRI **proposes support courses** for PhD students or other ongoing research in open health/learning that could be **integrated as modules** in the pilot program. In this first qualitative phase, **a co-design group** (n~25) will be constituted with PhD students and other stakeholders. A series of **individual interviews, focus groups and other innovative formats** (co-design sessions) will be proposed in order **to question first the definition of well-being** and collective care in the specific context of academic research. Mainly it will concern **the co-design of the program** such as the modules to be included, the communication to be conducted but also **the research protocol to collect and analyze data** within this study. While using an open health perspective and **ethics by design principles**, a major goal will be to lead collective reflection on the tools and data made available in order to foster mutual learning, while respecting social, ethical, legal issues and the **i**ntegrity (and assistance if needed) of the future participants. For the analysis, **a systematic inductive approach in qualitative research called *grounded theory*** will be used [13].This phase will allow **also to test the experimental settings** based on diverse digital technologies.

b/ Development of the assistive technologies (Year 1 and 2): In the meantime, **open source hardware and software** will be developed then improved. This implementation will be based on on-going projects at the CRI in order to enhance the frugal and open dimension of these initiatives and to propose other complementary fields of study. For example, **the mindlogger mobile application** will allow to collect a range of social and behavioral data by administering questionnaires at different moment of the

program as well as proposing Ecological Momentary Assessments (EMAs) (cf. 2). Physiological data will be collected by the **development of open source wearable devices,** in particular for measuring the cardiac activity (ECG) required to evaluate the interoceptive awareness/accuracy. Other physiological elements (skin conductance, vagal tone, etc.) may be proposed following discussions/collaborations with other projects or partnerships carried out at the CRI (4youandme, Healthy Brain Network).

Phase 2 (QUAN/quan) - a/ Implementation of the pilot program and its evaluation (control and modules group) (Years 2 and 3): Following the first year of co-design (program and its research protocol), the next 2 years will be dedicated **to its implementation and evaluation** with mostly a quantitative approach. To this end, an invitation to participate in this project will be shared with several partners (universities and doctoral schools) **to recruit PhD students**. Via mobile and web applications, participants (n~300/400 PhD students) will have to **complete different questionnaires** throughout these two years. With the agreement of PhD students, some will also be sent **to external observers** (n~50 supervisors, colleagues, etc.). In addition, **ecological measurements will be proposed** via the mindlogger application as well as the use of wearable devices. During the study, **a set of participants will be invited to follow modules of the pilot-program** with dedicated questionnaires. The perspective would be to develop 3 to 4 different modules running one or two times a year (n~20/30 PhD Students for each modules). In addition to the quantitative data (for the modules group), **a set of qualitative data** will be collected with participatory observation in the modules followed by the PhD students as well as interviews at different key moments (end of modules, year 1 and 2).
b/ Co-analysis of the result in open and data science (a meta-reflexive group): The data will be analyzed through **a data science iterative workflow,** and free and open science practices promoting research reproducibility (R or python programming language, use of a collaborative work platform for sharing algorithms, open access) **while being in compliance with the IRB prerequisite**. In a participatory action research approach, the data collected will be analyzed as much as possible with the involvement of the different stakeholders . Rather than considering it as a bias to avoid, some PhD students will be involved and constitute **a meta-reflexive group** by itself to question the influence of reflexivity and meta-research on the sense of agency of PhD students and as factors influencing individual and collective well-being in research today.

Phase 3 (QUAL) - Writings and dissemination of the outcomes, reporting to the various stakeholders with a qualitative interpretation to foster adaptation of the pilot program in other contexts (Year 3): This project will end up with the dissemination of the main results in the form of diverse outcomes (guidelines, scientific articles, workshops). Feedbacks from participants and other stakeholders will be part of a last qualitative research phase **to refine the first qualitative results** obtained two years ago and **then enriched by the data collected during the phase 2**. This last analysis with grounded theory will help reflecting about the implementation of this program to other partner institutions in France and abroad in order **to test this project in other situations** and implement comparisons between groups : design of the program, other student populations or other cultural context.

4/ Methods : summary table

This table below summarizes the phases of the research and its methodologies described in part 3.

<table>
<tr><th colspan="8">A participatory action research with embedded mixed-methods (qualitative/quantitative)</th></tr>
<tr><th colspan="3">Co-design of the pilot program and its research protocol (QUAL)</th><th colspan="3">Test of the pilot study and the assessment tools QUAN/qual</th><th colspan="2">Final qualitative interpretation (QUAL)</th></tr>
<tr><th>Participants</th><th>Data collection</th><th>Data analysis</th><th>Participants</th><th>Data coll.</th><th>Data anal.</th><th>Data coll.</th><th>Data anal.</th></tr>
<tr><td rowspan="2">Co-design group (n~25) : PhD students, researchers, members of doctoral schools, etc.</td><td rowspan="2">QUAL: Interviews, focus group, online/offline participatory observation, co-design sessions</td><td rowspan="2">Grounded theory data analysis</td><td rowspan="2">PhD Students (n~ 300/400) with:
- 1/ control group (n~ 200/250)
- 2/ Modules group (n~ 100/150 with n~20/25 for each modules)
+ External observers (supervisors, colleagues, etc.) (n~50)</td><td>QUAN : Questionnaires, Ecological Momentary Assessments (EMAs), use of open wearable devices</td><td>Descriptive and inferential analysis (variance and linear regression)</td><td rowspan="2">Feedbacks of stakeholders and participants, quantitative results</td><td rowspan="2">Grounded theory data analysis</td></tr>
<tr><td>Qual: Interviews, participatory observation</td><td>Grounded theory data analysis</td></tr>
<tr><td colspan="3">Outcomes:
- More precise definition of well-being and collective care taking into consideration socio-cultural context
- First pilot program (modules, format, communication for recruitment) and its research protocol (assessments)
- Ethical and legal considerations in addition to IRB pre-requisite</td><td colspan="3">Outcomes:
- Influence of the program and different modules
- Relevance of new factors for its evaluation (physiological, behavioral, social)</td><td colspan="2">Outcomes:
- Validation or modification of the pilot program and its research protocol
- Adaptations needed for its implementation in other situations</td></tr>
</table>

5/ Timeline : summary table

This table below summarizes the different phases of the research described in part 3.

GANT Project	Start date	End date
0/ Meta-analysis and review of the existing network (3 months S1)	9/2/2019	12/13/2019
1a/ Co-design of the pilot program and its research protocol (6 months S1-S2	1/13/2020	26/06/2020
1b/ Development of the assistive technologies (6 months S1-S2)	1/13/2020	26/06/2020
2a/ Implementation of the pilot program and its evaluation (2 year S3-S6)	10/1/2020	05/20/2022
2b/ Co-analysis of the results, improvement of the technologies (1,5 years S3-S6)	10/1/2020	12/1/2022
3/ Writings outcomes/recommendations, qualitative interpretation of feedbacks for future program (6 months S6)	06/01/2022	08/30/2022

6/ Match between the researcher and the project

This project combines the skills that I acquired (Célya Gruson-Daniel) in 1/ **my initial course in biology** (undergraduate) then **in cognitive and behavioral neurosciences** (postgraduate) at ENS, UPMC and USCF (cv. CV) 2/ the **theoretical knowledge on open science** developed in my doctoral research [13] at CRI in the field of Science and Technologies Studies and mixed-methods 3/ my **commitment to PhD students** with the HackYourPhD community and my **daily open science practices** and experimentation 4/ my transversal skills in the use of digital technologies in research and education (open and data science **project management**, **coordination of a MOOCFactory**). I will develop this research project rooted in collaborative practices and mutual sharing of knowledge and expertise by **relying on an established network of senior researchers and other professionals** (open science, public health, neuroscience, psychology). My background at the crossroads between medical sciences, social sciences and digital research/entrepreneurship offers me the opportunity to be **a mediator** between these fields and multiple stakeholders in order to develop innovative digital and open research practices grounded in strong ethical and social reflections.

7/ Originality, innovation, and interdisciplinarity

In addition to open and community-driven approaches used to understand and promote well-being in research, this project is **grounded in a meta-research perspective** to foster open learning and phronesis at the heart of research and education ecosystem. Participants will be able to question their own biases concerning their visions of (open) science and their role as researchers, students, etc. today. This initiative also aims to explore interdisciplinarity at the interfaces of Life, Digital and Learning sciences through **a dialogue and experimentation between different research paradigms** (hypothetico-deductivist/action-research). The originality of this project is also based on a strong conviction **to consider openness as an open-mind "thinking outside the box"** to create societal but also economic and political innovations grounded in the theory of the commons [13] and an ethics of collective care [14].

8/ Main challenges and potential pitfalls

One of a main challenge is due to the use **of mixed-methods and the incommensurability of research paradigm** (different conceptions of science) between stakeholders (researchers, advisory and evaluation committee). It could be overcome by an existing rich literature raising this topic and a great opportunity to participate in this debate on interdisciplinarity [15]. Another difficult aspect will be to **communicate sensitive issues** related to well-being, that is to say controversial or even taboo topics such as mental disorders, burn-out, high competitiveness and pressure that crosses the academic world both on an individual and a collective level. Building a network of various stakeholders in time and dealing with **institutional blockages or inertia** will be a challenge in terms of time management as well as being in compliance with ethical and health protection committee. Regarding this last point, **a fair balance will also have to be developed between research integrity, ethics and policy and the involvement of stakeholders in data analysis.** This project, with its dimension of co-design and its qualitative approach with a systemic aim, will nevertheless anticipate possible obstacles and their solutions. This initiative will also rely on the advice and previous experience offered by the CRI ecosystem. Even if the pilot-program might encounter limitations, **the collection of a diverse range of data** at different stages will lead to

concrete outcomes along the study (cf. 4) for a more precise understanding on how to foster well-being in PhD studies as well as the implementation of interdisciplinary open health projects.

9/ Budget

BUDGET (in €)	Year 1	Year 2	Year 3	Justification for expenditures
1- Equipment and Supplies				
1-1 General IT	5000			Computer, smartphones, hard disk for the team
1-2 For data collection				
1-2-1 Digital technologies for quantitative research	5000			Assistive technologies : android, wearable/mobile devices, web-based platform
1-2-2 Costs and supplies for qualitative research	5000	5000	5000	Supplies for interviews, focus group, workshops + Legal advices
1-3 For data entry and analysis	1000	1000	1000	Open source software freemium, servers, data storage
1-4 For dissemination				
1-4-1 Publications costs		1500	1500	Open access journal cost
1-4-2 Graphic and UX design (web and mobile)	2500	1000	1000	Communication (logo, pedagogical graphics, etc.)
2- Personnel services				
2-1 Hardware engineer/Data scientist	30000	40000	40000	Hardware engineer (1st year), Data scientist (2 other years)
2-2 Master student interns	5000	5000	5000	Design (3 months/y), Data science/hardware (6 months/y)
3- Travel, conferences and training	5000	5000	5000	Travel (networking, conferences) + Specific trainings for the team (psycho, data science)
TOTAL (per year)	58500	58500	58500	**TOTAL BUDGET (3 years): 175 500**

In addition to research budget, 1.5 person/year will be funded

10/ Speculation

In addition to the impacts mentioned in the application form, this research, although aimed at the doctorate, is part of a more global reflection on the ethics of care within the research community. This project will potentially show that through **a change in the mentality of future generations of young researchers** longer-term transformations (supervisory relationships) can be thought-out. This initiative would provide concrete solutions to social, pedagogical and economic challenges in research and higher education with adapted feedbacks to the different stakeholders. It also opens up, from a fundamental research perspective, questions on the **cognitive, emotional and bodily mechanisms that contribute to individual and collective awareness** allowing for the development of sustainable digital societies.

11/ References

1. Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., Chisholm, D., Collins, P.Y., Cooper, J.L., Eaton, J., Herrman, H., Herzallah, M.M., Huang, Y., Jordans, M.J.D., Kleinman, A., Medina-Mora, M.E., Morgan, E., Niaz, U., Omigbodun, O., Prince, M., Rahman, A., Saraceno, B., Sarkar, B.K., De Silva, M., Singh, I., Stein, D.J., Sunkel, C., UnÜtzer, Jü.: The Lancet Commission on global mental health and sustainable development. The Lancet. 392, 1553–1598 (2018). doi:10.1016/S0140-6736(18)31612-X

2. Levecque, K., Anseel, F., De Beuckelaer, A., Van der Heyden, J., Gisle, L.: Work organization and mental health problems in PhD students. Research Policy. 46, 868–879 (2017). doi:10.1016/j.respol.2017.02.008

3. Evans, T.M., Bira, L., Gastelum, J.B., Weiss, L.T., Vanderford, N.L.: Evidence for a mental health crisis in graduate education. Nature Biotechnology. 36, 282–284 (2018). doi:10.1038/nbt.4089

4. Metcalfe, J., Wilson, S., Levecque, K.: Postgraduate researchers: mental health and wellbeing report - Research England. Research England (2018)

5. Haag, P., Shankland, R., Osin, E., Boujut, É., Cazalis, F., Bruno, A.-S., Vrignaud, P., Gay, M.-C.: Stress perçu et santé physique des doctorants dans les universités françaises. Pratiques Psychologiques. 24, 1–20 (2018). doi:10.1016/j.prps.2017.04.005

6. Haag, P.: Report on the Participatory Action Research « Well-being, Health and Work during the PhD », https://wellbeing.hypotheses.org/tag/doctorat, (2015)

7. Baum, F., MacDougall, C., Smith, D.: Participatory action research. J Epidemiol Community Health. 60, 854–857 (2006). doi:10.1136/jech.2004.028662

8. Creswell, J.W., Klassen, A.C., Plano Clark, V.L., Smith, K.C.: Best practices for mixed methods research in the health sciences. Bethesda (Maryland): National Institutes of Health. 2013, 541–545 (2011)

9. Alexander, L.M., Escalera, J., Ai, L., Andreotti, C., Febre, K., Mangone, A., Vega-Potler, N., Langer, N., Alexander, A., Kovacs, M., Litke, S., O'Hagan, B., Andersen, J., Bronstein, B., Bui, A., Bushey, M., Butler, H., Castagna, V., Camacho, N., Chan, E., Citera, D., Clucas, J., Cohen, S., Dufek, S., Eaves, M., Fradera, B., Gardner, J., Grant-Villegas, N., Green, G., Gregory, C., Hart, E., Harris, S., Horton, M., Kahn, D., Kabotyanski, K., Karmel, B., Kelly, S.P., Kleinman, K., Koo, B., Kramer, E., Lennon, E., Lord, C., Mantello, G., Margolis, A., Merikangas, K.R., Milham, J., Minniti, G., Neuhaus, R., Levine, A., Osman, Y., Parra, L.C., Pugh, K.R., Racanello, A., Restrepo, A., Saltzman, T., Septimus, B., Tobe, R., Waltz, R., Williams, A., Yeo, A., Castellanos, F.X., Klein, A., Paus, T., Leventhal, B.L., Craddock, R.C., Koplewicz, H.S., Milham, M.P.: An open resource for transdiagnostic research in pediatric mental health and learning disorders. Scientific Data. 4, 170181 (2017). doi:10.1038/sdata.2017.181

10. Payne, P.R.., Shah, N.H., Tenenbaum, J.D., Mangravite, L.: Democratizing Health Data for Translational Research. In: Biocomputing 2018. pp. 240–246. WORLD SCIENTIFIC (2017)

11. Seth, A.K.: Interoceptive inference, emotion, and the embodied self. Trends in Cognitive Sciences. 17, 565–573 (2013). doi:10.1016/j.tics.2013.09.007

12. Palser, E.R., Palmer, C.E., Galvez-Pol, A., Hannah, R., Fotopoulou, A., Kilner, J.M.: Alexithymia mediates the relationship between interoceptive sensibility and anxiety. PLoS ONE. 13, 1–11 (2018). doi:10.1371/journal.pone.0203212

13. Gruson-Daniel Célya: Numérique et régime français des savoirs en~action : l'open en sciences. Le cas de la consultation République numérique (2015), https://zenodo.org/record/1491292#.W_e8BZNKiAw, (2018)

14. Bégué, P., Zaric, Z.: Agir avec compassion, penser un soin (en) commun. Soins. 62, 56–59 (2017). doi:10.1016/j.soin.2017.02.015

15. Morgan, D.L.: Paradigms Lost and Pragmatism Regained Methodological Implications of Combining Qualitative and Quantitative Methods. Journal of Mixed Methods Research. 1, 48–76 (2007). doi:10.1177/2345678906292462

12/ Credits and open access

Attribution :

This document (version 2) was written by Célya Gruson-Daniel after taking in consideration comments of Cloé Brami, Maddalena Canna, Anirudh Krishnakumar, Noemi Micheli, Florence Piron, Marc Santolini, David Tareste, Franck Zenasni. It has been proofread by HackYourPhD members (Guillaume Dumas, Matthieu Le Chanjour, Jean-Baptiste Bohuon), Clément Epié and Amelia Robertson.

Other open science comments : A specific Zotero collection #ExCCiR in the HackYourPhD group has been created. You will find online here the budget, the GANT project, the methods summary table as well as the description project on Zenodo (version 1 and 2)

Answers to the questionnaire CRI Research Fellowship

Please consider and discuss any ethical considerations that may arise from the project and how you plan to address them. This could include, but is not limited to collecting any personal information and medical data, working with humans or animals, as well as the potential effects and outcomes of your work. (100 words)

Ethical considerations and solutions are embedded elements of this project. Indeed, the well-being and mental health of PhD students is a sensitive topic and needs specific attention. This is one of the reason this study includes a first qualitative research phase, grounded in “ethics by design” principles to tackle different issues (communication, data collection and analysis, dynamic consent, assistance to participants in distress). In addition to the validation of the IRB protocol, stakeholders should be reassured that their participation will not threaten the future careers of PhD Students, as well as the reputation of Higher Education Institutions (HEIs).

What is the expected impact of your project (fundamental, social, pedagogical, applied, entrepreneurial, etc.) ? (100 words) *

This Participatory Action Research (PAR) project is adapted to develop direct actions with strong social impact: improves the well-being of PhD students and builds an ethics of care in research and higher education. This project will be developed in close interaction with pedagogical team. Economic impact will be indirectly achieved because mental and physical health impact the quality of research and its efficiency (cf.ref [2]). It has a strong fundamental research perspectives by participating in the field of cognitive science, implementation science as well as meta-research in order to improve transversal and interdisciplinary approaches and methodologies in open health.

Have you secured or are applying for other financial support for your project? (100 words) *

Since July 2018, I have had discussions about this project with different CRI individuals (research fellows, Health Lab, PhD program team) as well as the HackYourPhD community. My goal is to create a collective dynamic to secure or apply to other financial support while integrating reflection about an economic model grounded in social solidarity and the commons economy. At the same time, I have already met potential partners (Pasteur Institute, Fabrique des Territoires Innovants (FTI), Northwestern university). In addition to the CRI comments, I have also shared this project on Zenodo to get some feedback and initiate potential private/public partnership.

Project - interactions with CRI : How do you envisage to interact with and contribute to the CRI pedagogy ecosystem (spanning from pre-school outreach, to undergrad, master and PhD programs, and life-long learners ? (150 words) *

This project would be designed in close interaction with the CRI pedagogical team (FIRE Program and Ecole de recherche Interdisciplinaire de Paris) since the project will include the CRI and its network of partners. Using open science and learning approaches, workshops or courses would be organized along the project at CRI for Labs, research fellows but also under/postgraduate students. Moreover, I have been

already teaching a course about open and data sciences which could be integrated as the meta-reflexive module in the program. The PhD Students (or master students in internship) participating in the co-design of the program or such meta-research course will get the ability to discover open science methodologies as well as developing their critical thinking about research and it socio-political stakes (ethics, integrity). This reflection about research and education will participate in open learning and phronesis discussion as a way of deploying collective care at the CRI.

List up to three people from CRI research network* you would like to interact with and tell us why (150 words)

I'm in contact with Anirudh KrishnaKumar (CRI/MatterLab) to use the mindlogger application with specific EMAs (Ecological Momentary Assessments) on well-being. Based on his CRI outreach program in Chennai, we also conversed about the possibility of adapting this pilot program in India to explore the influence of cultural context. I would like to exchange more with Felix Schoeller (working on human psychophysiological states) about the open sensors that we can develop at the CRI in collaboration with other Labs (Health Lab, Motion Lab, Maker Lab). I have already met Aida Bafeta and the perspective she is developing between open learning/serious game and research integrity could give innovative modules to integrate into the program.

List other potential project collaborators (individuals, labs, companies) in Paris, France, or abroad, and briefly describe the nature of their contribution (150 words)0/150

I have already contacted people/institutions to co-construct this program and get several feedbacks. The asterisk are people who have already shown their interest for further contribution.
1/ For the implementation of this program in France and abroad : FIRE Program* (CRI)/ La MAASCC at Pasteur Institute/Northwestern University (Maddalena Canna)*/Jean-Charles Caillez* (Université Catholique de Lille)/François Bottollier (FTI)/ I-Share 2/ For the development of wellbeing modules and assessment: Health Lab CRI with Cloé Brami* (MBSR Program)/ Pascal Haag (BESTDOC course coordinator)/ Antoine Flahault* (Director of the Geneva Institute of Global health)/ Luc Mallet* (APHP/ICM)/Margot Morgieve* (Cermes)/ Franck Zenasni and Laurent Sovet (CRI/LATI) 3/ For fundamental research in cognitive neuroscience/anthropology: Guillaume Dumas* (Pasteur Institute)/ Maddalena Canna* (Northwestern University, ALIUS)/ Emma Cohen (Oxford University) 4/ For open and data science approaches: DRISS*/HackYourPhD community*/La Paillasse*/ Florence Piron* (Université Laval Québec)/ Healthy Brain Network/SageBionetwork/4Youandme.

What specific equipment or support would you need for your project? (100 words) *

Specific equipment needed would be mainly digital equipment which required 1/ web and UX design development for the mobile applications and web-based platform (behavioral and social data) 2/ Maker lab for the open source hardware and the development of portable open devices (physiological data). Other general IT would be necessary as computers, hard disks but also dedicated servers and data storages. Support needed would be from designer, open hardware engineers, data scientists but also psychologists, meditation trainers and lawyers for legal and ethical considerations (cf. Budget in the Project Description).

Total amount of budget requested for the entirety of your fellowship stay (in euros) *

The total amount of budget requested for 3 years is 175 500 euros. The detail budget is available on the project description and also online here : https://docs.google.com/spreadsheets/d/1xyd-DrfTjKFYQI3y0END_OGflKh_NPOB4_Vq7-VTDEo/edit#gid=0

Beyond the time at CRI : How will you personally benefit from your time at CRI Research? (150 words)

The CRI (as a former PhD Student) has been already a wonderful place for me to incubate research and education projects grounded in societal and care values. It is a place that I feel comfortable, understood and at home but also driven to think and create projects combining my background in biology and cognitive neurosciences, my practical expertise in open science and other professional skills. This research Fellow will help make the last 10 years of work and exploration about open science in France and abroad a reality, while keeping in mind the complex ecosystem where we are living. Indeed, this project will allow me to continue the work I have done during my PhD in social science (metaresearch) and put into action the analysis I have made relating to the conception of open science and the necessity of mediation to alleviate frictions between research fields in Science today.

How will your project continue after you leave CRI? (150 words)

This project is integrated in Open and FAIR (Findable, Access, Interoperability and Reuse) principles for all its components. An important part will be to document all the steps of the project to create a pilot program that is reusable. The development of an open and data science protocol to collect and analyze social, behavioral and physiological data with the use of open source and frugal hardware and software will facilitate its implementation and adaptation. During these three years, I'm eager to benefit from the international CRI ecosystem to propose and develop this program in other cultural context and with other partners. I hope this program will be adapted for other population (undergraduate and postgraduate students) but also in complementary studies (using psycho-education or mindfulness program) in the field of global mental health and well-being prevention for our societies.

General interests and past work : Describe briefly one research project you have done so far. (200 words)

The #MOOCLive project (IDEFI-N) highlights specifically the utility of my interdisciplinary knowledge (from cognitive sciences to humanities and social sciences) and other intersecting skills that I acquired with my professional experiences (open and data science management, MOOC coordination, research funding, scientific communication). This project was led by the Centre Virchow-Villermé and other partners in the field of global health and data sciences. I contributed to the writing application for this three year project (1150K euros). I then became the research project manager in order to study the MOOC participants' behavior using data science and machine learning. I coordinated an interdisciplinary team : data scientists from the company ANEO, pedagogical engineers and social scientists. The big challenge has been to

create an interface and translation between these team sharing different theoretical and technical background. We designed a project to identify MOOCs learners profile based on a mixed-methods (qualitative/quantitative) with the support of active learning and markov Decision Process for behavioral inference. This project also included reflections on ethical and legal issues related to open science and digital technologies in order to consider personal data protection, data storage, open access of articles and algorithms for a reproducible research.

5 keywords that describe your research interests Open and digital science, interdisciplinarity, well being, participatory action research, meta-research