

# Bringing experience-sampling technology to family medicine

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## Impact

This impact chapter describes the scientific and societal impact of the findings presented in this thesis. Furthermore, we discuss the relevance of the findings per stakeholder. Finally, we describe the dissemination activities performed during this doctoral project.

## Aim and main conclusions

The main aim of this thesis was to explore the continued development and implementation of an experience-sampling platform, the PsyMate™. The PsyMate™ was proposed as an mHealth tool to support problem explorations for patients suffering from mental health problems in family medicine. This thesis has three parts, including five studies. **Part I** explored the current practice about the use of electronic diaries in healthcare. Electronic diary use relies on the content and design of the tool, external policies and incentives for use, the implementation climate in the organization, the end users' beliefs and attitudes, and activities related to the implementation process. **Part II** assessed the feasibility of experience-sampling technology by administering two newly developed objective cognition tasks measuring respectively information processing speed, and visuospatial working memory and concentration in healthy individuals. Experience-sampling technology is feasible for the application of momentary cognition tasks in the daily life of healthy individuals. They reported positive experiences with these tasks and felt motivated to perform well. **Part III** explored the continued development and implementation of an experience-sampling platform to support problem explorations for patients suffering from mental health problems in family medicine. Embedding an mHealth tool to support the exploration of core problems and resilience in family medicine seems promising, yet challenging. Fine-tuning of the technology of the PsyMate™ remains essential to ensure an optimal fit with the end users' wishes, needs and routines. Some required improvements were technological, but we also recommended to provide both theoretical and practical training, and coaching on the job sessions for psychological assistants. In addition, we concluded that it was important that the organization provides the adequate resources (e.g., time, financial reimbursements) to support psychological assistants with embedding experience-sampling technology in existing work routines.

## Scientific impact

Mapping the factors that influence the use of electronic diaries in healthcare contributes to the understanding of the essential elements for future implementation. The scoping review concluded that design aspects, end users' characteristics, and training and instructions determine electronic diary use (**Chapter 2**). Two articles in this thesis describe the development and evaluation of new momentary cognition tasks to supplement health domains not covered in the original set of universal ESM items (**Chapter 3 and 4**). The findings of these studies contribute to the knowledge about the feasibility of experience-sampling technology. Fuzzy memory problems are important worries for many patients consulting family physicians. With the design thinking study, we showed how to approach a redesign process of an experience-sampling platform in a concrete and systematic way, using co-creation methods (**Chapter 5**). The redesign process led to meaningful insights into the needs and work routines in family medicine. In implementation research, attention needs not only be paid to the technological barriers, but also to organizational, practical and end users' barriers. To discover how and when an experience-sampling platform can be embedded in routine clinical care, we opted for an action research approach to engage end users, in line with their needs and daily routines (**Chapter 7**). We tried to collect in-depth knowledge by optimizing the barriers encountered in the design thinking study. This study design is not often used in daily clinical practice because there are many barriers and the researchers have insufficient knowledge and skills about the clinical reasoning process. The action research study yielded meaningful insights into the use and experiences of psychological assistants and their patients, and the implementation of experience-sampling technology in family medicine. It also allowed the psychological assistants and their patients to experience and learn about when and how they could use experience-sampling technology to support problem explorations in family medicine. These research designs were needed to understand why experience-sampling technology would (not) be used in routine clinical care. The iterative approach ensured the active involvement of the end users, resulting in a close collaboration between the research team and the end users. However, this was not easy because getting started with the ESM tool was already challenging for the psychological assistants and we used a mediating strategy where the psychological assistants managed the contact with patients. Although end user involvement was only partly successful in our project, the findings of the studies described in this

thesis are more likely to be incorporated into daily clinical practice and provide valuable evidence for the prospective implementation of experience-sampling technology or other mHealth tools in daily clinical practice.

## Societal impact

This studies described in this thesis investigated the use and implementation of experience-sampling technology as a method to support problem explorations in family medicine, thereby focusing on the patients' vulnerabilities as well as strengths and resilience, in order to reduce the burden of psychosocial problems.

Worldwide, the prevalence of mental health problems in the family medicine population ranges between 20 and 55 per cent<sup>1-8</sup>. Mental disorders cover seven percent of the global disease burden<sup>9</sup>. People suffering from mental health problems experience reduced daily life functioning in different contexts (e.g., at work, at home). Despite frequent consultations in family medicine and specialist mental healthcare, current treatment of mental health problems remains challenging. Almost half of the patients with mental health problems relapse within the first year after treatment<sup>10-12</sup>. To prevent this relapse, scholars propose to focus on other health domains that are part of daily life functioning<sup>13-15</sup>. This requires the development of other assessment strategies, for example experience-sampling technology. However, although psychological assistants and patients experienced the added value of its use to support problem explorations in family medicine, experience-sampling technology was not taken for granted. Psychological assistants experienced difficulties to integrate the ESM tool into existing work processes and patients experienced difficulties to integrate it into their daily life activities. When integration succeeded, psychological assistants and their patients gained more in-depth insights into patterns of contextual variability and resilience, thereby improving patient empowerment. These findings demonstrate the importance of paying more attention to eHealth use and implementation in daily clinical practice in order to improve the actual use of the many tools that are updated daily in the Google Play Store or the App Store, thereby reducing the burden of mental health problems. Currently, a lot of attention is paid to the development of these tools<sup>16-19</sup>. The findings presented in this thesis contribute to the understanding, knowledge and skills to actually use and implement

experience-sampling technology or other mHealth tools in daily clinical practice.

## **Target population and other stakeholders**

The findings presented in this thesis may be relevant to individuals suffering from mental health problems, family physicians and their psychological assistants, healthcare students, researchers, technology manufacturers and health insurance companies. This thesis was part of the Brightlands Innovation Program LIME (Limburg Measures; limeconnect.nl), a program that facilitates smarter measurement methods and more efficient data collection for better care and health, funded by the Province of Limburg, Zuyd University of Applied Sciences, and Maastricht University, the Netherlands.

## **Individuals suffering from mental health problems**

The knowledge we have gained in this doctoral project can be an added value for individuals suffering from mental health problems. The PsyMate™ was re-designed with patients suffering from mental health problems in family medicine. The findings of this project demonstrated that the use of an experience-sampling platform is not taken for granted by patients. Individuals suffering from mental health problems who tried the PsyMate™ app, experienced it as a functional, easy to use and simple tool to monitor their vulnerabilities and strengths. However, the web-based reporting tool was too difficult for some to read and interpret quickly. The findings of this project also indicated that the PsyMate™ is feasible to assess objective cognitive performance in the daily life of healthy individuals. These findings create opportunities to gain insight into momentary cognitive functioning of healthy individuals. Gaining this insight could help healthy individuals or patients navigate and adjust daily life challenges. It may provide starting points for dealing with cognitive deficits that are individually relevant in the context of daily life. In the future, this might also be relevant to improve prevention and treatment for individuals with neurological conditions (e.g., mild cognitive impairment, Parkinson's disease, early dementia).

## Family physicians and their psychological assistants

Although only psychological assistants participated in this project, the findings may be relevant to several healthcare professionals in mental healthcare as well as in somatic care, assuming that patients will get better if you pay more attention to their self-reliance. However, the use and implementation of experience-sampling technology still remains a challenge. It is not taken for granted by psychological assistants. Although severe barriers were encountered related to its uptake and use, the psychological assistants who successfully implemented the PsyMate™, experienced its added value, as it allowed in-depth problem explorations and promoted patient empowerment. The findings presented in this thesis demonstrate that the treatment can be a more collaborative process. The step-by-step guide for using experience-sampling technology in daily clinical practice that has been developed as a part of this thesis, may be helpful to healthcare professionals, as it depicts real-world examples and provides recommendations to facilitate its use (**Chapter 6**). Healthcare professionals can also benefit from the lessons learned from our action research study, through the theoretical and practical training for healthcare professionals (**Chapter 7**).

## Healthcare students

The findings presented in this thesis can be used to create awareness among healthcare students about the development, use and implementation of experience-sampling technology in daily clinical practice. Although technology availability and use increase in healthcare, knowledge about the uptake and use of eHealth is limited in the course curricula of healthcare education<sup>20</sup>. To integrate more eHealth into the course curricula, healthcare students need to get acquainted with eHealth during their medical or clinical training in which it is especially important to pay attention to its use in daily clinical practice and patient involvement. Furthermore, providing use cases, based on real-world examples, might help healthcare students to develop abilities on when and how to use eHealth in daily clinical practice. For example, Maastricht University recently started with a major in Digital Technology and Care for health sciences students to educate students in bridging the gap between information technology and routine clinical care. Open University also incorporated a course

on e-mental health interventions for psychology students. Both curricula focus on the uptake and implementation of eHealth.

## Researchers

The findings presented in this thesis contribute to the empirical knowledge about the development, use and implementation of experience-sampling technology in routine clinical care, more specifically family medicine. It is also a first step towards embedding the use of an experience-sampling platform in daily clinical practice in general and family medicine in particular. The findings provide insight into the advantages and challenges of the different study designs and co-creation methods used in our research. The findings emphasize the importance to conduct a thorough needs assessment, to involve relevant stakeholders in the redesign process of an experience-sampling tool by using co-creative techniques, and to test and evaluate its use in an iterative way with the intended end users. When using co-creative techniques, it is important to look for a trade-off between stakeholders who want to have a feeling of (psychological) mastery, and the technological feasibility of implementing changes and scientific experience of the researchers. Moreover, healthcare professionals usually have a greater say in the development process of an action research study, while the research team has a more supporting role<sup>21-23</sup>. But, healthcare professionals might also ask for more coaching on when and how to use experience-sampling technology or other mHealth tools, so the research team has to take a more leading role. The design and findings of the studies can be used as a starting point in future research focusing on experience-sampling technology or other mHealth tools, its use in other healthcare settings and its cost-effectiveness.

Within LIME, this doctoral project was, along with another doctoral project (the MISS Activity), part of the main theme 'Personalized Wearables'. The findings presented in this thesis are in line with the findings from the other doctoral project, demonstrating the importance of using other research designs to investigate the use and implementation of eHealth in daily clinical practice<sup>24-26</sup>.

## Technology manufacturers

To develop a specific protocol that fits with research or care practices, the PsyMate™ is available for purchase via the technology manufacturer. The findings might be useful for technology manufacturers when developing an experience-sampling platform for individuals suffering from mental health problems. Furthermore, the findings presented in this thesis indicate that it might be useful to establish more collaborations between technology manufacturers, researchers and healthcare professionals when developing eHealth tools.

## Health insurance companies

The findings presented in this thesis might encourage health insurance companies, policymakers, healthcare professionals, individuals suffering from mental health problems, technology manufacturers and researchers to collaborate more when developing and implementing eHealth in routine clinical care. Health insurance companies recognize the opportunities of eHealth applications to, among others, keep healthcare affordable and accessible and, where possible, bring it closer to the patient<sup>27</sup>. As co-funders of healthcare, they play a role in scaling up eHealth and focus on the (cost-)effectiveness of eHealth initiatives<sup>27</sup>. Demonstrating that the use of eHealth applications is well-integrated into routine clinical care is a prerequisite for (cost-)effective eHealth applications.

## Dissemination

Findings of this thesis were nationally shared in symposia and via (co-creative) workshops with the general population, patients, experts by experience, healthcare professionals and researchers. They were also mentioned in a radio broadcast on RTV Maastricht. Findings of this thesis were disseminated via posters, oral presentations and workshops at national and international conferences on mental health, Experience Sampling Method and digital healthcare. This project received a golden gnome as one of the three nominees for the Innovation PRoF 2018 Award; for innovative projects in the broad domain of healthcare applications and care innovation. Promotion of a better understanding and positive attitude of potential future healthcare professionals

can rely on findings presented in this thesis. They were made available through lectures, tutorials and workshops at Maastricht University and Zuyd University of Applied Sciences. Furthermore, findings of this thesis were published in international peer-reviewed journals. This project was part of the Brightlands Innovation Program LIME (Limburg Measures; limeconnect.nl), a program that facilitates smarter measurement methods and more efficient data collection for better care and health, funded by the Province of Limburg, Zuyd University of Applied Sciences, and Maastricht University, the Netherlands. Table 1 provides an overview of the dissemination activities performed during this doctoral project.

**Table 1** Dissemination activities within education, healthcare and research.

Presentations	<p>Daniels N. The use of the PsyMate™ to support detailed functional analyses in family medicine – an action research design. LAM; October 2020; Online (oral presentation).</p> <p>Daniels N, Ummels D. Hoe een wearable werkbaar wordt: ervaringsverhaal na doorontwikkeling van wearables en apps. Limburg Meet(ing); December 2019; Heerlen, The Netherlands (oral presentation).</p> <p>Daniels N, Hochstenbach L, van Zelst C, Bokhoven M, Delespaul P, Beurskens A. Successful long-term engagement in self-monitoring using e-diaries: a scoping review. MHeNs Annual Research Day; October 2019; Maastricht, The Netherlands (poster presentation).</p> <p>Daniels N, Daemen M. De Experience Sampling Methode: inzicht en interventies in het dagelijks leven. Jaarcongres kinder- en jeugdpsychiatrie; October 2019; Bussum, The Netherlands (workshop).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. SAA; June 2019; Syracuse, New York, the United States of America (oral presentation).</p> <p>Daniels N, Verhagen S, Bartels S, Tans S, Borkelmans K, de Vugt M, Delespaul P. Cognition in daily life: how to unravel momentary variation? SAA; June 2019; Syracuse, New York, the United States of America (poster presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. ENMESH; June 2019; Lisbon, Portugal (oral presentation).</p> <p>Daniels N, van Zelst C. PsyMate: wat kan je ermee? Landelijke week van de psychiatrie, afsluitingsdag; March 2019; Utrecht, The Netherlands (workshop).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. 3<sup>rd</sup> ESM network meeting; November 2018; Heerlen, The Netherlands (poster presentation).</p>
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	<p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. MHeNs Annual Research Day; November 2018; Maastricht, The Netherlands (poster presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. CAPHRI Research Day; November 2018; Valkenburg, The Netherlands (poster presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. ISOQOL; October 2018; Dublin, Ireland (poster presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Re-design of PsyMate™ for family medicine: design thinking in co-creation with health care professionals. BrainTrain Symposium; September 2018; Maastricht, The Netherlands (poster presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. PCPM – Primary Care PsyMate. PRoF 2018 Award Symposium; May 2018; Ghent, Belgium (oral presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. The value of co-creation: boosting the optimization of PsyMate™ in primary mental healthcare. MHeNs Annual Research Day; November 2017; Maastricht, The Netherlands (oral presentation).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. The value of co-creation: collaboration with primary mental healthcare professionals to boost the optimization of an ESM application in clinical practice. 2<sup>nd</sup> ESM network meeting; November 2017; Groningen, The Netherlands (oral presentation).</p> <p>Delespaul P, Verhagem S, Daniels N. Wat wil jij beter kunnen? Naar een persoonlijke hulpverlening... 13<sup>de</sup> Psychocongres; November 2017; Zwolle, The Netherlands (workshop).</p> <p>Daniels N, Hochstenbach L, Bokhoven M, Beurskens A, Delespaul P. Bridging the gap between research and daily practice: optimization of PsyMate™ in primary mental healthcare (PMHC). CAPHRI Research Day; November 2017; Valkenburg, The Netherlands (poster presentation).</p>
Nominations	Innovation PRoF 2018 Award
Multimedia	Radio broadcast on RTV Maastricht: <a href="https://www.rtvmaastricht.nl/tv/bet-beleg-tv/116027988">https://www.rtvmaastricht.nl/tv/bet-beleg-tv/116027988</a>
Lectures	Daniels N. Co-creatie in de dagelijkse praktijk: ervaringen met verschillende methodieken. Bachelor track Health Sciences, major Digital Technology and Care, course Design Thinking and Digital Healthcare Technology, Maastricht University; November 2020; Online.
Education	208 students from different disciplines of Zuyd University of Applied Sciences and Maastricht University: Communication and Multimedia Design, People and Business Management, Business Economics, Physiotherapy, Primary Care Assistant Practitioner Mental Health, Psychology, and Mental Health

Publications in international peer-reviewed journals	<p>Daniëls NEM, Hochstenbach LMJ, van Bokhoven MA, Beurskens AJHM and Delespaul PAEG (2019). Implementing Experience Sampling Technology for Functional Analysis in Family Medicine – A Design Thinking Approach. <i>Frontiers in Psychology</i> 10:2782. doi: 10.3389/fpsyg.2019.02782</p> <p>Verhagen SJW*, Daniëls NEM*, Bartels SL, Tans S, Borkelmans KWH, de Vugt ME, et al. (2019). Measuring within-day cognitive performance using the experience sampling method: A pilot study in a healthy population. <i>PLoS ONE</i> 14(12): e0226409. doi: 10.1371/journal.pone.0226409</p> <p>Daniëls NEM*, Bartels SL*, Verhagen SJW, Van Knippenberg RJM., De Vugt ME and Delespaul PAEG (2020). Digital assessment of working memory and processing speed in everyday life: Feasibility, validation, and lessons-learned. <i>Internet Interventions</i> 19:100300. doi: 10.1016/j.invent.2019.100300</p> <p>Daniëls NEM, Hochstenbach LMJ, van Zelst C, van Bokhoven MA, Delespaul PAEG and Beurskens AJHM (2021). Factors That Influence the Use of Electronic Diaries in Health Care: Scoping Review. <i>JMIR mHealth and uHealth</i> 9(6):e19536. doi: 10.2196/19536</p>
Book chapters	<p>Daniëls NEM, Verhagen SJW and Delespaul PAEG (2020). mHealth binnen herstelnetwerken. In Niels Mulder, Jaap van Weeghel, Philippe Delespaul, Frist Bovenberg, Bram Berkvens, Eva Leeman, Hans Kroon, Tom van Mierlo, Gerdie Kienhorst (Eds.), <i>Netwerkpsychiatrie: samenwerken aan herstel en gezondheid</i> (pp. 161–168). Amsterdam, Nederland: Boom uitgevers Amsterdam BV</p>

## References

- World Health Organization. *Mental health in primary care: illusion or inclusion?* : World Health Organization;2018.
- Nordström A, Bodlund O. Every third patient in primary care suffers from depression, anxiety or alcohol problems. *Nordic Journal of Psychiatry*. 2008;62(3):250–255.
- Rancans E, Renemane L, Kivite–Urtane A, Ziedonis D. Prevalence and associated factors of mental disorders in the nationwide primary care population in Latvia: a cross-sectional study. *Annals of General Psychiatry*. 2020;19:1–10.
- Serrano–Blanco A, Palao DJ, Luciano JV, et al. Prevalence of mental disorders in primary care: results from the diagnosis and treatment of mental disorders in primary care study (DASMAP). *Social Psychiatry and Psychiatric Epidemiology*. 2010;45(2):201–210.
- Ustün TB, Sartorius N. *Mental illness in general health care: an international study*. John Wiley & Sons;1995.
- Anseau M, Dierick M, Buntinkx F, et al. High prevalence of mental disorders in primary care. *Journal of Affective Disorders*. 2004;78(1):49–55.
- Toft T, Fink P, Oernboel E, Christensen K, Frostholm L, Olesen F. Mental disorders in primary care: prevalence and co-morbidity among disorders. Results from the functional illness in primary care (FIP) study. *Psychological Medicine*. 2005;35(8):1175.
- Balestrieri M, Isola M, Quartaroli M, Roncolato M, Bellantuono C. Assessing mixed anxiety–depressive disorder. A national primary care survey. *Psychiatry Research*. 2010;176(2–3):197–201.
- Rehm J, Shield KD. Global burden of disease and the impact of mental and addictive disorders. *Current Psychiatry Reports*. 2019;21(2):1–7.
- Agenagnew L. The Lifetime Prevalence and Factors Associated with Relapse Among Mentally Ill Patients at Jimma University Medical Center, Ethiopia: Cross Sectional Study. *Journal of Psychosocial Rehabilitation and Mental Health*. 2020;7(3):211–220.
- Lin EH, Katon WJ, VonKorff M, et al. Relapse of depression in primary care: rate and clinical predictors. *Archives of Family Medicine*. 1998;7(5):443.
- Moriarty AS, Castleton J, Gilbody S, et al. Predicting and preventing relapse of depression in primary care. *British Journal of General Practice*; 2020.
- Huber M, Knottnerus JA, Green L, et al. How should we define health? *BMJ*. 2011;343.
- Keyes CL. Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*. 2005;73(3):539.
- Slade M. Mental illness and well-being: the central importance of positive psychology and recovery approaches. *BMC Health Services Research*. 2010;10(1):1–14.
- Verwey R, Hochstenbach L, Huygens M, Swinkels I, van der Weegen S, Willard S. Geleerde lessen uit e-health onderzoek. *ICT&health*. 2017;2017(1):11–13.
- Keuper J, Meurs M, Victoor A, Huygens M, Groot JD, Jong JD. *De inzet van e-health-toepassingen in de huisartsenzorg: leren van de succesverhalen uit de praktijk*. 2020.
- Wouters M, Huygens M, Voogdt H, et al. *Samen aan zet! eHealth-monitor 2019*. 2019.
- Krijgsman J, Bie Jd, Burghouts A, et al. *eHealth, verder dan je denkt: eHealth-monitor 2013*. 2013.
- Wentink M, Siemonsma P, van Bodegom–Vos L, et al. Teachers' and students' perceptions on barriers and facilitators for eHealth education in the curriculum of functional exercise and physical therapy: a focus groups study. *BMC Medical Education*. 2019;19(1):1–8.
- Koshy E, Koshy V, Waterman H. *Action research in healthcare*. 2010.

22. Reason P, Bradbury H. *Handbook of action research: Participative inquiry and practice*. Sage;2001.
23. Van den Steene H, Van West D, Glazemakers I. Het potentieel van participatief actieonderzoek voor cliënt, praktijk en onderzoek in de ggz; onderbouwing en praktijkvoorbeeld. *Tijdschrift voor Psychiatrie*. 2019;61(5):343–351.
24. Ummels D, Braun S, Stevens A, Beekman E, Beurskens A. Measure It Super Simple (MISS) activity tracker:(re) design of a user-friendly interface and evaluation of experiences in daily life. *Disability and Rehabilitation: Assistive Technology*. 2020:1–11.
25. Ummels D, Beekman E, Moser A, Braun SM, Beurskens AJ. Patients' experiences with commercially available activity trackers embedded in physiotherapy treatment: A qualitative study. *Disability and Rehabilitation*. 2020;42(23):3284–3292.
26. Ummels D, Beekman E, Braun SM, Beurskens AJ. Using an Activity Tracker in Rehabilitation: Experiences of Healthcare Professionals and Patients. *International Journal of Environmental Research and Public Health*. 2021;18(10):5147.
27. Keuper J, Meurs M, Victoor A, Huygens M, Groot J de, de. JJ. *De inzet van e-health-toepassingen in de huisartsenzorg: leren van de succesverhalen uit de praktijk*. Utrecht: Nivel;2020.