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From smoke to sweat: developing and evaluating an accessible virtual coach to support smoking cessation and physical activity

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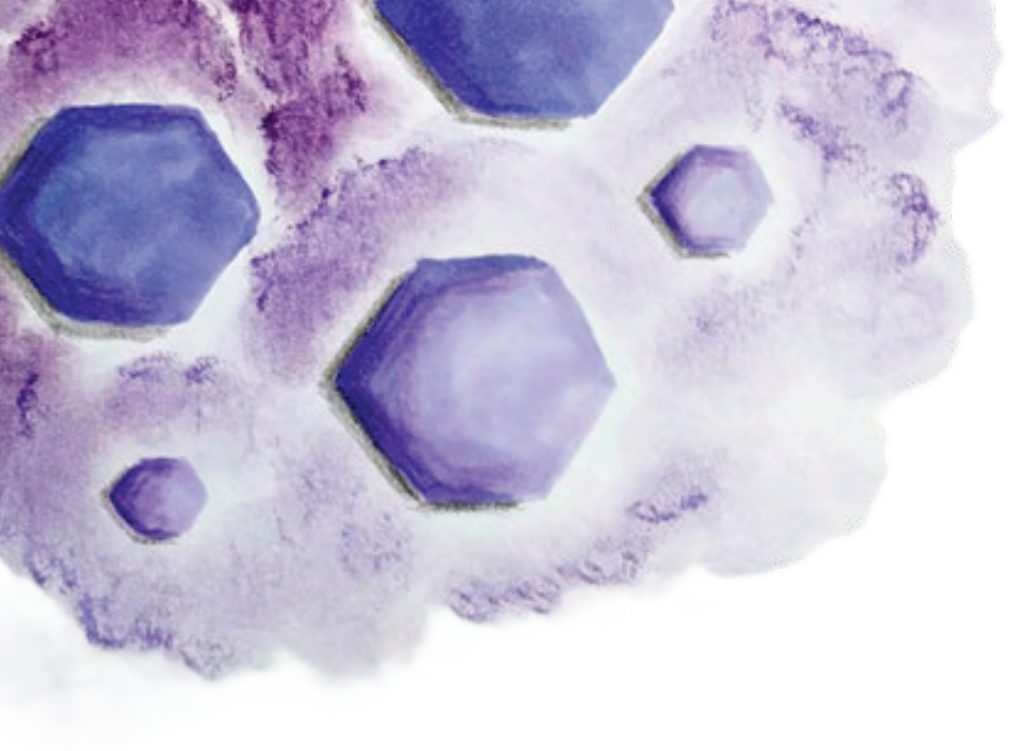

PhD portfolio

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Bibliography

Academic training and activities

The PhD trajectory - an overview

During my **first PhD year**, my work focused on laying the conceptual and methodological foundations of my PhD research within the interdisciplinary Perfect Fit (PF) project. Early in the trajectory, I set up an advisory board of potential end-users together with a fellow PhD candidate. I organized meetings and participatory activities and acted as the primary contact person for the advisory board throughout the project, gaining experience in end-user engagement and participatory research coordination.

While setting up the PF advisory board, I observed that the scientific literature provided limited practical guidance on how to operationalize Patient and Public Involvement (PPI) in eHealth research. To support meaningful involvement of the advisory board, I drew on the practical expertise and resources shared by a more experienced PhD candidate. Recognizing that such experiential knowledge was largely absent from the literature but relevant to other researchers, the idea emerged to develop a practical, step-by-step PPI approach in collaboration with other eHealth researchers (Chapter 2). Through this process, I developed skills in identifying research gaps, initiating new research outputs, and translating experiential knowledge into a structured and transferable research product.

During this first year, I also took the lead in preparing the ethical approval application for the experimental proof-of-concept study (Chapter 4). This study applied a novel virtual reality method to evaluate a prototype of the PF intervention and had a particular focus on recruiting participants from lower socioeconomic backgrounds. Therefore, study preparation involved several activities, including visiting community centers as part of recruitment strategies, designing research procedures together with the advisory board, working with virtual reality software, and preparing detailed study protocols. Through these activities, I developed competencies in preparing ethical approval applications and designing experimental studies with feasible study procedures.

In addition, I became a member of the PhD candidates' committee of my department, a position I held for nearly two years. Together with other committee members, I represented PhD candidates by participating in meetings with the department's management team, organizing meetings and activities for PhD candidates, and advocating for improvements in organizational processes. During my first year, I also co-initiated the organization of a symposium at a national conference, in collaboration with researchers from multiple universities. These activities strengthened my organizational coordination and professional communication skills.

During my **second PhD year**, my work increasingly focused on intervention development, study preparation, and teaching. I led the ethical approval application for the PF evaluation study (Chapters 5-7) and contributed substantially to the content develop-

ment of the PF virtual coach intervention. The six-month development phase involved several activities, including creating a user journey, writing virtual coach dialogs, and participating in development sprints with fellow PhD candidates. The intervention was developed with an interdisciplinary team, in collaboration with the advisory board and external experts. Working in this context required coordination and communication across disciplines, alignment of different methodological perspectives, and joint decision-making, which strengthened my skills in translating knowledge into an operational intervention, interdisciplinary collaboration, and project coordination.

In my second year, I also developed and taught a workshop on motivational interviewing as part of the Medicine bachelor's minor, which I continued to teach during my third and fourth year together with another PhD candidate. I also taught multiple working groups within the bachelor-level medical course 'Lijn Samenwerking, Gezondheidsbevordering en Leiderschap'. Additionally, from my second year onwards, I supervised nine master's thesis students, research interns, and research assistants, further developing my competencies as an academic teacher and supervisor.

The **third PhD year** primarily focused on study execution and dissemination of my findings. I finalized the research protocol article for the evaluation study (Chapter 5) and the systematic review (Chapter 3), which involved the use of ASReview, a novel, open-source machine learning tool for literature screening.

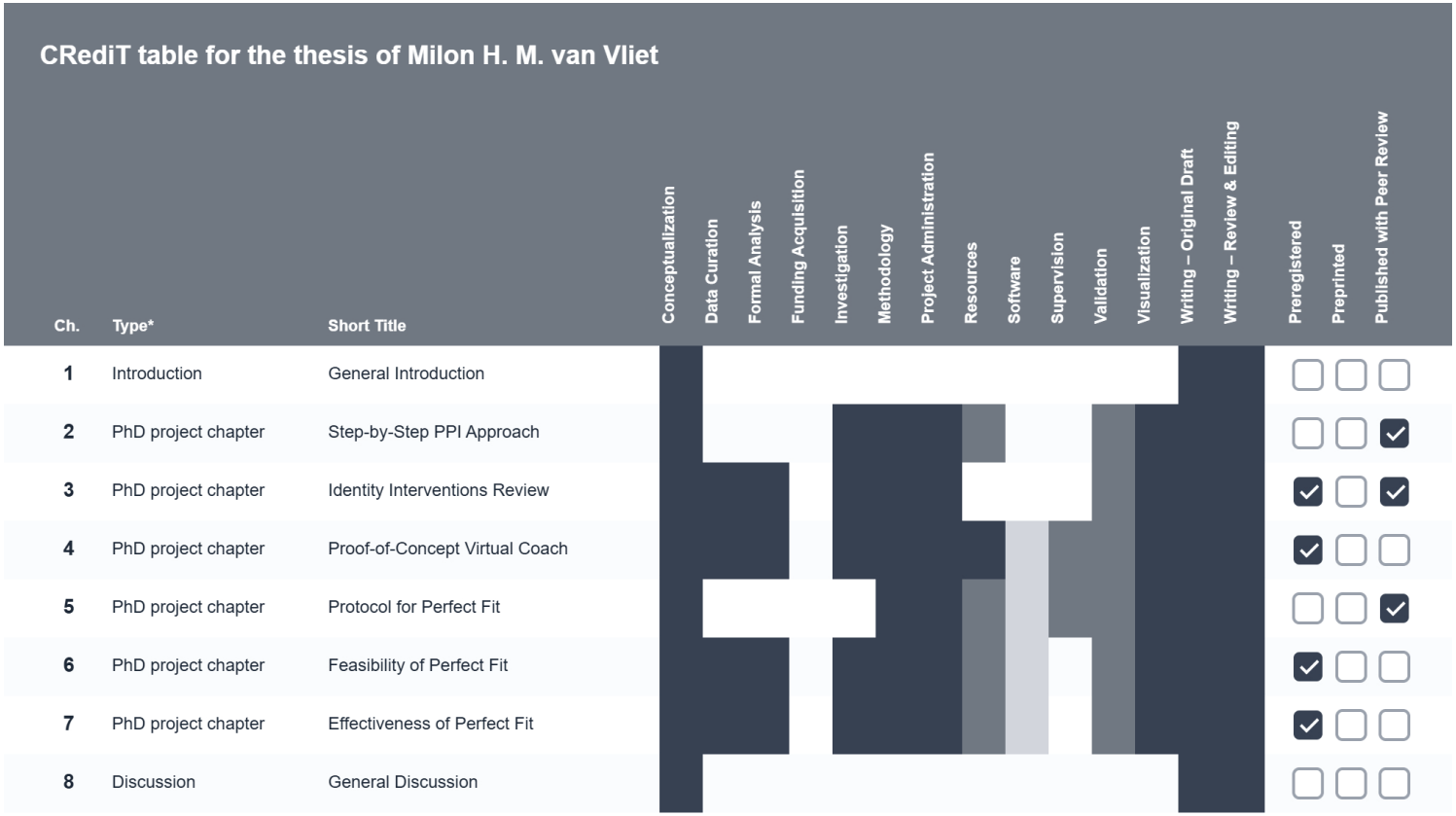
To support recruitment for the evaluation study (Chapters 6 and 7), I wrote Dutch-language articles for healthcare professional journals and participated in a local newspaper interview. The evaluation study involved the use of multiple smartphone applications, a smartwatch, and a mixed-methods design. Conducting this study increased my experience in mixed-methods research and managing complex study logistics, technical systems, and datasets.

During the **final phase of my PhD**, the focus was primarily on data analysis and manuscript preparation. I finalized the articles corresponding to Chapters 2, 4, 6, and 7 and conducted qualitative and advanced quantitative analyses, including analyses of application log data, smartwatch data, and (generalized) linear mixed models. This phase further strengthened my competencies in advanced statistical analysis and data integration.

Across my PhD trajectory, I preregistered the studies presented in Chapters 3, 4, and 5-7, took the lead in submitting, revising, and finalizing manuscripts, and contributed to open science practices by making intervention materials publicly available. I completed the mandatory and additional relevant PhD training courses (e.g., Analysis of Repeated Measures course) and presented my work at (inter)national conferences (e.g., International Congress of Behavioral Medicine). Finally, beyond the work in this dissertation, I contributed to several other publications from collaborations within the PF team and earlier research collaborations at Leiden University.

CRediT statement for the chapters in this dissertation

CRediT table for the thesis of Milon H. M. van Vliet



Ch.	Type*	Short Title	Conceptualization	Data Curation	Formal Analysis	Funding Acquisition	Investigation	Methodology	Project Administration	Resources	Software	Supervision	Validation	Visualization	Writing – Original Draft	Writing – Review & Editing	Preregistered	Preprinted	Published with Peer Review
1	Introduction	General Introduction	■												■	■	☐	☐	☐
2	PhD project chapter	Step-by-Step PPI Approach	■				■	■	■	■			■	■	■	■	☐	☐	☑
3	PhD project chapter	Identity Interventions Review	■	■	■		■	■	■				■	■	■	■	☑	☐	☑
4	PhD project chapter	Proof-of-Concept Virtual Coach	■	■	■		■	■	■	■	■	■	■	■	■	■	☑	☐	☐
5	PhD project chapter	Protocol for Perfect Fit	■					■	■	■		■	■	■	■	■	☐	☐	☑
6	PhD project chapter	Feasibility of Perfect Fit	■	■	■		■	■	■	■			■	■	■	■	☑	☐	☐
7	PhD project chapter	Effectiveness of Perfect Fit	■	■	■		■	■	■	■	■	■	■	■	■	■	☑	☐	☐
8	Discussion	General Discussion	■												■	■	☐	☐	☐

**PhD project chapters are the direct result of the PhD project of the PhD candidate.*
Some theses also include Collaboration Chapters, to which the PhD candidate has contributed but fall outside the PhD project.

Bibliography

Publications and submitted manuscripts in this dissertation

1. **van Vliet MHM***, van Eersel RA*, Poot CC, Faber JS, Aardoom JJ, Meijer E, Versluis A. A practical step-by-step approach for patient and public involvement in eHealth intervention research: Lessons learned from three case projects. *Internet Interventions.* 2025;43:100896. doi:10.1016/j.invent.2025.100896. (*authors contributed equally; **Chapter 2**)
2. **van Vliet MHM**, Penfornis KM, Gebhardt WA, von Haeseler EF, Chavannes NH, Versluis A, Meijer E. The effect of identity-related interventions on physical activity- and smoking-related identities and behavior: a mixed-methods systematic review. *Systematic Reviews*. 2026;15:103. doi:10.1186/s13643-026-03103-2 (**Chapter 3;** *OSF preregistration: https://osf.io/hkd9c/*)
3. **van Vliet MHM**, Meijer E, van Eersel RA, Albers N, Penfornis KM, Antoniades A, Chavannes NH, Versluis A. Smoking cessation support in high-risk situations via a virtual coach: a virtual reality proof-of-concept study. *Contemporary Clinical Trials Communications.* (submitted; **Chapter 4**; *ClinicalTrials.gov preregistration: https://clinicaltrials.gov/study/NCT05654545*)
4. **van Vliet MHM**, Versluis A, Chavannes NH, Scheltinga BL, Albers N, Penfornis KM, Baccinelli W, Meijer E, on behalf of the Perfect Fit consortium. Protocol of a mixed-methods evaluation of Perfect Fit: a personalized mHealth intervention with a virtual coach to promote smoking cessation and physical activity in adults. *Digital Health*. 2024;10:20552076241300020. doi:10.1177/20552076241300020.(**Chapter 5**; *ClinicalTrials.gov preregistration: https://clinicaltrials.gov/study/NCT06095999*)
5. **van Vliet MHM**, Meijer E, Albers N, Penfornis KM, Baccinelli W, Scheltinga BL, van Eersel RA, Chavannes NH, Versluis A, on behalf of the Perfect Fit consortium. Evaluating the feasibility and acceptability of Perfect Fit: a mixed-methods study of a virtual coach-based mHealth intervention for smoking cessation and physical activity in adults. *JMIR Human Factors*. (under revision; **Chapter 6**; *ClinicalTrials.gov preregistration: https://clinicaltrials.gov/study/NCT06095999*)
6. **van Vliet MHM**, Versluis A, Penfornis KM, Baccinelli W, Scheltinga BL, Albers N, Chavannes NH, Rippe RCA, Meijer E, on behalf of the Perfect Fit consortium. Evaluating the two-month effectiveness of Perfect Fit: a mixed-methods study of a virtual coach-based mHealth intervention for smoking cessation and physical activity in adults. *Digital Health*. (under revision; **Chapter 7**; *ClinicalTrials.gov preregistration: https://clinicaltrials.gov/study/NCT06095999*)

Other publications and submitted manuscripts

7. Penfornis KM, **van Vliet MHM**, Meijer E, Gebhardt WA. Mapping the evidence on identity processes and identity-related interventions in the smoking and physical activity domains: a scoping review protocol. *BMJ Open*. 2022;12(7):e058405. doi:10.1136/bmjopen-2021-058405. (*OSF preregistration: https://osf.io/hkd9c/*)
8. **van Vliet MHM**, Meijer E, Versluis A. Virtuele persoonlijke coach: Gezonder leven. *TvPO*. 2023;4:34–36.

9. Ghantasala RP, Albers N, Penfornis KM, **van Vliet MHM**, Brinkman WP. Feasibility of generating structured motivational messages for tailored physical activity coaching. *Front Digit Health*. 2023;5:1215187. doi:10.3389/fdgth.2023.1215187.
10. Westendorp J, Geerse OP, van der Lee ML, Schoones JW, **van Vliet MHM**, Wit T, Evers AWM, van Vliet LM. Harmful communication behaviors in cancer care: A systematic review of patients and family caregivers perspectives. *Psycho-Oncol*. 2023;32(12). doi:10.1002/pon.6247
11. Versluis A, Penfornis KM, van der Burg SA, Scheltinga BL, **van Vliet MHM**, Albers N, Meijer E. Targeting key risk factors for cardiovascular disease in at-risk individuals: Developing a digital, personalized, and real-time intervention to facilitate smoking cessation and physical activity. *JMIR Cardio*. 2024;8:e47730. doi:10.2196/47730 (*Preprint: https://preprints.jmir.org/preprint/47730*)
12. Penfornis KM, **van Vliet MHM**, von Haeseler EF, Gebhardt WA, Meijer E. Conceptualisation, operationalisation and role of identity in physical activity and smoking in individuals aged 45 and over: a systematic scoping review. *BMJ Open*. 2025;15(7):e097232. doi:10.1136/bmjopen-2024-097232 (*OSF preregistration: https://osf.io/hkd9c/*)
13. Meijer E, **van Vliet MHM**, Zijp A, de Frel D, Versluis A. Gelijke kansen om te stoppen met roken: Twee mHealth stoppen-met-roken-interventies voor mensen met een lagere sociaaleconomische positie. *Ned Tijdschr Leefstijlgeneeskd*. 2025;3(5):269–272.
14. Hondmann SM*, **van Vliet MHM***, van Eersel RA, Breeman LD, Keesman M, de Buisonjé DR, Haroon G, Kraaijenhage R, Janssen VR, Evers AWM. Enhancing weight loss programs: A meta-analysis of financial incentives and behavior change techniques. *Obesity Rev*. (accepted; *authors contributed equally; *PROSPERO preregistration: https://www.crd.york.ac.uk/PROSPERO/view/CRD42021239275*)

Overview of academic training and activities

Completed courses and other training

Mandatory courses

2021 Leiden University Onboarding Programme Inform & Connect

2022 Basic Methods and Reasoning in Biostatistics, Boerhaave Nascholing, Leiden

2022 Basiscursus regelgeving en organisatie voor klinisch onderzoekers (eBROK®), NFU

Other courses and training

2022 Organizing and attending course 'Participatie in onderzoek', INVOLV

2022 Advanced Project Management for PhDs, Leiden University

2022 Challenges in Responsible Research and Innovation: Making Collaborations Work

2023 Qualitative research in the age of open science: the Reproducible Open Coding Kit (ROCK), European Health Psychology Society

2024 Analysis of Repeated Measurements course, Boerhaave Nascholing, Leiden

2024 Job Orientation course, Leiden University

Presentations

(Inter)national conferences

2022 *Het effect van gepersonaliseerd advies van een chatbot op stoppen met roken in risicovolle situaties een virtual reality experiment studieprotocol* – Nederlands Netwerk voor Tabaksonderzoek congres, online (organization of symposium; oral presentation)

2022 *A practical guide for patient and public involvement in eHealth intervention research* – Association of Researchers in Psychology and Health conference, Egmond aan Zee, The Netherlands (oral presentation)

2023 *A practical guide for patient and public involvement in eHealth intervention research* (oral presentation)
Development of a virtual coach for smoking cessation and physical activity promotion (poster presentation)
– 37th Annual Conference of the European Health Psychology Society, Bremen, Germany

2024 *The effect of identity-based interventions on physical activity- and smoking-related identities, and behavior: A systematic review* – Association of Researchers in Psychology and Health conference, Maastricht, The Netherlands (oral presentation)

2024 *Perfect Fit: Insights and lessons learned from the interdisciplinary development of a virtual coach for smoking cessation and physical activity* – Supporting Health by Technology conference, Groningen, The Netherlands (oral presentation)

2024 *The effect of identity-based interventions on physical activity- and smoking-related identities, and behavior: A systematic review* (poster presentation)
A mixed-methods evaluation of a virtual coach for smoking cessation and physical activity in adults (poster presentation)
– 17th European Public Health conference, Lisbon, Portugal

2025 *A mixed-methods evaluation of a virtual coach for smoking cessation and physical activity in adults* – Supporting Health by Technology conference, Enschede, The Netherlands (oral presentation)

2025 *A practical step-by-step approach for patient and public involvement in eHealth intervention research* (oral presentation)
A mixed-methods evaluation of a virtual coach for smoking cessation and physical activity in adults (poster presentation)
– 18th International Congress of Behavioral Medicine, Vienna, Austria (poster and oral presentation)

Other presentations

2022 *Het effect van gepersonaliseerd advies van een chatbot op stoppen met roken in risicovolle situaties een virtual reality experiment studieprotocol* – Perfect Fit consortium meeting, online (oral presentation)

2023 *Co-creatie met de Perfect Fit doelgroep: Aanpak en geleerde lessen* – Perfect Fit consortium meeting, online (oral presentation)

2024 *De inhoudelijke ontwikkeling en evaluatie van Perfect Fit: Een inkijk in mijn PhD* – Perfect Fit consortium meeting, Leiden, The Netherlands (oral presentation)

2025 *Multidisciplinary collaboration: Experiences and lessons learned from the Perfect Fit project* – Netherlands eScience Center, Amsterdam, The Netherlands (oral presentation)

2025 *Evaluatie van een virtuele coach voor stoppen met roken en meer bewegen bij volwassenen* – Perfect Fit consortium meeting, Leiden, The Netherlands (oral presentation)

Teaching activities and student supervision

2022 Teaching workshop: *Motivational Interviewing*, Minor Innovations in Primary Care, Medicine Bachelor's

2023 Teaching working groups: *Lijn Samenwerking, Gezondheidsbevordering, en Leiderschap*, Medicine Bachelor's

2023 Teaching workshop: *Motivational Interviewing*, Minor Innovations in Primary Care, Medicine Bachelor's

2024 Teaching workshop: *Motivational Interviewing*, Minor Innovations in Primary Care, Medicine Bachelor's

2022 – 2025 Supervision of nine master's thesis students, research interns, and research assistants