Open Universiteit

Research Program Psychology 2021-2025

Understanding Human Change in a Dynamic, Digital Era

Research Program Psychology 2021-2025

Faculty of Psychology
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CONTENT

Preface

Before you lies the research program of the Faculty of Psychology.
The program has been prepared by the Research Committee of the Faculty, in close collaboration with the chairs of the different departments The program has been approved by the Dean in March 2021.

The program has both a descriptive and a strategic objective: it describes the most important current research lines within the Faculty and at the same time provides direction and coherence for future research activities. The program will be regularly evaluated for effectiveness, including reflection on new developments within and outside the Faculty and the Open University.

1 The faculty

The Faculty of Psychology is one of the six faculties of the Open University of the Netherlands. It was founded in 1985 as a "knowledge domain in the social sciences" and developed into the Faculty of Psychology in 2010. After a short merge with Education Science into the Faculty of Psychology and Educational Sciences (2014-2019), the Faculty regained its independent status at the beginning of 2020.

The Faculty consists of four departments (Clinical psychology; Health psychology; Lifespan psychology; Work and organizational psychology) and two sections (General psychology; Methods & statistics). While these groups represent different fields within Psychology, research and teaching activities take place both within and between these groups and fields.

Until 2008, the primary mission of the Open University was distance teaching and innovation of (distance) teaching. In line with this mission, the Faculty of Psychology has provided academic education in psychology at the Bachelor and Master level, using a wide range of activating, distance teaching methods. Year after year, the psychology program is assessed as high-quality by both official assessment committees and students. Moreover, the program has received the E-xcellence certificate of the European Association of Distance Teaching Universities.

In 2008, the education mission of the Open University was supplemented with a research mission in an agreement with the Ministry of Education, Culture and Science (Prestatieafspraken). Although research activities were already taking place, they happened on an individual basis, and were supported with few means and low available research capacity. The research mission had a number of implications; for instance, staff were provided with 20 percent research time; non-promoted staff members were encouraged to write their dissertation; and, initially, funds were made available for PhD projects. Moreover, a first research program for Psychology was written, "The interaction between implicit and explicit strategies for behaviour", which was revised and extended in 2014.

Since then, research expertise within the Faculty of Psychology developed rapidly, owing to the strong research competences and activities of the researchers already present and the newcomers who had already obtained their PhD. Research capacity was further strengthened by an increase in research time (from 20% to 30%) in 2017; and a financial incentive for the Faculty to stimulate research (Stimuleringsgelden), which was used to temporarily give researchers more research time and to develop a research portal (O4U).

In 2017, the Faculty took part in a national research assessment, organized by (almost all) Psychology faculties in the Netherlands and performed by the Qanu. This resulted in a positive review. In its report, the assessment committee writes

(2017, p. 21): “The Department of Psychology at the Open University has had a successful start as a research unit; several high impact publications, citation scores and other marks of recognition indicate the performance, impact and international recognition of OU’s Psychology research.” In addition to a positive evaluation, the review report and review procedure resulted in a number of important insights, such as the necessity of defining a more unique research profile, bringing more focus in research activities and publications, and building on the OU’s expertise in e-learning and e-communication.

The new program ‘Understanding Human Change in a Dynamic, Digital Era’ incorporates these insights while building on the former program. Discussions with the chairs of the different groups as well as with staff members have taken place to sharpen the research focus and incorporate new developments and ideas that emanate from society, research, and staff members. The aim of the new research program is to increase insights into the role that change has in people’s life’s and the cognitions, emotions and behaviour that are associated with change. The program addresses different sources of change, such as external changes (e.g. new technologies, intensification of life, Corona crisis, parents’ divorce), internal changes (e.g. gaining weight, developing an anxiety disorder, becoming older), and necessary changes that can be accomplished with interventions, treatment, and/or education (e.g. life style changes, anxiety treatments, workplace learning). Addressing the topic of human change as a research group is fundamental, and is considered highly relevant in terms of scientific insights as well as in terms of practical use for society. As such, the program adheres to the ambition of NWO’s ‘Nationale Wetenschapsagenda’ to make a positive and structural contribution to tomorrow’s society, where new questions from practice and society find acceptance in new research and new knowledge flows easily from researcher to user (NWO, 2021).

2 Research mission and introduction to the program

2.1 Research mission

The research mission of the Faculty of Psychology is to develop a relevant and viable research group and research program that produces high quality research, with great impact on the scientific as well as social level, both nationally and internationally. As our research is strongly linked to our educational BAMA program, and since interaction between teaching and research is essential, fruitful and self-evident for our university, our objectives are to emphasize and focus on research related to the specializations in our Master of Science in Psychology: Clinical psychology, Health psychology, Lifespan psychology, and Work and organizational psychology, as well as the supporting fields of General psychology and Methods & statistics that are addressed in the bachelor. While this might lead to a wide range of different research topics, the research program serves as a guide, providing direction to the research activities in the various disciplines.

2.2 Previous program

The first research program of the Faculty, ‘The interaction between explicit and implicit strategies for behaviour’, was developed in 2010 and extended in 2014. This program started from the observation within the field of Psychology of a discrepancy between explicit explanations (and consequent interventions) that persons have, with their own reasons, plans, strategies, regulations etc., versus explanations (and consequent interventions) that suppose humans to

have no insight in motives, causes, and strategies for behaviour. While this might reflect theoretical gaps or controversies in psychology, it might also reflect a fundamental feature of human beings, leading to complementary or conflicting sources for behaviour regulation and interventions. Based on this observation, the general objective of the first research program was to address the explicit and implicit strategies for behaviour people use across a diversity of situations.

Strong points of this program were its focus on a fundamental psychological problem and its theoretical foundation. As the program describes, the paradox is that human behaviour is law-like yet volitional. While most people will report strong convictions about the conscious decisions they made to act in certain ways, extensive evidence shows that their behaviour is as much ruled by implicit (and mostly unconscious) processes(e.g. Kahneman, Slovic, & Tversky, 1982; Todd & Gigerenzer, 2012). One way to deal with the paradox is to commit to only one view at the expense of the other; in the past, this has led to controversies such as behaviourism versus phenomenology. Another way is to accept the utility of both viewpoints and investigate where and when these views are fruitful and how their supposed mechanisms interact. This latter approach formed the basis of the first research program.

Another strong point of the research program was that it served as a theoretical umbrella for much of the research activities that took place within the different groups. However, this point could also be considered a weakness of the program, as the emphasis on extrinsic and intrinsic strategies still leaves room for a variety of topics and behaviours that can be understood from this perspective.
A potential risk of too much diversity is that it can result in publications in too many different outlets (as it turned out during the preparation of the 2017 research assessment), dilute the Faculty's research profile for external parties, and ultimately undermine the likelihood of external research funding.

In short, while this first research program has contributed enormously to the development of the research activities and expertise of the Faculty of Psychology over the past ten years, the time has now come to transform this program into one that brings more focus to research activities and publications, and as such contributes to a more specific and recognizable research profile.

2.3 Introduction to the new program

The new research program builds on the previous program by recognizing the importance of studying both implicit and explicit factors and strategies in order to better understand human behaviour. The new program adds more focus by emphasizing the role of 'change' for human behaviour, cognitions and affect.

The concept and phenomenon of change has a long history. One of the most well-known theories on change is Darwin's (1859) evolution theory. In his book, "On the origin of species", Darwin explains the process by which organisms change over time as a result of changes in heritable physical or behavioral traits, and the interaction of these traits with the environment. As such, Darwin pointed to three major factors that relate to human change: (i) the role of (changes in) the external environment; (ii) the role of internal changes; and (iii) the necessity of change for the survival of the species (read: for human development, well-being, and behavior). These three factors form the foundation of the new research program. While these factors may be closely linked to each other, with reciprocal relationships, they will be separately and shortly explained below.

External, digital environment
We live in a dynamic world. Change is ubiquitous in every aspect of our society and affects the behaviour patterns, attitudes and emotions that we develop on a daily basis. An important impetus for change is the continuous development of

new technology. Technological innovations have major consequences for society as a whole and for our personal lives, affecting, for instance, how we live, work, shop, and which medical treatments we receive. The rise of the computer and the internet in particular have resulted in a digital world in which information is easily obtained and everyone (and everything) is connected. The digitization of our communication, production methods and the rise of AI and the 'internet of things' provides us with new issues to be addressed in scientific research. Moreover, it provides us with new tools that can be applied in psychological interventions, such as E-health interventions and Virtual Reality games.

In addition to digitization and technological innovations, there are many other factors that affect us, such as economic changes, new laws and regulations, virus infections, and demographic changes. On a personal level, people may experience both negative events (e.g. divorce, illness, death of a family member, bullying, job loss, social isolation) and positive events (e.g. marriage, birth, a new home, promotion, social support) that instigate changes in cognitions, emotions, and behaviour.

People are generally inclined to adjust to the events and changes in their external environment. Several theories (e.g. Darwin's (1859) Evolution theory; Lazarus' (1991) Appraisal theory; Hobfoll's (1986; Hobfoll et al., 2018) Conservation of Resources Theory) emphasize the importance of effective adaptation to changed circumstances for individuals' functioning and well-being. Ineffective adjustment has been associated with negative outcomes, such as depression, anxiety, and energy depletion (Aldao et al., 2010; Hobfoll et al., 2018). People can vary widely in their ability to restore the equilibrium with the environment and adapt effectively. Also within their lives, people can be more resourceful, adaptive and resilient at some times than at other times (Block & Kremen, 1996; Bonanno et al., 2015).

It should be noted that effective adaptation is more than mere adjustment and conformity to external conditions (Ployhart & Bliese, 2006). People can be proactive and even anticipate change in such a way that they are able to achieve their goals and fulfil their personal needs (Van Dam, 2013). Moreover, while individuals can modify themselves to fit the environment, the environment is also malleable and subject to change (Ashford & Taylor, 1990). As such, adjustment to change can imply creativity and innovation as well as personal accomplishment and health. Proactivity, self-regulation and self-efficacy are therefore important concepts in our research program. Moreover, our research focus on these external factors of human change align well with two research lines of the 'Sectorplan Maatschappij- en Gedragswetenschappen 2020-2025': 'The human factor in new technologies', and 'Social transition and behavioral change' (DWS, 2021).

Internal change and development

Human change is inevitable. Throughout the lifespan, that is from conception and birth to the moment we die, we change. Human change happens on a physical, or biological, level as well as a psychological level. Different stages in our development comprise specific changes, for instance learning to walk or talk. Moreover, different periods of life present certain specific demands for successful functioning. Changing aspirations, time perspectives, and social connections during the life course affect how people experience, structure, and regulate their lives and themselves (Bandura, 1997). While some patterns of change may seem general and inevitable, there is still wide variation in how people develop and experience their development over time. For instance, some may feel competent in dealing with the demands of the environment, develop an approach orientation, and an adaptive pattern of self-regulation. Yet others might feel less efficacious, and possibly develop patterns of helplessness, and maladaptive cognitions and behaviours, such as anxiety and an avoidance orientation (Elliot et al., 2011).

Human development, such as the development of self-efficacy, self-regulation, and competences, is not just a matter of the individual's genes, personality or temperament, but also happens in a social environment, such as the family, schools, peers, and work. As Social Cognitive Theory posits, human functioning is a result of the interplay between personal, behavioral, and environmental influences (Bandura, 1986). For example, a child who is bullied in school can develop feelings of loneliness and even suicidal thoughts (Völlink et al., 2016). A cancer survivor may return to work more easily in a supportive work environment in which the requirements do not exceed the still limited energy of the reintegrating employee (Spelten et al., 2002). As these examples show, research has focused on both problematic human development, such as severe psychological problems, burnout, chronic disease, and loneliness, and positive human change, such as individuals' self-regulation of subjective and physical well-being, recovery, burnout prevention and successful aging. The concepts of proactive behaviour, self-regulation and self-efficacy are central to this line of inquiry too.

Interventions
In addition to human changes as response to external and internal factors, goal-directed human change can happen in the form of an intervention. Goal-directed human change is necessary when there is a (negative) discrepancy between an actual state and a desired state. For instance, a lifestyle intervention can take place to prevent an overweight child from developing type 2 diabetes. The school or class of the bullied child might participate in an anti-bullying program. Employees who are struggling with burnout-complaints may decide to participate in a burnout prevention program. And cancer survivors can be supported with a return-to-work intervention.

Evidence-based interventions, education, training and counselling are important means to address these discrepancies, and they belong pre-eminently to the domain of psychologists. Technological developments have made it possible to provide online counselling and support to people. Recently, E-health and E-mental health interventions have been developed, for prevention and treatment purposes, that consist of either exclusive online contact, blended types including online and face-to-face contact, and fully-automatized programs (e.g. Peels et al., 2012; Simon et al., 2020). For example, some interventions consist of a web-based portal that is composed of several computer tailored (CT) modules, holding different types of information and adaptive strategies that can be tailored to the specific needs, situation and characteristic of the participant (De Nooijer et al., 2004).

For some populations, such as the elderly, people with dementia or severe psychopathology, computer-based interventions are less suitable. In these cases, clients might profit from regular psychotherapy, with the client-therapist interaction as a central element (Tryon et al., 2007) or non-verbal and experience-oriented arts therapies ("Vaktherapie"), in which the therapist works with for instance drama, movement, music, and drawing (Van Hooren, 2017). In addition, animal-supported interventions, in which animals are used to promote human well-being, are on the rise (Glenk, 2017). Animal-assisted therapy is a method of integrating therapy animals into psychotherapy such that the animal forms an integral part of the treatment process (Hediger et al., 2019; Janssens et al., 2020). It is of crucial importance for all forms of therapy to systematically investigate their effectiveness and underlying processes and mechanisms.

3 Research program: Thematic lines

Goal of the program
The goal of the research program is to study the phenomenon of human change in an ever-changing, digital world, its antecedents and consequences as well as the processes and mechanisms involved. The program is designed to stimulate research in concordance with the aims of the Open University's agreements on research, the domain specific knowledge of the psychology of human change in the international scientific community, the expertise and ambition of the faculty's researchers and teaching program, and the needs of society and its members.

The research program is operationalized within six research lines that are closely connected to the Faculty's master and bachelor education program:
- Clinical psychology; especially early detection, prevention, and treatment of severe psychological problems, including e-mental health applications;
- Health psychology; especially prevention and coping with (chronic) disease; including e-health interventions;
- Lifespan psychology; especially professional and personal development towards self-development and well-being;
- Work and organisational psychology; especially employee adaptation to a dynamic and demanding work context;
- General psychology; especially working mechanisms underlying therapies and interventions
- Methodology and statistics; especially the development and analysis of longitudinal research designs.

Collaborations
While the specification of these fields might suggest independent research lines and barriers between the different departments, the opposite is true. Collaborations between members of the various groups have already been established and are one of the strengths of research within the faculty. Moreover, collaboration is a clear objective of the new program, as the interaction of different viewpoints and disciplines is likely to result in innovative research questions and new insights. The focus on human change is intended to increase the number and quality of mutual cooperation within the faculty.

3.1 Clinical psychology

Clinical psychology focuses on diagnosing and treating psychopathology, reducing psychological complaints and maladaptive behavior or behavioral problems. The field of clinical psychology is evolving rapidly in both research (Gruber & Joormann, 2020) and practice (clinical work).

Human change
Consistent with the overarching faculty research program, the research of the department of Clinical psychology examines the change, that is the development and treatment, of psychopathology within a dynamic and digital daily environment.

First, we focus our research on investigating human change. More specifically, change regarding internal and external factors of psychopathology as well as change attributable to (elements of) psychotherapeutic interventions. We investigate ways to inhibit, reverse or adapt to individual change and thus to prevent or reduce psychological symptoms or problem behavior using psychotherapeutic interventions. Within this scope, it is necessary to consider the specific characteristics of individuals from different age groups, with respect to the nature of the symptoms, differences in internal and external factors, and ways to approach or treat them. Therefore, we categorize our research in children and adolescents, adults, and older individuals.

Second, our research is characterized by using e-mental health applications. E-mental health refers to the use of ICT to inform individuals with psychological complaints/disorders and/or to support mental health in a process of recovery and improving quality of life (Akwa GGZ, 2017a). E-mental health applications include digital assessment tools to gain more insight into transdiagnostic mechanisms of psychopathology as well as technological applications useful in psychotherapeutic interventions. Examples are mobile tools based on the Experience Sampling Method (Gunther & Thewissen, 2019; Van Os et al., 2017), iSPOT (Kuntze et al., 2017), and Memorylane tablet.

Objectives and research questions
In general, our research aims to better understand the development and treatment of psychopathology within a dynamic and digital daily environment. Symptoms of psychopathology are nowadays seen as lying on a continuum with normal functioning, meaning that these symptoms are not only present in individuals diagnosed with a mental disorder, but also occur in a significant proportion of individuals without a mental disorder and not resulting in significant distress or impairment. A mental disorder can be conceptualised as the extreme manifestation of continuous normal variation. Over the last two decades, this continuum approach has facilitated greater theoretical understanding of the psychological mechanisms associated with psychopathology (e.g. Altinbaş, et al., 2020; Fried, 2015).

Recent research indicates that we may consider symptoms as mutually interacting elements of a complex network and mental disorders as sets of connected symptoms that could not be neatly separated from each other (Borsboom et al., 2020; Wigman et al., 2015). High comorbidity rates in individuals with mental disorders are in line with this. Studies on psychopathology in children, adults and elderly repeatedly show common symptoms and problem behaviours and indicate a transdiagnostic way of looking at psychopathology (Krueger & Eaton, 2015; Fusar-Poli et al., 2019). These insights in clinical psychology impact the way we diagnose persons as well as change the target of therapeutic interventions. Our research moves beyond diagnostic categories and focuses on targeting shared underlying mechanisms of dysfunction. Using a transdiagnostic perspective, the *first objective* of our research line is to get insight into the vulnerabilities and putative risk profiles for mental disorders by examining internal and external factors that make individuals at risk for psychopathology. This may give a solid base for investigating prevention strategies and integrated treatment for (comorbid) symptoms, in particular transdiagnostic treatments, in which interventions are used that apply the same underlying treatment principles, without tailoring the protocol to specific diagnoses. This is regarded as the *second objective* of our research line.

(1) Internal and external factors of psychopathology
Internal and external factors are important in determining whether an individual (at risk) will change and in case of clinical psychology whether an individual will shift along the continuum. Internal factors that may contribute to psychopathology are biological and psychological factors, such as gender differences (Van Lankveld, et al., 2020, Van Lankveld, et al., 2018), cognitive problems (Van Hooren et al., 2008), feelings of loneliness (Jongen et al., 2018), low or instable self-esteem (Bos et al., 2010; Thewissen et al., 2011), high negative and low positive affect or affective instability(Duif et al., 2019; Henckens et al., 2020), sleep disturbances (Kasanová et al., 2020), and personality characteristics (Grauvogl et al., 2018). External factors that may play a role in inducing psychopathology are situations or factors in the environment, such as social exclusion (Bos et al., 2013; Jacobs et al., 2014) and negative life events. Regarding the internal factor, we specifically focus on the psychological factors in our research line. Regarding the external factors, a special emphasis is on (the experience of) social relations and stigmatization.

In order to achieve this first objective, we address the following overall key questions: which underlying factors or processes contribute to the development of psychopathological symptoms? Which underlying factors or processes may reduce psychopathological symptoms or may work as protective factors in the development of psychopathological symptoms?

(2) Psychotherapies
Therapies in clinical psychology are seen as interventions in order to prevent psychopathology; to change from maladaptive/dysfunctional to normal behavior, feelings, or cognitions or to learn to self-manage or adapt to change. In the last decades, the effects of psychotherapies have been extensively studied. Although this knowledge improved the quality of treatments in clinical practice, the next step in this field is to focus on examining which specific components are responsible for the therapeutic changes and to better understand the mechanisms of action beyond the boundaries of diagnostic categories. In addition, there is a need to focus on types or elements of psychotherapies, which are promising in the near future (Mulder et al., 2017). In this scope, our research focuses on interventions using 1) e-mental health applications, 2) transdiagnostic approaches and 3) patient-centered outcomes. By embedding our research in clinical practice, we aim to improve therapist behavior, attitude, and the therapeutic relationship.

Ad 1) E-mental health applications. Examples of innovative interventions using e-mental health applications of the clinical psychology research group are the online anxiety intervention 'Learn to Dare!' for children (Simon et al., 2020), the blended music therapy intervention for people with dementia (Prick et al., 2021), and mobile-based interventions such as just-in-time adaptive interventions (Platteau et al., 2020). The need for these kind of digital interventions has increased substantially due to the COVID-19 pandemic which can be considered a game changer for e-mental health practice and research (Thewissen & Gunther, submitted).

Ad 2) Transdiagnostic approaches. Transdiagnostic approaches refer to specific approaches that are believed to transcend diagnostic categories, such as emotion regulation and cognitive appraisal. This is often the main focus of animal assisted therapies, arts therapies and psychomotricity (in Dutch 'Vaktherapie', Akwa GGZ, 2017b). In these therapies, animals, art, music, dance, drama, or movement are therapeutically integrated in therapy and offer a different entry for psychological change (Aalbers et al., 2020; Haeyen et al., 2018; Heynen et al., 2017; Hediger et al., 2019; Wijker et al., 2020). These kinds of therapies are applied for many years in mental health care and are considered as important supportive interventions for patients with mental disorders (Haeyen et al., 2020). In the last decade, more and more research has shown beneficial effects of these interventions (De Witte et al., 2020; Hediger et al., 2019; Kovács et al., 2020). More research is needed to gain clarity on the working mechanisms of these interventions.

Ad 3) Patient-centered outcomes In clinical psychology, there is increasing attention for patient involvement in the treatment and care of (severe) mental illness. Patients are encouraged to actively participate in their own treatment and to have an active and empowered role in recovery (Delespaul et al., 2018). However, this is not always obvious for vulnerable individuals, e.g. in case of (mild) intellectual impairment, chronic mental disorders, of dementia. Our research not only focuses on symptoms or complaints, but also includes patient-centered outcomes, such as quality of life and emotional well-being (Van der Wolf et al., 2019; Haeyen et al., 2020). E-mental health applications, including mobile tools, as well as transdiagnostic treatment approaches are pre-eminently appropriate for mental health care with a focus on recovery and empowerment (Delespaul et al., 2018; Van Os et al., 2017).

Key research questions regarding this second objective of our research line are: which components in psychotherapeutic interventions using e-mental health applications or transdiagnostic approaches are responsible for change? Which mechanisms of actions may explain effects of these interventions? What effects do psychotherapeutic interventions have on (decrease of) symptoms or complaints as well as more patient-centered outcomes?

The field of psychology practice is heading towards a more dynamic and digital daily environment in which blended care (based on a mix of face-to-face treatment with e-mental health applications), transdiagnostic approaches and emphasis on the central role of patients is becoming more mainstream.

3.2 Health psychology

Health psychology concerns health promotion and the primary prevention of health problems, secondary prevention or early detection of health problems, and tertiary prevention in coping with disease and promoting optimal functioning through patient education and communication. As conceptualized in most theories in health psychology, so-called determinants play a vital role in influencing health.

Human change
Human change (behavioral and psychological) is the essence in health psychology research, and the dynamic digital era provides both an essential setting as well as a relevant context for our research. Our main research theme is therefore highly related to human change: health promotion through changing health determining psychological factors. Characteristic for our research are two key issues; eHealth and Digitization risks in vulnerable populations.

eHealth
One of the central themes in our current intervention research is eHealth, linked to computer tailored advice, or Computer Tailoring (CT). CT can be directed at all health related determinants and can integrate multiple (behavioural and psychological) change strategies. Further, CT interventions can be directed at different target populations; the general public, but also vulnerable or hard to reach groups, such as people with a low education level. It also provides a method to help patient groups to better cope with the consequences of their disease. In most of our research eHealth constitutes an essential part. Our eHealth interventions are developed for online use through computers and tablets, but we are integrating new devices, including wearables, apps and smartphones.

Digitization risks in vulnerable populations
eHealth is often operationalised through online advice or coaching. Especially recent opportunities for online and synchronic intervention and research using smartphones and wearables are promising in bridging the gap between accessibility and mobility. In addition, the recent Covid-19 crisis has shown the essential role that eHealth can play for improving and maintaining physical and mental health in society as a whole. However, vulnerable populations may have difficulties dealing with the ever-growing digitization of our society, as they often lack the skills to adhere to the digital demands of our society. It underlines the importance of making eHealth understandable, easy to use and engaging for all target populations. Several of our projects explicitly focus on these issues. Examples are projects like *Let's get digital*, that focuses on improving the use of online and social media in vulnerable older adults, the *Healthy ageing project*, an integral neighbourhood health project to activate older adults and increase their eHealth skills, and *Adoption of Digital Communication Technology by vulnerable citizens* in which we study facilitating and impeding factors of inclusive onboarding and adoption of Public Health Safety apps by vulnerable groups.

Objectives and research questions
Our research sub-program has defined objectives at three levels that relate to: (1) Health typology research; (2) Human change through health determining factors; and (3) Intervention research.

(1) Health typology research
The highest level, and ultimate goal of all health psychology research is improving or sustaining people's health. In the more classical definition we define health according to the WHO as "a state of complete physical, mental and social well-being and not merely the absence of disease or Infirmity" (WHO, 1948). This definition strongly links health to reaching an optimal Quality of Life (QoL) and well-being. In recent decades more focus is placed on a more dynamic perspective: "health, as the ability to adapt and to self-manage" (Huber et al., 2011). This definition, linked to the three domains of physical, mental, and social health, provides new options of improving and optimizing research in the health domain.

(2) Human change through health determining factors
At the second level, we study health determining *factors*. In order to understand and possibly optimize health, we study the relevant factors that relate to, explain and possibly improve and sustain health. Within our research we focus on two types of health related factors: (i) health related behaviours and (ii) other health related psychological factors.

- *Understanding and changing health related behaviours.* Our research focuses on the behaviours that influence and determine health, either positively or negatively. Further, we also study how people actually change their behaviour towards more healthy behaviours. By understanding why and how people change their behaviour, we gain insight into possible strategies to help others change this behaviour and thus improve their health.
- *Understanding and changing health related psychological factors.* Next to actual behaviours there are also non-behavioural factors directly related to health. People can have perceptions, cognitions or psychological characteristics that (in)directly influence their experienced health. For example, patients who focus on the positive aspects of their life, experience a higher well-being that those who focus on the limitations of their disease. Factors such as resilience, coping or their mind-set can determine their experienced health.

(3) Intervention research
At the third level we perform Intervention research. Our knowledge and insight of the previous two levels (understanding health and understanding psychological factors determining health), provides us with the essential foundation for intervention research. Interventions aim to change health related (behavioural and psychological) factors, to ultimately improve health. All our intervention research exists of three subsequent parts: development, evaluation and implementation. Especially the development part is strongly imbedded in thorough theoretical research. Theories and models that underlie (behavioural) change strategies are tested and integrated in the intervention, the intervention is then evaluated and – when effective – subsequently implemented in practice. Within the Health psychology research group we develop, evaluate and implement a wide range of interventions: digital or eHealth interventions, face-to-face interventions, group interventions, or interventions using a community approach. Often our interventions have a blended format, for example an online eHealth intervention to motivate older adults to improve their physical activity combined with group activities in their neighbourhood (walking or cycling for older adults).

Strategies we use in our interventions vary greatly, depending on the used channel(s), the target population and the health related factor we want to improve. Examples of strategies used are Motivational Interviewing, peer modelling, improving health related skills, strengthening self-efficacy, or

monitoring progress through wearables. Especially in our eHealth interventions we use technical opportunities to optimize our interventions, for example through wearables, Ecological Momentary Assessment/Interventions (EMA/EMI), and Chatbots who provide just-in-time information guided by Artificial Intelligence algorithms. In the development of eHealth interventions we combine more traditional models (e.g. Intervention Mapping) with human-technology related models as the CeHRes Roadmap (Gemert-Pijnen et al., 2011), the human-centred design thinking approach (Burns, 2018), and the UTAUT-model (Venkatesh et al., 2012).

Evaluating effectiveness of interventions remains an important instrument for testing hypotheses about the way (behaviour) change strategies operate and how (behaviour and psychological) regulation takes place. These interventions are related to different settings (e.g. school, community, workplace, health care), different target groups (e.g. general public, risk groups, patient groups) and different levels (individual, group, organization). Further, from societal perspective, an increased emphasis on cost-effectiveness of these interventions is of great importance. Also, from public impact perspective it is important to achieve sufficient levels of adoption and implementation of the interventions that are implemented in practice, making dissemination preconditions and enhancing factors important research topics.

Applying these levels to different target populations
Our research (on health, health related factors and interventions) is directed at a broad range of target populations, with differences in health related goals.

- *Among the general public:* Several lifestyle interventions are being studied, targeted at a broad array of lifestyle behaviours: physical activity, nutrition, smoking, and based on both the traditional social cognitive theories, as well as on the Self Determination Theory and Motivational Interviewing (Van Bree, 2016; Van Buul et al., 2017; Coumans et al., 2020, 2021; De Hoog et al., 2020; Duif et al., 2020; Friederichs et al., 2016a, 2016b; Peels et al., 2020; Tummers et al., 2020, Wouters et al., 2018).
- *Among young adults/adolescents:* Several projects focus on social well-being, resilience and social safety among children and adolescents, including projects that target bystanders in discriminatory bullying situations using a serious game approach; and anti-cyberbullying interventions using a co-participatory approach. Several projects targets young adults on risk behaviours, i.e. using party drugs and noise exposure (Jacobs et al., 2016, 2017; *earcheck; party drugs project)*.
- *Among older adults:* Several (eHealth) intervention projects focus explicitly on older adults in our society. Within this older population we also include sub-groups such as those who suffer from chronic conditions. These projects focus on themes such as healthy ageing, physical activity and wellbeing, loneliness, physical activity and cognitive functioning, and improving digitalization and (e)health skills (Boekhout et al., 2018, 2019; Bruin et al., 2019; Golsteijn et al., 2014; Peels et al., 2014, 2014; Van Bree et al., 2017).
- *Among patient groups:* We develop and test (eHealth) interventions that help patient groups to change their lifestyle, and help (former) cancer patients to better cope with the broad consequences of their disease and its treatment. Especially self-regulation and self-management are of major importance for these patient groups. We are also developing and evaluating blended interventions to integrate within health care. Regarding health determining factors, we study relations between psychological factors, QoL and well-being in several patient groups, for instance former Intensive Care patients and their relatives (Bakker et al., 2015; Berndt et al., 2012, 2014; De Hoog et al., 2016; Donarchie et al., 2020; Golsteijn et al., 2017, 2018; Hooghe et al., 2018; Kanera et al., 2017; Metzemaekers et al., 2020; Nijkamp et al., 2017; Tilburgs et al., 2015; Volders et al., 2020; Van Mol et al., 2014, 2015; Van der Wolf et al., 2019; Willems et al., 2017a, 2017b).

- *Among vulnerable groups:* We perform research projects (*Healthy active ageing; Let's get Digital*) that are directed at vulnerable populations, based on health status, educational level, living in deprived neighbourhoods, and lack of (e-)health skills. These project aim to improve self-management, (e) health skills, adoption and use of eHealth, experienced safety, wellbeing, and QoL.

3.3 Lifespan psychology

Lifespan Psychology examines patterns of change and stability in psychological characteristics across the life course, departing from a positive view on human development. Human development is lifelong, multidimensional and multidirectional, plastic, and affected by multiple interacting forces (Berk, 2017).

Human change
The research line of the department of Lifespan Psychology contributes directly to the faculty research program's main theme as human change is central to the field of lifespan psychology. Change hereby refers to the qualitative and/or quantitative changes that reveal themselves during the lifespan. Human development is conceived as a dynamic system – a perpetually ongoing process, extending from conception to death, which is moulded by a complex network of biological, psychological and social forces (Lerner et al., 2011). Each life period is associated with changes in major developmental domains such as the physical, neurological, physiological, cognitive and the affective/social domain, influencing the further course of life (Berk, 2017).

Additionally, biological, social and historical forces (such as the ubiquitous presence of digital technologies) interact in their influence on the lifespan development. Individuals have to cope with these forces and differ in the strategies to handle these forces, resulting in inter-individual differences in development that lead to idiosyncratic life paths. Research of faculty staff members within the area of lifespan psychology is directed at identifying these strategies and their effect on mental health. Mental health is hereby conceptualised as a two-continua model consisting of both mental illness or psychopathology and well-being (Keyes, 2002, 2005). Mental illness and well-being represent related but distinct dimensions. The absence of mental illness is neither necessary nor sufficient to ensure well-being. Many studies have already documented strong links between well-being and health that are maintained even after psychopathology is taken into account. This implies that associations between well-being and health are distinctive. Consequently, this opens a broad and new window for interventions promoting well-being in particular, and health in general. It is therefore not surprising that the study of well-being has become a major topic over the past decade not only in psychology, but also in public policy, economics, and associated fields (Steptoe, 2019).

Objectives and research questions
Research of faculty staff members within the area of lifespan psychology is focused at studying well-being or more broadly formulated *positive mental health across the lifespan* (e.g. Simons et al., 2018) and can be described along four major research lines with associated research questions:

(1) The study of positive growth change
(2) The study of positive aging
(3) The study of human-animal interaction in daily life
(4) The study of the effectiveness and working mechanisms underlying coaching

(1) Positive growth change
Research within the department is characterized by a positive view on human change. Individuals are active agents for personal growth. The ability to

change and to cope with biological, social and historical forces influencing the development, is hallmark of an optimal good functioning and flourishing individual (Robitschek et al., 2012; Robitschek et al., 2019). Given the universal need for lifelong personal growth in a rapidly changing dynamic world, this concept of (intentional) personal growth is highly relevant.
Key research questions associated within this research line are:

a) How is (intentional) personal growth characterized?
b) How can human development, in terms of positive growth change and well-being, be stimulated?

In formulating answers to these key research questions, we focus on especially positive psychological processes such as psychological flexibility, resilience, positive emotions, gratitude, (self-)compassion, strength-use (e.g. Frinking et al., 2019; Jans-Beken et al., 2019, 2020). Additionally, we examine post-traumatic growth, i.e. the positive growth as a result of the psychological struggle following adversity, and investigate how post-traumatic growth can be promoted.

(2) Positive ageing

Although our research is characterized by a life span approach, in this research line we focus especially on the elderly. Positive ageing refers to the process of maintaining a positive attitude, feeling good about yourself, keeping fit and healthy, and engaging fully in life (Hill, 2011). Flexibility in thinking and behaving is a central characteristic of positive ageing. Giving the increasing number of older individuals and the rapid and radical transformation of current society through technological and digital developments, positive ageing is one of the main challenges for the near future.
Key research questions associated within this research line are:

a) How is psychological flexibility associated with well-being, and positive ageing in particular? How can psychological flexibility be stimulated?
b) How can digital media help in preserving good mental health, including social well-being, at older age? (e.g. Simons et al., 2020b)

(3) Human-animal interaction in daily life

Companion animals are an important part of human life. Although it is generally accepted that individuals benefit from the presence of companion animals such as dogs and cats (termed the “pet-effect”), evidence suggests that the nature of this association is diverse and complex and that many of the studies performed so far are subject to methodological constraints. In this line of research we elucidate the role of companion animals in mental health, and well-being in particular and disentangle the pathways involved in this pet-effect. We hereby explicitly focus on daily life research (Janssens et al., 2020), using an ecological momentary approach (see further).

(4) The effectiveness and working mechanisms of coaching

Life-coaching is a “facilitative and goal-focus process, usually within a one-to one relationship between a coach and a coachee, which brings about an enhancement in the quality of life and personal growth of the coachee, and possibly a life changing experience” (Hamlin et al., 2009, p. 18). However, the recent growth of an emergent ‘coaching industry’ has resulted in a cry for more and better scientific research in this area. This research line acts upon that request and is focused at understanding the coaching process, thereby incorporating state of the art knowledge from the field of positive psychology. Special attention is given to collaboration with practitioners.
Key research questions associated within this research line are:

1) Does coaching facilitate the growth and well-being of non-clinical coachees?
2) What are the working mechanisms underlying coaching?

In sum, research of faculty staff members within the area of lifespan psychology is directed at identifying the strategies individuals used to cope with biological, social and historical forces influencing their development as well as their effect on well-being in particular. The research lines and the associated key concepts are depicted in the figure below.

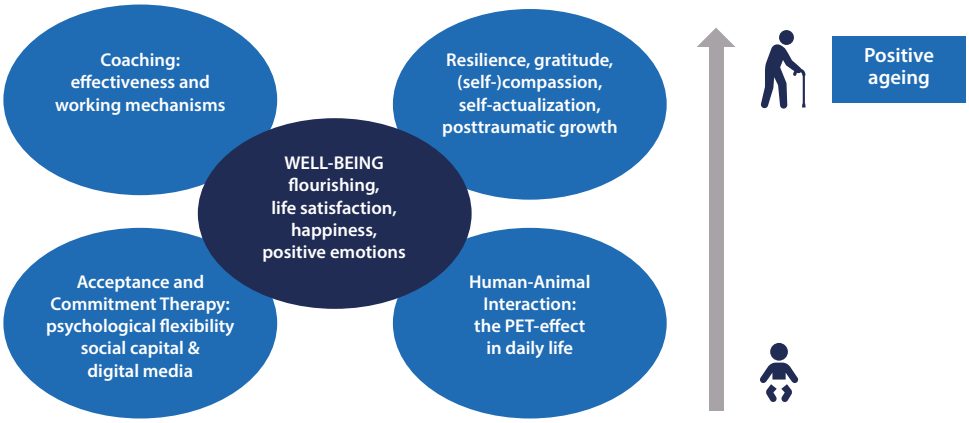

Figure: Lifespan Psychology Research Themes

Digital
In our research, we use traditional research methods such as (online) cross-sectional and longitudinal surveys (e.g. Jans-Beken et al., 2015; Kennes et al., 2020; Leontjevas et al., 2014; Vermeiden et al., 2019), as well as more state-of-the-art methods such as ecological momentary assessment methods such as ecological momentary assessment (EMA, also called Experience Sampling Method, ESM). Ecological research methods are especially interesting in the area of lifespan research studying the dynamics of the individual-environment interaction (e.g. Duif et al., 2019, 2020; Jans-Beken et al., 2019b; Simons et al., 2020a). EMA combined with digital technologies such as smartphones, smartwatches and wearables, makes it possible to translate the 'film' of daily life into (real-time) person-tailored feedback on relevant patterns of emotions and behaviour in daily life, helping individuals to select a strategy that regulates behaviour and emotions towards well-being. The development of e-health and m-health interventions departing from a positive view on human development and the associated opportunities for positive change is part of the research agenda of the Lifespan Psychology staff, as well as the study of their effectiveness (e.g. https://www.ou.nl/-/online-cursus-van-klacht-naar-veerkracht-voor-iedereen-van-40-jaar-en-ouder).

3.4 Work and organizational psychology

Work & Organisational psychology is the study of people and their behaviour, cognitions, emotions, and motivation at work.

Human change
The research line of the department of Work & Organisational psychology contributes directly to the faculty research program's goal; that is, we study human change, its antecedents and consequences as well as the processes and mechanisms involved in the ever-changing, ever more digitized context of work and organisations. This research line is titled: '*Dynamic work contexts, adaptation and thriving at work*'.

Today's organisations are facing fast changing environments that emphasize the necessity of enhanced organisational flexibility and adaptation (Van Dam, 2013). Forces, such as economic crises, increased competition, and technological

innovations, or unexpected events, such as the occurrence of a pandemic, require organisations to continuously change, adjust and develop. As a consequence, todays' employees are challenged to function in dynamic work contexts that are characterized by high unpredictability and uncertainty. This implies heightened pressure for employees to be increasingly adaptable, versatile, and tolerant of uncertainty in order to perform effectively in new or changing work situations. On the other hand, employees are putting self-fulfilment and psychological success more central than before and sometimes even above norms and goals of the organization. This requires organizations to be flexible as well and adapt to the changing needs of its' increasingly diverse group of employees.

Objectives and research questions
Given the prevalence of dynamic work contexts, and the key role of employee and organisation adaptation, the *first objective* of this research line is to gain more insight into adaptive behaviors that employees engage in to cope with changing realities at work and in organizations. In particular our focus will be on proactive types of adaptation. A deeper understanding is needed into how employee adaptation to a volatile and uncertain work environment impacts their personal well-being and development, as well as the prosperity of the work group, the organisation, and society at large. Consequently, the *second objective* of this research line is to investigate how adaptation processes and mechanisms are related to important outcomes such as employee well-being and professional development. In particular, our focus will be on thriving at work, i.e. a positive psychological state characterized by a joint sense of vitality and learning (Klein et al., 2019).

To obtain these objectives, this research subprogram addresses the following key questions:
(1) Which mechanisms and processes contribute to effective adaptation?
(2) How are these adaptation mechanisms and processes related to thriving at work and other important outcomes, such as performance, creativity, motivation and sustainable employment?
(3) Which personal and organisational/environmental processes and factors serve as antecedents or boundary conditions for effective adaptation?

(1) Adaptation and proactivity
Our research tries to specify which processes and factors determine whether and how employees adapt and whether or not they will take personal initiative in this respect.

While recognizing that change can have negative effects (e.g. resistance to change, turnover, detrimental effects for employee well-being), the present research program takes a positive stance. In line with the positive psychology framework that focuses on conditions and processes contributing to optimal functioning (Seligman & Csikszentmihalyi, 2000), our research into adaptation emphasizes the positive side of change (e.g. thriving at work, self-fulfilment, creativity). In particular our research will deal with *proactive* types of adaptation, the environmental conditions and personal characteristics that enable, facilitate and instigate such proactive adaptive behaviors and the mechanisms that contribute to the success of adaptive efforts.

Proactive adaptation refers to self-initiated, self-directed and future oriented adaptive actions individuals undertake to change the situation or oneself for the better (Parker & Wang, 2015). This implies that workers can proactively adjust themselves, their work environment, or both, in order to meet important personal and organizational needs and requirements (Dawis, 2005; Deci et al., 2017).

In this respect, our research views workplaces as multi-goal environments (Vancouver, Weinhardt, & Schmidt, 2010), where different goals might be emphasized at different levels (organisation, department, team, individual).

Accordingly, discrepancies can occur among personal and work context goals (van Dam, 2014), or between task and social goals (Chong & DeShon, 2013). Merely adjusting (reactively) to external conditions may result in negative consequences for individuals' health and well-being, and may thwart thriving at work. On the contrary, proactive adaptive efforts by employees that succeed in balancing personal and work/organizational goals evenly may allow employees to flourish and organisations to thrive simultaneously. This is in line with the concept of wise proactivity, i.e. proactive behavior that is contextually-sound (beneficial for the context), personally-sound (beneficial for the initiator) and other-focused (beneficial for others) (Parker & Wang, 2015). More research is needed regarding employees proactive actions in work related multi-goal environments.

Research projects cover amongst others: the development of an adaptability measure (Van Dam, & Meulders, 2020), proactive adaptation to prevent burnout (Otto et al., 2020, 2021), and self-initiated work adjustment to advance workplace learning (Van Ruysseveldt et al., 2021a). Other research projects tackle outcomes of adaptation to transitions related to careers and the labour market (from unemployment to employment and from sickness to work), e.g. studies into proactive behavior of unemployed to search for and find (Van Dam, & Menting, 2012) a new job and the role of reemployment crafting (Hulshof et al., 2020), or into self-directed behavior of lower skilled employees in return to work after long-term sickness absence (Hoefsmit et al., 2020).

(2) Adaptation, proactivity and thriving at work
employee adaptation to a volatile and uncertain work environment has important consequences for the prosperity of the individual employee, work group, organisation, and society at large. Given that change and adaptation are ever-present features of organisational life, the program sets out to investigate the factors and conditions contributing to positive outcomes of change, such as thriving at work, well-being, learning, creativity and sustainability. As such, the program aims to contribute to the new and rapidly developing field of positive organisational behaviour (Luthans, 2002). This field emphasizes that individual characteristics and work context aspects can facilitate important positive outcomes, such as learning and well-being. In particular, our research focusses on how adaptation can advance thriving at work in dynamic work contexts, allowing employees to become more healthy, competent, motivated and employable.

Our research deals with outcomes of adaptation processes such as well-being and burnout (Otto et al., 2020, 2021), sustainable employment (De Lange, 2020; Frins et al., 2016; Van Dam et al., 2017), workplace learning (Proost et al., 2020; Van Ruysseveldt, & van Dijke, 2011; Nikolova et al., 2014; Van Ruysseveldt et al., 2021a), moral behaviour (Proost et al., 2021; Lennartz et al., 2019; Van Dijke et al., 2021), creativity (Boogerd et al., 2015), withdrawal behavior (Van Ruysseveldt et al., 2021b) and successful aging at work (De Lange, 2020).

(3) Personal and organizational factors and processes in adaptation
in line with Social Cognitive Theory, human functioning is considered to be the result of the interplay between personal, behavioral, and environmental influences (Bandura, 1986). As individuals and organisations benefit from effective adaptation to changes, our research aims to advance our understanding of the personal and organisational factors, conditions and processes that affect adaptation processes, and their outcomes. Which personal, job and organizational resources enable, facilitate and promote successful adaptation and thriving at work? How can psychological interventions and organizational policies and practices contribute to the development and continuous growth of these resources, e.g. personal success factors and competencies such as adaptability, self-management and resilience, or organizational strengths such as a learning culture or innovativeness. In line with our dynamic view on adaptation, interactions between personal and organisational factors receive special

attention. In particular, these interactions are central to the study of dynamic adaptation in the context of digitization. A key question here is how personal, organizational and environmental factors influence the acceptance of, adaptation to and (smart) use of these new technological instruments in settings such as healthcare and education.

In the personal domain our research addresses topics such as personality (De Vries et al., 2011; 2014), proactive personality (Otto et al., 2020), self-management (De Lange et al., 2021), self-reflection (Van Seggelen-Damen & Van Dam, 2016; Van Seggelen-Damen et al., 2017), self-directedness (Hoefsmit et al., 2020) and various personal resources such as adaptability and resilience (Van Dam, 2013; Van Dam & Meulders, 2020). In the organisational domain research deals with organisational factors such as (types of) organisational change processes (Van Ruysseveldt et al., 2018), leadership (Van Dam et al., 2021a; 2021b), learning climate (Nikolova et al., 2014a), learning opportunities (Proost et al., 2020; Van Ruysseveldt et al., 2011), learning potential (Nikolova et al., 2014b), workplace goal orientation (Van Dam, 2015), human resources practices (Ybema et al., 2020), technological innovation, digitalization and human-technology interaction (Spronken et al., 2020).

3.5 General psychology

General psychology focuses on the foundation of studying science of psychology that deals with psychological functions. In other words, this field studies basic psychological principles, problems and methods of human development, emotions, motivation, learning, genetics, aging, memory, senses, thinking, perception, information processing, and intelligence. In line with the research program of the faculty of Psychology, the research program of the department of General psychology examines psychological functions by studying their underlying workings mechanisms. Were a function is about ‘what’ specific processes are involved, is a working mechanism about ‘how’ specific processes work.

Human change
The research of the department of Applied psychology contributes to the central theme of the research program by focusing on the working mechanisms in psychological interventions and therapies. While research has generally shown beneficial effects of psychological interventions and therapies, more research is needed to clarify their working mechanisms (e.g. De Witte, et al., 2020). Working mechanisms can provide insight about how specific psychological interventions or therapies might work. The research program of General psychology will take up that shortcoming, as a main focus, by identifying and substantiating (potential) working mechanisms, at various levels in the central nervous system. With regard to human to change, the focus will be on studying identified working mechanisms of psychological interventions and therapies, in relation to 1) biological changes, like aging, 2) external changes, like (new) technologies and 3) meaningful changes, like determining beneficial effects of interventions and therapies. Research will be performed from a genetically oriented biological-evolutionary perspective.

Objectives and research questions
The aim of the research program of General psychology, regarding working mechanisms, is to improve the understanding how psychological interventions and therapies might work, whether (new) technologies can contribute to that, and how a beneficial effect can be assessed under different circumstances. To obtain this objective, the research program of General psychology addresses the following key questions:

1 Which working mechanisms can be identified in order to understand effects of psychological interventions and therapies?
2 What are the working elements of psychological interventions and therapies that results in meaningful changes through identified working mechanisms.
3 Are there (new) technologies that can improve outcomes of psychological interventions and therapies through identified working mechanisms?
4 How can be determined if an outcome of a specific psychological intervention or therapy is a meaningful change?

In this research sub-program, several (potential) working mechanisms, within different contexts, were and are still subject of study. Outcomes of the 'older' research tracks will be used to consolidate basic working mechanisms. The consolidation process will be substantiated by theory expansion on research methodology (Gruijters & Peters, 2020). More specific, introducing Bayesian methodology (Waterink et al., in press; Waterink & Van Hooren, submitted) and causal inference (Gruijters, 2021), within the context of psychological interventions and therapies.

Sexual motivation, as a potential working mechanism (Waterink, 2011; Waterink, 2012, 2014; Eshuis, 2020), was studied to explain specific sexual behaviour, like, infidelity (Waterink & Boom, 2016), masturbation (Waterink et al., 2016), and sexual dysfunction (Brand & Waterink, 2018). Within the new research program, sexual motivation will be studied as a working mechanisms of therapies for women with pelvic floor complaints with accompanying sexual problems (Brand et al., 2021).

Another track, regarding potential working mechanism, lies within context of the gerontopsychology and gerontopsychiatry. Inhibition and wellbeing, as potential working mechanisms, were studied in relation with aging, dementia and sexuality (Van Hooren et al., 2012; Waterink et al., 2012; Bartelet et al., 2014; Van Hooren & Waterink, 2015; Van der Wolf et al., 2016, 2017, 2018, 2021). This track will be expanded by investigating potential working mechanisms of involuntary interventions within the care of elderly people (Mengelers et al., 2018).

In addition, new research tracks are on emotion regulation and on the use of (new) technologies in psychological therapies and interventions (Berezowska et al., 2019). Emotion regulation refers to a working mechanism by which the onset, strength, and the expression of emotions are regulated. It has be suggested that emotion regulation may be one of the most important working mechanism to accomplish human change in (experiential) therapies (Aalbers et al., 2020; Scherer, 2009). With regard to (new) technologies in psychological therapies and interventions, the focus will be on the use of virtual reality. For example, neurocognitive interventions will be provided by means of serious games in the form of virtual reality and where potential working mechanisms will be investigated, as well as the effects of these virtual interventions.

The research will be conducted within the theoretical framework of Predictive coding (Clark, 2013). This framework provides insight in the interactions between specific working mechanisms. Predictive coding states that our brain actively predicts incoming information rather than passively registering incoming information. Our brain continually creates models of the outer and inner world, to predict incoming information based on internal representations. In terms of processes in the brain, a predictive model is created in higher cortical areas and communicated through feedback connections to lower levels of the central nervous system. It has been suggested that Predictive coding is especially useful in understanding (human) change as a result of (experiential) therapies (Waterink & Van Hooren, 2019).

3.6 Methodology and statistics

The field of Methodology and Statistics is concerned with research methodology and statistical methods, in particular in the context of psychological research. As such, the field focuses on the development, application and evaluation of psychological research.

Human change
The research line of the department of Methodology and Statistics (M&S) contributes directly to the faculty research program's goal; that is, we improve and support research in the assessment of change in humans, which is an important topic in various sub-disciplines of psychological science. Human change can be studied as a consequence of intentional interventions or as a function of temporal variables.

The past decades have made it clear that to study human change with between-subjects designs often requires untenable assumptions. As a consequence, within-subject designs have become commonplace. Common designs include longitudinal studies with three or more waves to study changes in cohorts; experimental single case designs, which are by definition optimized to study intra-individual change; and other experimental designs with multiple post-intervention (follow-up) measurements. These shifts in methods are reflected in the accumulation of expertise in methodology and statistics within the Faculty of Psychology. Whereas this expertise was initially manifest mostly in the methodology and statistics courses in the psychology curriculum, the shift towards research in the Open University coincided with an increase in methodological and statistical research and an increasing need for support in this area within the various sub-disciplines.

At the same time, research practices, possibilities, opportunities, as well as risks are rapidly changing. Rapid technological developments enable researchers to benefit from these opportunities and avoid the risks, but this also means that there is a persistent need for researchers to keep up-to-date. In addition, legislative changes such as the General Data Protection Regulation (GDPR, in the Netherlands implemented as the Algemene Verordening Gegevensbescherming, the AVG) require changes in the procedures of psychological research. Here too, the M&S department supports researchers of the faculty in keeping up with these new developments and requirements.

Objectives and research questions
The aim of M&S research activities is to increase further expertise on the design and analysis of longitudinal studies (including single case designs), developing expertise in the development and validation of (longitudinal) measurement instruments, developing methods to support behavior change research, promote rigorous Open Science practices, and sharing this knowledge by participating in internal or external research projects (e.g. Aalbers et al., 2020; Kwasnicka et al., 2020; Kwasnicka & Naughton, 2020), organizing workshops, writing tutorials, and developing user-friendly software. Research within M&S can thus be described in terms of two interlinking domains: (1) Translational Methodology and Statistics and (2) Applied Methodology and Statistics.

(1) Translational methodology and statistics
Translational methodology and statistics aim to promote the dissemination, adoption, and implementation of novel statistical methods and insights (Cumming, 2012), similar to other knowledge translation fields such as translational medicine. In this domain, results from the applied domain are described in tutorial-like formats, accompanied by internal or external workshops, conference presentations. It has been recognized by several scholars (e.g. Epskamp et al., 2018) that tutorial-like papers facilitate the application of a statistical approach in a substantive field. An example is the experience sampling

method, ESM (Myin-Germeys et al., 2009), that is frequently used in the faculty as a method to gather intensive longitudinal data. Through smartphone use and easily accessible software, this method has become very popular in the last decade. The ESM approach can be applied in various ways, and methodological research may support users in choosing the proper way to apply this method given their research question, as well as support researchers learning these novel analyses.

The aim is to let researchers in substantive fields apply the methods and the theoretical results. In addition to describing the steps required to implement such an approach, state of the art software and, if necessary, relevant or tailor-made software to support its application are developed and distributed. Examples concern the promotion of the use of the omega statistic for reliability instead of Cronbach's alpha (Peters, 2014), the application of cyclic patterns of emotion in ESM research (Van de Maat et al., 2020; Verboon & Leontjevas, 2018), and the use of the logistic model in single case analyses (Verboon & Peters, 2020). Furthermore, methodological issues on the use of confidence interval based estimates in behavior change interventions (Crutzen et al., 2017) and on power (Crutzen & Peters, 2017a) are discussed.

The aim of M&S in the forthcoming years is to continue and extend their activities on translational methodology and statistics. Important foci are methodology in the area of longitudinal designs (e.g. Verboon et al., 2020); methods for supporting behavior change efforts (e.g. Crutzen et al., 2017); and improving the general rigour of psychological research (e.g. Kwasnicka et al., 2020).

(2) Applied methodology and statistics
Applied Methodology and Statistics comprises both the development of novel applications of existing statistical principles as well as the support of them. The aim is to support substantive researchers with state-of-the-art methodology. Such efforts typically manifest themselves as collaborations with researchers of substantive departments. Within clinical psychology, examples are van Tuijl et al. (2020), as well as examples of longitudinal research on loneliness across adolescence (Hutten et al., 2019; Verboon et al., 2020) and ESM research on intimacy within relations (Lankveld et al., 2018). Another clinical oriented topic is depression in nursing homes (Leontjevas et al., 2020; Nijsten et al., 2017).

Within health psychology, various papers have been produced with an important methodological angle (e.g. de Hoog & Verboon, 2020, Crutzen et al., 2017, Crutzen & Peters, 2017b), also using the ESM methodology for predicting smoking lapse (Bolman et al. 2018) and using three waves longitudinal design to evaluate interventions for health promotion behavior (Peels et al., 2020; Volders et al., 2020). Within work and organizational psychology, also a three-wave longitudinal research design has been applied and analyzed using SEM methodology (Van Ruysseveldt et al., 2021). Yet another SEM application in this field is in van Dam et al. (in press).

Other research in which statistical or methodological expertise has been applied is in van Lankveld et al. (2020), concerning the item-response model and in Pat-El et al. (2021), concerning polynomial regression. Collaboration is also present in the educational sciences field (Van den Bosch et al., 2019) and in the anthrozoology (Wijker et al., 2020a; 2020b). Several studies have benefited from M&S involvement in their aim to develop a valid and reliable measurement instrument (Evers et al., 2017; Leontjevas et al., 2014; Simon et al., 2017; Simon & Verboon, 2016; Van Geel et al., 2016; Vos et al., 2016).

The M&S department is also active in developing software in R and jamovi that enable or support various methods and analyses (https://gitlab.com/r-packages). Some software aims to make existing analyses easier to use (ufs), others are developed to support Open Science principles (rock) or for special purposes,

like (replicated) single case designs (scda). Together, the packages developed by M&S are downloaded well over 5,000 times per month, with a total number of downloads of more than 150,000.

The aim of M&S is to continue in participating and supporting the research of the faculty by sharing knowledge, by developing user-friendly research tools, and by applying and promoting the state-of-the-art methodology and statistics.

4 Reflection on the research program

4.1 Quality of research

The mission of the Faculty of Psychology is to create an appealing and lively research environment that is characterized by high research quality, productivity, and (inter)national visibility. The positive outcome of the national review procedure in 2017 indicates that the Faculty has made a promising start towards this end. As the review committee notes (2017, p. 19-20): "... the OU is clearly still in the process of building a research programme and is conducting research of good quality, especially given the limited time available for research [...] What the research staff has accomplished is therefore all the more impressive."

The quality of the Faculty's research is strengthened by the new focus of the research program. We strongly believe that this more specific orientation of the program will lead to even higher quality research in the future. Human change is fundamental to human life, and it is a scientific and societal relevant topic that is addressed in all research lines. We live in a world that is dynamic and increasingly digital, with changing biological and social frameworks and extending obligations. The research lines of the research program explicitly show the relevance of a better understanding of the processes involved in human change. Moreover, the publications and grants that have already been realized are valid indications of the viability of the research topic and the quality of the Faculty's research.

Another strong point of the Faculty's research is the use of high quality and innovative research methods, resulting in relevant, innovative and state of the art research output. In order to draw valid conclusions, the psychology researchers have a strong preference for using rigorous, scientific methods to collect and analyse data. For instance, in our Faculty, new measures and interventions are based on theoretical and empirical insights, and extensively tested for their reliability, validity and/or effectiveness (Willems et al., 2017a, 2017b; Van Dam & Meulders, 2020). Recently, a web-based research tool (O4U) has been developed for online experimentation and data-collection that complies with current data management protocols and is well applicable in longitudinal investigations of human change and development. This research tool aligns well with the Faculty's expertise in distance learning using online multimedia education that is independent of time and place.

Resources have also been invested in tools used for the Experience Sampling Method (ESM). ESM is a validated random signal-contingent sampling technique that allows assessment of moment-to-moment changes in emotions and behaviours as well as the environment in which they naturally occur (Hektner et al., 2007; Myin-Germeys et al., 2009; Stone et al., 2007). Future research will focus on the use of Virtual Reality technology for simulating real life situations and studying patterns of behaviour over time, and the use of Closed-circuit television (CCTV) and body cameras for recording and analysing real life events and conflicts in a unobtrusive way (Van Dam et al., 2021). These latter approaches (ESM, VI, CCTVs, body-cameras) are applied in participants' natural everyday environment, which improves ecological validity of the data and avoid memory bias, and can be used to investigate human change processes in relation to, for

instance, lifespan developments, health activities, conflict escalation, and other human change patterns.

4.2 Societal relevance

The faculty's research program has clear societal relevance, for several reasons. Our research can be characterized as applied rather than fundamental research. The program focuses on issues and questions that are topical in our society. Some example questions are: How do workers deal with new technologies (e.g., how do hospital nurses adapt to the introduction of electronic patient records), and what can be done to support them (Spronken et al., 2020)? What strategies can people adopt to recover from the demands of the work, home and social environment (Otto et al., 2020; Van Dam, 2020)? What are important determinants of life style changes; for instance, what are motivational factors for initiating and maintaining physical activity among adults aged over fifty (Peels et al., 2020)? What are the causes of loneliness in the elderly (Jongen et al., 2018), and, how can online bullying among young people be stopped (Völlink et al. 2016)? With this focus on current social issues, the research program aligns well with themes 3, 4 and 5 of the 'Sectorplan Maatschappij– en Gedragswetenschappen' (DWS, 2021).

Moreover, the knowledge and insights obtained in our research are used to support the public. A large number of studies focus on developing and validating interventions. For instance, (online) interventions have been, and will be, developed for improving people's health behaviour, by making participants aware of their risky life style and the environmental factors that may trigger this behaviour, by providing information and tools for alternative and healthier responses, and by increasing their self-regulation strategies and their motivation for behaviour change (e.g., Boekhout et al., 2018; Peels et al., 2020). Other interventions focus on different topics. For instance, an intervention toolbox will be developed with interventions at different levels (individual, HR and organization) to promote dynamic adaptation to and smart us of digital tools in healthcare (e.g. electronic health records) and educational (e.g. serious games) settings.

In addition to the regular research staff, other researchers are involved who have a strong connection with practical questions and populations, such as master students, external PhD-students, and endowed chairs. While conducting their master research, the master student population (working professionals) facilitates access to relevant issues and interesting research populations. Our expertise in training and educating divergent categories of students makes the program also accessible for external PhD-students who can combine their scientific research with work in relevant practice settings. Finally, there are several endowed chairs with an explicit focus on practice, such as the chair 'Successful aging at work', investigating the determinants of sustainable employability during workers' career, and the chair 'Arts therapies and psychomototricity' (*Vaktherapie*)', investigating non-verbal therapies for treating or supporting people with psychological complaints.

With this focus on societal relevant topics, our research yields interesting findings for the general public, which are communicated through various valorisation activities. Presentations, workshops, interviews, newspaper articles, platform lectures (*perron colleges*), lectures at the 'Universiteit van Nederland', Certified Professional Courses, are some of the means we use to bring our insights and knowledge to the general public.

4.3 Quality and future proofing of the research group

The current composition of the research group is good. All staff members in the program have a PhD and contribute to the research program as well as the educational program. At the start of 2021, the research capacity of the Faculty of Psychology was 22 fte (11.70 fte when PhD students are excluded). There were 48 PhD candidates, of which 13 internal and 35 external PhD candidates. In addition, there were 3 vacant PhD positions.

Members of the academic staff publish in peer reviewed, international journals, have editorial memberships, and participate in review procedures of international journals and grant boards (e.g. NWO, FWO, ZonMW). They are also successful in obtaining external funds; acquired research funds were approximately €1.800.000 in both 2019 and 2020. Collaborations have been established with researchers from other universities, both within and outside the Netherlands, e.g. Germany, Israel, Norway, Switzerland. In the upcoming years, we strive for strengthening existing collaborations with external partners, and seeking new external collaborations in line with this research program.

The future of the research group also looks good. After a period of organizational and educational changes, there is now sufficient time for research activities. Recently, the Faculty has been allocated additional staff with implies that researchers' contribution to the educational program is less demanding and researchers can spend the full 30% of their time on research. More time and support is available for writing grant proposals. As our research program indicates, we aim to contribute to priority research questions as formulated in national and international research agendas. For instance, our research themes align well with three topics of the Sector 'Sectorplan Maatschappij- en Gedragswetenschappen 2020-2025': 'The human factor in new technologies', 'Social transition and behavioral change', and 'Social inequality and diversity' (DWS, 2021).

Moreover, different measures are taken to guard and improve the quality of the research group. When hiring new staff members, research competences and experience are important hiring criteria. Development activities are regularly organized to keep the knowledge and competences of the researchers up to date. These activities include: a monthly research meeting (the Brown Bag Lunch Meeting) where current research issues are discussed; workshops on, for instance, research methods and analytics, data management, Open Access procedures, and writing grant proposals. In addition, the Graduate School of the Open University has a varied development program for PhD students, including courses on writing and presenting in English. Our Faculty's Methodology and Statistics Department keeps researchers up to date with the most advanced technologies and statistical developments.

5 Research organization

5.1 Responsibilities

The responsibility for executing the Faculty's program rests with the individual researchers, the chairs of the departments, the research committee, and the dean. At the university level, the Rector Magnificus is responsible for research, supported by Academic Affairs (*Academische Zaken*) and the Research Board.

The main goal of the Faculty's research committee is to facilitate the research activities of the members of the program, for instance by organizing research meetings and workshops, and by providing feedback on research proposals. The latter is mandatory. Both grant proposals and PhD proposals must be

submitted to the research committee for assessment. Proposals can only be submitted to funding organizations or realized after approval by the committee.

The chair of the research committee participates in the Research Board at the university level, together with the chairs of other faculties' research committees. As such, all six departments of the Faculty are represented in the Research Board. The Research Board advises the rector on overarching, university-wide research issues.

5.2 Academic culture

The Open University strives for a research climate that is characterized by transparency, safety, and scientific integrity. All researchers, including (bachelor, master, and PhD) students, must meet (inter)national standards regarding ethics, scientific integrity and legislation [1]. For researchers of the Faculty of Psychology, there are also the rules for psychological research of the Netherlands Institute for Psychologists (NIP) and the ethical guidelines for human-related research of the American Psychological Association (APA).

The Open University considers academic integrity very important and has therefore participated in the development of the Code of Conduct for Scientific Practice together with other Dutch universities (VSNU, 2012). To ensure that researchers do not act in violation of this code of conduct, two committees have been set up: (i) the Academic Integrity Committee, which deals with well-founded suspicions of a violation of academic integrity; and (ii) the Research Ethics Committee (cETO), which assesses studies not covered by WMO rules for ethical acceptability. Since 2017, ethical assessment is obligatory for all researchers of the Faculty of Psychology when studying human participants (with the exception of secondary data-analysis). The cETO provides binding written advice to the dean of the Faculty

In addition to these committees, a confidential adviser for academic integrity has been appointed who acts as a low-threshold point of contact for questions and complaints about academic integrity. The confidential advisor can advise the complainant to submit a complaint to the Academic Integrity Committee. However, the confidential adviser also has the authority to mediate in a complaint or otherwise resolve the complaint amicably.

5.3 Open science

Open science relates to the open access of research articles as well as research data. Since 2016, the Open University's policy has been to stimulate open access publications, making funds available for doing so. The aim of Dutch universities and the Open University is to publish all scientific papers open access. Agreements have been made with many publishers about publishing in open access. If open access publishing is not possible, the 'preprint' of the publication can be stored in a so-called institutional full text open access repository, and thus is freely accessible. However, the guideline is that open access is the norm.

Regarding the open access of data, researchers are encouraged to follow the rules in their discipline and the requirements of the journals in which they publish. A data steward has been appointed to help researchers storing their data according to data management protocols, and guard Dutch privacy rules. Data can be stored on a safe site of the Open University, with DANS (Data Archiving and Networked Services) and the Open Science Framework.

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[1] Researchers have to adhere to the following rules [in Dutch]: (i) Algemene verordening gegevensbescherming (AVG) en VSNU gedragscode voor gebruik van persoonsgegevens in wetenschappelijk onderzoek; (ii) Wet medisch-wetenschappelijk onderzoek met mensen (WMO); (iii) Nederlandse gedragscode wetenschappelijke integriteit; (iv) Landelijke Code Ethische toetsing onderzoek; (v) Registratie Trial register en intellectueel eigendomsrecht.

5.4 PhD management

The Faculty of Psychology has both internal and external PhD students. All PhD students are a member of the Open University Graduate School. The Open University Graduate School (OUGS) aims to develop a centre of excellence for the acquisition of knowledge and information for PhDs and their supervisors. To obtain this goal, the OUGS provides (i) a basic, program independent education for PhD students (such as academic writing and academic presentation); (ii) support to supervisors; (iii) information to (prospective) PhD candidates; and (iv) an exchange platform that can help build a social network of PhD students.

The OU has defined well-described doctoral regulations for the supervision, assessment and defense of dissertations that is available on the internet (https://www.ou.nl/promoveren-procedures). Doctoral candidates must be registered with the Doctorate Committee, which monitors their progress as well as compliance with the regulations.

During the course of their research project, PhD students are offered two different contracts. Based on a full-time research period of four years, internal PhD students receive a contract for a period of 15 months, during which an assessment takes place (usually in the 12th month). If this assessment has a positive outcome, a contract for the remaining 33 months is offered. External PhD students start with a contract as an aspiring doctoral candidate, which guarantees them entrance to the library and supervision while writing their research proposal. They also have access to the OUGS PhD network and can participate in general OUGS activities. Once the research proposal (including an educational program) is positively evaluated by the supervisors, research committee and cETO, external PhD students are offered a contract as full external doctoral candidate. In that case, they are entitled to follow the OUGS educational program and other research trainings. To further support external PhD students, the faculty has made a budget (max 5,000 euros) available to them to follow a course or to attend a conference. These costs will be reimbursed after successful completion of the PhD dissertation.

5.5 Talent management

The OU aims to be an inclusive organisation where employees can find a supporting and safe work environment, irrespective of their gender, age, health, sexual orientation and ethnic or cultural background. An inclusive work organization is an organization that makes optimal use of the diversity of talents and capabilities in the labour market.

The OU has a top-position in the Netherlands regarding female professors, with 39.9 percent female professors in 2020 (in increase of 5.2 percent since 2019), while the average in the other Dutch universities is 24.2% (LNVH, 2020). Age diversity has increased now that those employees who took part in establishing the OU (in 1980s) have come to retire from work. Cultural diversity is limited by the fact that the OU offers education in Dutch; as a consequence, applicants can only be hired if they are fluent in Dutch (writing and speaking). Nevertheless, the OU employs several scientists from a number of other countries.

Lifelong professional development is an important topic for the OU, also with regard to its academic staff. In 2018, a portal for learning and career development (yOUdevelop) was introduced, with the aim to support workers in their career, vitality and sustainable employability.
Moreover, the OU supports the initiative of the VSNU and others for more widely recognizing and rewarding the work of academics, as explained in the position paper ‘Room for everyone’s talent: towards a new balance in the recognition and appreciation of scientists (VSNU, 2020).

APPENDIX →

APPENDIX A: DEFENCES 2015-2020

Richard Griffioen (2020-11-13): 'Children and animals in synchrony in search of an underlying mechanism of the effects of animal-assisted therapy on the development of children with Down syndrome and children with autism spectrum disorder'
Promotor: prof. dr. M.J. Enders-Slegers
Co-promotores: dr. T. Verheggen and dr. S. van der Steen (Rijksuniversiteit Groningen)

Elja van der Wolf (2020-09-24): 'Well-being in gerontopsychiatric nursing home residents'
Promotores: prof. dr. L. Lechner and prof. dr. S.A.H. van Hooren
Co-promotor: dr. W. Waterink

Rianne Golsteijn (2019-11-22): 'Physical activity promotion in prostate and colorectal cancer patients and survivors: development and evaluation of the computertailored OncoActive intervention'
Promotores: prof. dr. L. Lechner and prof. dr. C. Bolman
Co-promotor: prof. dr. H. de Vries (Maastricht University)

Janet Boekhout (2019-11-07): 'Physical activity and loneliness a healthy ageing intervention for single older adults with physical impairments'
Promotores: prof. dr. L. Lechner and prof. dr. C. Bolman
Co-promotor: dr. D.A. Peels

Rob van Bree (2018-06-29): 'Habit and physical activity: Moderation and mediation studies in older adults'
Promotores: prof. dr. L. Lechner and prof. dr. C.A.W. Bolman
Co-promoter: dr. A.N. Mudde

Saskia Wouters (2018-03-22): 'Between-meal snacking in daily life'
Promotores: prof. dr. L. Lechner and prof. dr. N.E. Jacobs
Co-promotor: dr. V.H.M. Thewissen

Lilian Jans-Beken (2018-03-14): 'Appreciating gratitude: New perspectives on the gratitude-mental health connection'
Faculteit Psychologie en onderwijswetenschappen
Promotores: prof. dr. N.E. Jacobs and prof. dr. L. Lechner
Co-promotor: dr. J.J.E. Lataster

Vincent van Buul (2018-03-09): 'Nutrition information usage in food choices: a collection of interdisciplinary studies, with a focus on understanding the relation between intention and behavior'
Promotores: prof. dr. L. Lechner and prof. dr. F.J.P.H. Brouns (Universiteit Maastricht)
Co-promotor: prof. dr. C.A.W. Bolman

Roy Willems (2018-03-08): 'Kanker nazorg wijzer: Development and evaluation of a computer-tailored self-management intervention providing psychosocial support for cancer survivors'
Promotores: prof. dr. L. Lechner and prof. dr. C.A.W. Bolman
Co-promotor: dr. I. Mesters (Universiteit Maastricht)

Iris Kanera (2018-03-08): 'Web-based lifestyle support for cancer survivors'
Promotores: prof. dr. L. Lechner and prof. dr. C.A.W. Bolman
Co-promotor: dr. I. Mesters (Universiteit Maastricht)

Tom Platteau (2018-02-09): 'How to improve HIV prevention? Development, implementation and evaluation of combination prevention interventions among key populations'
Promotor: prof. dr. J.J.D.M. van Lankveld
Co-promotor: dr. E. Florence (Institute of Tropical Medicine)

Petra de Bil (2016-02-26): 'Tune in, or be left out: The role of social tuning in group formation processes during the first year of secondary school'
Promotor: prof. dr. R.W.J.V. van Hezewijk
Co-promotor: dr. T.D.V. Verheggen

Niels Jacobs (2015-12-11): 'Online pestkoppenstoppen: Development and evaluation of an online computer-tailored intervention for low-educated cyberbullying victims'
Promotor: prof. dr. L. Lechner
Co-promotores: dr. F. Dehue and dr. T. Völlink

Roelie Mulder (2015-11-20): 'Workplace mobbing: Toward a better understanding of bystander behavior'
Promotor: prof. dr. K. van Dam
Co-promotores: dr. A.E.R. Bos and dr. W.J. Pouwelse

Stijn Friederichs (2015-10-23): 'The I Move project'
Promotores: prof. dr. L. Lechner
Co-promotores: dr. A. Oenema and dr. C.A.W. Bolman

Bram Brouwer (2015-10-09): 'De mythe van de rode bloedcel'
Promotores: prof. dr. R.W.J.V. van Hezewijk and prof. dr. H. Kuipers (Universiteit Maastricht)
Co-promoter: dr. W. Burgerhout (Hogeschool Utrecht)

Jannes Eshuis (2015-09-11): 'Bridging the gap, an ecological approach to mind and culture'
Promotor: prof. dr. R.W.J.V. van Hezewijk
Co-promotor: dr. T.D.V. Verheggen

Irina Nikolova (2015-05-28): 'Professional learning and occupational well-being in times of job restructuring: Towards a better understanding of concepts and relationships'
Promotores: prof. dr. K. van Dam and prof. dr. H. De Witte (KU Leuven)
Co-promotor: dr. J.M.E. van Ruysseveldt

Denise Peels (2015-01-09): 'Promoting physical activity of people aged over fifty'
Promotores: prof. dr. L. Lechner and prof. dr. H. de Vries (Universiteit Maastricht)
Co-promotor: dr. C.A.W. Bolman

APPENDIX B: REFERENCES

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