

## Prevention and treatment of internalizing vulnerability (depression, anxiety)

### Researchers involved

Ymkje Anna de Vries (as PhD student and postdoc),  
Prof. Peter de Jonge, Prof. Annelieke Roest, all from the Faculty  
of Behavioural and Social Sciences

### Research program

Interdisciplinary Center of Psychopathology and Emotion regulation



*2020 Gratama Science Award Ymkje Anna de Vries*

Depression and anxiety disorders are responsible for the largest share of the global burden of disease due to mental disorders. These disorders usually first develop in childhood, adolescence, or young adulthood. Treatments, such as antidepressants and psychotherapy, have so far failed to substantially alleviate the burden of disease and therefore different avenues of research need to be explored.

The first approach was to evaluate the efficacy and safety of existing treatments, more specifically the reporting bias, and to explore if it was possible to predict who will and who will not benefit from treatment. In a later phase the focus of research shifted to research on the development of internalizing disorders, in the hope of contributing to a new way forward. Research had indicated that depression and anxiety are best seen as different clinical expressions of the same underlying vulnerability. This expression may differ between persons and across the life course, and provides a new way to look at the development of internalizing disorders, which may lead to new prevention strategies. In the 'u-can-feel project', we are focusing on a key part of the lifespan – adolescence – in order to find how internalizing problems develop in adolescence using a detailed time scale (from week to week and from year to year) and on the risk and resilience factors that influence this development.

The efficacy and safety of treatments for depression and anxiety have been overestimated; efficacy is only modest, with many patients not experiencing much benefit. It is very difficult to predict who will benefit. People rarely develop severe internalizing problems in adulthood if they were mentally well throughout childhood and adolescence. Children with generalized specific phobia, i.e. phobias



of many different things, have a very high risk of other internalizing disorders, serious functional impairment, and even suicidality later in life, even though the generalized specific phobia itself is rarely experienced as disabling or serious. These findings demonstrate the potential value of a transdiagnostic and life-course-oriented perspective.

**Ymkje Anne de Vries** has received several awards during her career: she graduated cum laude in 2018, received the Groningen van Swinderen Prize for best thesis (2500 Euro) and the Gratamaprijs science prize (€25,000; incentive award of the universities of Leiden and of Groningen for best young scientist).

The research project has direct clinical relevance, as it showed that the currently administered treatments were neither as effective nor as safe as previously thought. Shifting the research focus to a more transdiagnostic and life-course-oriented-perspective (the u-can-feel project) is expected to provide insight into the risk factors for the development and early diagnosis of internalizing vulnerability, thus offering opportunities for early intervention. Due to the emphasis on school-related factors and the explicit focus on collaboration with schools and municipalities in developing and executing the research, this project will deliver actionable results for the schools participating in the consortium and other schools, as well as for policy makers in the Netherlands (and beyond).



## Effects of mental health problems in adolescence on the transition to later life employment

### Researchers involved

Dr. K. (Karin) Veldman, Prof. S.A. (Menno) Reijneveld, Dr. J. (Josue) Almansa Ortiz, Prof. R.C. (Frank) Verhulst and Prof. U. (Ute) Bültmann

### Research program

Public Health Research (PHR)

### Theme

Mental health, education and employment

For some young adults, the transition into the labor market is not easy and some even fail. Education is a key determinant for a successful transition from school to work, and an unsuccessful transition may lead to disengagement from the labor market and eventually to social exclusion. In 2019, about 10% to 15% of young adults in Europe were not involved in employment, education or training (NEET). Among employed young adults, 13.5% left the educational system without finishing secondary education. Consequently, they lack essential skills, for example social skills or task performance skills, to be successful in the labor market.

Experiencing mental health problems in childhood and adolescence may negatively affect both educational and employment outcomes. However, longitudinal research linking mental health problems during adolescence with later life employment outcomes is lacking.

The researchers adopted a life-course perspective to examine the impact of mental health problems from early adolescence to young adulthood on the educational and employment status of young adults. They used data from 1711 young adults covering 9 years of follow-up from the TRacking Adolescents' Individual Lives Survey (TRAILS), a prospective Dutch cohort study starting at age 10 or 11. Mental health problems were repeatedly measured over time, and trajectories of mental health problems were identified from early adolescence to young adulthood with latent class growth models. Using these data, young adults were categorized into two groups: 1) at school or at work with a basic educational level (BEL, i.e. finished at least secondary education) and 2) in NEET or at work without BEL.

Research report

### Mental health trajectories from childhood to young adulthood affect the educational and employment status of young adults: results from the TRAILS study

Karin Veldman,<sup>1</sup> Sijmen A Reijneveld,<sup>1</sup> Josue Almansa Ortiz,<sup>1</sup> Frank C Verhulst,<sup>2</sup> Ute Bültmann<sup>1</sup>

**ABSTRACT**  
**Background** Young adults at work without basic educational level (BEL), and young adults in Neither Employment, Education nor Training (NEET) are at high risk of adverse employment outcomes. Evidence lacks on the impact of mental health problems during childhood, adolescence and young adulthood on employment outcomes of young adults. Therefore, the aims of this study were to (1) identify trajectories of mental health problems from childhood to young adulthood and (OECD) report<sup>1</sup> showed that among young adults at work, 13.5% left the educational system without BEL. These young adults lack essential skills to be successful at the labour market.<sup>2,3</sup> If they find a job, they more often have insecure and temporary jobs with low wages.<sup>2,3</sup> These disadvantages seem to accumulate over the life course, that is, leaving school without BEL will negatively affect educational and occupational achievement, financial security and social status.<sup>2-4</sup>

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The results of this study showed that young adults in trajectories with high-stable mental health problems, which started in early adolescence, had a worse perspective with regard to future education and employment: these young adults were more likely to work without BEL or to belong to the NEET group, than to be at school or work with BEL. These results emphasize the importance of adding a life-course perspective to work and health research and to follow young adults further during their working lives. High-stable levels of mental health problems during adolescence affect people's life-long chances to work, with negative effects on them and on society. Reducing adolescents' problems with better care might help them stay connected with school, thus leading to improved societal participation and wellbeing.

This study was also the background for the Vici grant that was awarded to Prof. dr. Ute Bültmann by the Dutch Research Council (NWO) to fund the project 'Today's youth is tomorrow's workforce: Generation Y at work'. This grant has enabled Dr. Bültmann and her team to examine the bidirectional relationship between mental health and work challenges from a life-course perspective. Dr. Bültmann has established a research team with two postdoctoral researchers and three PhD students to disentangle how early life experiences affect the (working) lives of young adults.

Collaborations with Danish, Swedish and Canadian researchers have been established to provide an international comparison for the study findings. Furthermore, the team is advised and inspired by members of a Scientific Advisory Committee (SAC) and a Practice Advisory Committee (PAC). The SAC consists of a group of top researchers from the Netherlands and abroad with backgrounds in sociology, psychiatry, epidemiology, community medicine, and demography. The PAC consists of policy makers, young adults (as

representatives of their generation), occupational and youth care physicians, and experts in the field of youth and occupational health.

Together the researchers aim to improve the understanding of the impact of mental health on educational and employment outcomes, bridge the gap between youth and occupational health, and ultimately help to ease the transition into the labor market for young adults.

Veldman K, Reijneveld SA, Ortiz JA, Verhulst FC, Bültmann U. Mental health trajectories from childhood to young adulthood affect the educational and employment status of young adults: results from the TRAILS study.

J Epidemiol Community Health 2015;69:588-593.

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## How the first 1000 days of life can predispose to childhood overweight

### Researchers involved

Dr. Eva Corpeleijn, Prof. Harold Snieder, Dr. Leanne Küpers,  
Prof. Ronald Stolk

### Research program

Reproductive origins of Adult Health and Disease (ROAHD)



Researcher Leanne Küpers explains the relevance of this study

Overweight is a strong driver of chronic diseases in adulthood, and prevention is key. The first 1000 days of life are a promising window of opportunity for prevention of childhood overweight, which often continues into adulthood. In the first 1000 days of life (from conception to 2 years of age) both genetic and lifestyle mechanisms provide a basis for future health. First, poor maternal health and lifestyle during pregnancy can affect the metabolic programming of the child, i.e. these aspects cause changes in how the children's genes can be read out, which can predispose a child to adverse health consequences. Second, after birth many factors can affect the growth of the child, also with potential adverse effects on the risk of becoming overweight. All these changes that occur in early life have a relatively strong impact on health later in life, making it a valuable window of opportunity for prevention and intervention.

To show that epigenetic and lifestyle mechanisms play a role, researchers within the Reproductive Origins of Adult Health and Disease (ROAHD) program followed a large group (around 2500) of newborns for a long period of time (for this specific study a period of two years, but for other studies over 15 years) in the GECKO Drenthe cohort. Using cord blood samples, they performed a 'whole genome methylation analysis' using an array from Illumina (novel at that time) that measured almost half a million methylation markers. Dr. Leanne Küpers, together with Prof. Snieder, pioneered quality control and data analysis of this complex data and compared the results of 129 children that were exposed to a smoking mother during pregnancy to those of 126 newborns from non-smoking mothers.



The main outcomes of the analyses showed that maternal smoking had a lasting effect on the epigenetic profile of the child. That implies that the effects of smoking exposure during pregnancy do not stop after birth, as these epigenetic changes may last well into the first part of life and possibly longer. After birth, new factors emerge that predispose people to overweight. In young children, they found that growth was very dynamic, and that unhealthy dietary habits in particular may drive excessive growth, a precursor for the development of overweight.

Dr. Eva Corpeleijn and Prof. Harold Snieder take part in the LifeCycle project, funded by a H2020 Horizon grant, to establish effective collaborations between European birth cohorts. Dr. Leanne Küpers and Prof. Snieder take part in the Pregnancy and Childhood Epigenetics (PACE) consortium to help quantify the impact of various factors on growth and health of babies (e.g. lifestyle on overweight risk, DNA methylation on growth and health of the baby) These studies highlight early life as a period that is crucial to healthy ageing. The impact of maternal lifestyle and child lifestyle on healthy ageing is significant, and more attention is needed to understand as well as focus on prevention and intervention in early life, from conception up to 6 years of age.

The outcomes of the GECKO Drenthe cohort are being used by the Youth Health Services in Drenthe and have enhanced awareness of overweight and high blood pressure as health issues at young age. To implement health initiatives, Dr. Eva Corpeleijn as a member of the 'Stuurgroep Drenthe Gezond' works together with policy stakeholders.



## Vaccination strategies: health economics and impact

### Researchers involved

Prof. Maarten Postma (project leader), Prof. Cornelis Boersma, Dr. Jurjen van der Schans (postdoc), Dr. Maarten van Wijhe (cum laude PhD), Dr. Pieter de Boer (cum laude PhD), Dr. Rob van Aalst (PhD USA), Drs. Florian Zeevat (PhD UMCG), Dr. Auliya Suwantika & Dr. Didik Setiawan (PhDs Indonesia)

### Research program

Value, Affordability and Sustainability

There is a global, national and regional challenge to control infectious diseases with effective (and cost-effective) vaccination strategies. The Covid-19 pandemic has shown us what can happen when an infectious disease spreads in the absence of vaccines, and how this emergency impacts society and vaccination strategies. The group led by Prof. Postma uses various approaches to tackle this challenge.

Using mathematical modelling, Dr. de Boer assessed the costs and effects of various vaccination strategies against two diseases with a considerable disease burden among older adults: shingles and influenza. In particular, the analysis of influenza provides a clear example for analyses of COVID-19 given the similarity of both underlying viruses in spread and groups at risk (i.e., elderly).



Dr. van Aalst studied real-world data on the effectiveness of influenza vaccines, in particular among the elderly; among this risk group in the United States the improved high-dose vaccine has been used for some years now. It indeed appeared that improved influenza vaccination of elderly prevents respiratory and cardiovascular hospitalizations, leading to reduced deaths. The methods and techniques applied were exported to the Indonesian setting (PhD students Suwantika and Setiawan) as well as to the integrated EU setting within the EU project VITAL (see below).



The thesis by Maarten van Wijhe showed the enormous health gains provided by infant vaccines, which save the lives of around 300 children in the Netherlands annually. But the thesis also showed the enormous room for further improvement, for example, when comparing the Netherlands and the UK, as was argued around his time of defense on the *front* page of the *Nieuwsblad van het Noorden*.

The results of these studies show potential major improvements in the Dutch vaccination program for protection of the elderly that are urgently needed: better influenza vaccines (quadrivalent, high dose), zoster vaccination and pediatric flu vaccination to indirectly protect elderly. These strategies are already being implemented in countries such as the UK, where Prof. Postma is member of the Joint Committee of Vaccination & Immunization (JCVI).

Scientific expertise from this ongoing project is communicated directly to relevant societal committees like the Dutch Health Council and the JCVI. The study results of Rob van Aalst were implemented in the recommendations of the JCVI, which advises the Departments of Health on immunization issues in the UK. Maarten van Wijhe received substantial media attention following his thesis defense. Pieter de Boer is currently working as a national COVID-19 modeler for the RIVM. Prof. Postma has been interviewed about the results of these studies on various TV and radio programs and in newspapers.

This research group is working together with several stakeholders: RIVM, all major vaccine-producers (Pfizer, GSK, Jansen, Sanofi, MSD and Sequiris), JCVI, Padjadjaran University (Bandung, Indonesia), Airlangga University (Surabaya, Indonesia), Public Health England (facilitating internships for Groningen PhDs), Global Burden of

Disease (GBD; University of Washington) and the World Health Organisation with team members in our group being on the roster of experts of the WHO for specific vaccines (for example, Group B Streptococcus).

Several PhD students are studying various aspects of this topic: Christiaan Dolk on the use of vaccines to combat resistance, Angga Kautsar on Dengue vaccines, Florian Zeevat (on the VITAL-project) and Arnold Hagens on COVID-19 vaccines.

The EU VITAL project (2019-2024) aims to develop and analyze strategies for better protection of elderly with vaccines (project leader: RIVM, Prof. Postma, WP leader Health Economics) as an IMI project with participants from both academia and industry. Also, the VALUE-Dx project is exploring the use of vaccines as one option to fight antibiotic resistance (project leader: University of Antwerp, Prof. Postma, WP leader Health Economics, Dr. Simon van der Pol, UMCG PhD).

Prof. Postma, a member of the JCVI in the UK, regularly discusses the issue of improving vaccines and vaccinations on Radio 1, BNR radio, television programs and in major newspapers, comparing the situation in the Netherlands with the much better situation in the UK. He believes that the Netherlands can generally take the UK as a role model for effective and extensive vaccination programs, as he recently argued in Parliament (speech 2019, *Initiatiefnota of political party VVD and Pleitnota*) and illustrated with Meningococcal B (current project), rota virus (various papers published), pneumococcal (challenging the Dutch Health Council advice), HPV (recent NTvG position paper) and influenza (2 papers in special issue of Value in Health edited by Profs Boersma & Postma).



## Coping with fatigue after cancer: the Untire app

### Researchers involved

Prof. Robbert Sanderman, Prof. Mariët Hagedoorn,  
Dr. Anne Looijmans, Simon Spahrkäs (PhD student)

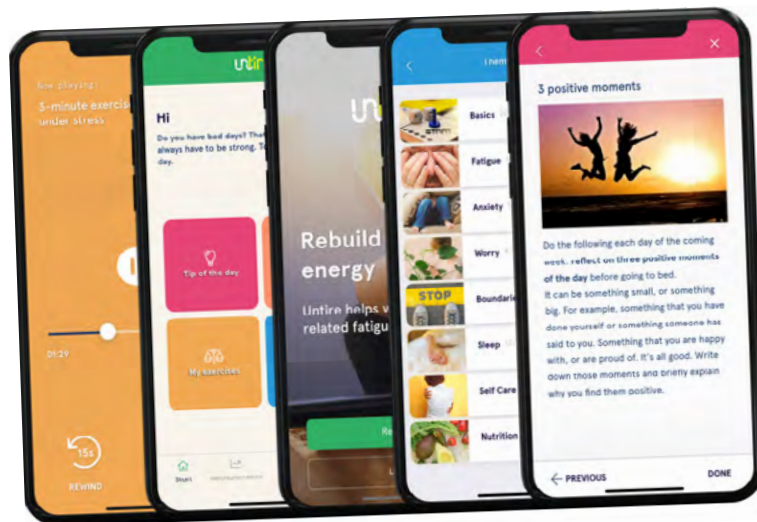
### Research program

Health Psychology Research

A common and distressing long-term side effect of cancer and its treatment is cancer-related fatigue (CRF). CRF is a persistent subjective sense of physical, emotional and cognitive tiredness related to cancer or cancer treatment that is not proportional to recent activity. One-third of the patients with cancer suffer from fatigue on a daily basis, and this can persist for up to 10 years after diagnosis, with a considerable impact on their everyday life and quality of life. In-person psychosocial treatments based on cognitive behavior therapy (CBT), mindfulness-based stress reduction (MBSR), psycho-education, and physical exercises have been found to reduce symptoms of fatigue effectively, but are limited in scope, as one therapist can only treat one patient or group at a time.

Inspired by the academic research and clinical practice, Tired of Cancer BV (Utrecht, the Netherlands) developed the Untire app, with the aim of providing an effective self-management app to improve CRF and quality of life (QoL) of patients and survivors of cancer who feel fatigued. The app is based on the successful elements of face-to-face therapy for CRF, such as energy conservation, activity management, optimizing restful sleep, MBSR, psychosocial support, CBT, and physical activity exercises. The app aims to create awareness by providing psychoeducation, giving insight into the user's energy levels, thoughts and behaviors about fatigue, and helping users to challenge unhelpful thoughts (e.g., catastrophizing thoughts) and behaviors (e.g., increase physical activity) by means of exercises. The app is currently available in English and Dutch.

The research team of the Health Psychology Research program section collaborated with the company Tired of Cancer BV (Utrecht, The Netherlands) that developed the app. The research team set





up a large-scale waiting-list randomized controlled trial targeting cancer patients and survivors who experience moderate to severe fatigue in four English-speaking countries (Australia, Canada, the United Kingdom, and the United States). This RCT showed that after 12 weeks of having access to the Untire app, the levels of fatigue decreased and quality of life on average improved in the intervention group as compared to the control group that did not have access to the Untire app. This study showed that a self-management app can support cancer patients and survivors in managing their fatigue and QoL, and suggests that besides existing face-to-face therapy or therapist-guided online interventions, a low-threshold mHealth app can also be an effective treatment solution. The Untire app could present a scalable opportunity in supporting people worldwide experiencing disabling fatigue (<https://research.rug.nl/en/publications/beating-cancer-related-fatigue-with-the-untire-mobile-app-results>).

This project demonstrates the collaboration between a company developing an app and a research team independently examining the app's effectivity. From the launch of the Untire app in English (March 2018), Dutch (October 2018), and German (May 2020), it has been downloaded 30,000 times. The app is available to all users who feel that they can benefit. Tired of Cancer BV is continuously generating attention to bring the Untire app to cancer patients/survivors and to healthcare professionals. Tired of Cancer BV is also in touch with insurance companies so that users can receive a reimbursement for using the Untire app from their health insurance.

## Grip eHealth toolbox for persistent somatic symptoms

### Researchers involved

Prof. Judith Rosmalen, Prof. RA Schroevers, Dr. Denise Hanssen

### Research program

Interdisciplinary Center for Psychopathology and Emotion regulation

Persistent somatic symptoms (PSS), such as gastrointestinal complaints or fatigue, are physical symptoms that cannot be conclusively explained by medical disease. PSS are very common: 50% to 75% of visits to medical specialists are related to PSS, and they occur at every age. They are also one of the most expensive health care problems in the Netherlands, second only to dementia. PSS are associated with major personal and economic costs: our studies showed that loss in health-related quality of life and productivity is at least as severe in PSS as in chronic diseases characterized by similar symptoms. Although PSS are common, costly and disabling, little research on this topic has been published. Clinical guidelines are available, but their implementation in daily practice has proven to be difficult. In addition, the only evidence-based treatment is psychotherapy, but this is not widely accepted or available to all patients.

The group of Prof. Rosmalen together with the company Nedap Healthcare co-developed an eHealth toolbox, called Grip, to improve care for persistent somatic symptoms. This toolbox is based on a combination of knowledge of a large group of experienced clinicians and scientific studies. This scientific and clinical knowledge is translated into automatic algorithms to support health care professionals outside mental health care, such as general practitioners, in the diagnostic process and treatment of patients with PSS. The Grip toolbox also contains an e-learning and a website with patient information.

The Grip toolbox was developed with an initial grant of the Innovation Fund Health Insurances in collaboration with a large group of patients (242) and healthcare professionals (114), and





the technology company Nedap Healthcare. An article on this development has been published (<https://grip.health/news/ontwikkeling-grip>). The toolbox was initially tested in a pilot study, after which it was improved. There is an ongoing scientific evaluation of cost-effectiveness, financed by the Netherlands Organisation for Health Research and Development (JMIR Res Protoc, 8 (10) (2019), p. e13738); funding for the scientific evaluation of implementation was provided by a grant from EU Horizon 2020 research and innovation program (Trials. 2020 Oct 28;21(1):893.doi: 10.1186/s13063-020-04686-4.). The group of Prof. Rosmalen also received a BMP grant from the Pain Alliance Europe, a pan-European umbrella organization of 44 national and regional associations concerned with chronic pain in 19 European countries. This grant enabled them to study the use and implementation of Grip in the care for patients with rheumatic pain.

The Grip toolbox was launched together with the new clinical guidelines on PSS, in which it was mentioned. The e-learning course has received accreditation from multiple professional organizations (doctors of all specialties, physiotherapists, psychosomatic therapists, nurse practitioners, general practice mental health workers, psychologists: <https://grip.health/pages/Accreditatie>), thus facilitating multidisciplinary collaboration in the care for patients with PSS. It has also been integrated into the national professional training program for psychiatry residents, and local training programs for residents in other specialties, such as internal medicine, neurology, gynecology. We are currently incorporating and studying the e-learning course in the national training program for general practitioners, financed by Innovatiefonds huisartsopleiding. The Grip e-learning course has by now been taken by 100 mental healthcare professionals, 475 general practitioners, 114 somatic medical specialists, and 68 psychosomatic therapists. The e-learning course was co-developed together with the Technical

University of Munich, funded by a grant from EIT Health, and will be disseminated and used internationally (<https://eithealth.eu/news-article/persistent-somatic-symptoms-pss-elearning-boosts-insight/?fbclid=IwAR31p-TWOJGaw3VqUKcS9cyleP0klyd2yrbs9skPdZr33Ko9v3ZnIS1Vdm8>).

The patient information of the Grip toolbox has been added to the website of the Dutch national network for PSS. The website of general practitioners (thuisarts.nl) also refers to the Grip toolbox.

The Grip tools for diagnosis and treatment promote a patient-centric approach; with these tools, in the future it will be possible to predict the best outcome from a treatment and increase the chances of recovery for patients. These tools are being offered on the market (grip.health), and are now being used by customers outside scientific studies.

## Students' stress and engagement; bridging the gap between research and education

### Researchers involved

Prof. Joke Fleer & Prof. Debbie Jaarsma

### Research program

LEARN

Stress affecting students in higher education, and especially in medical education, has increased in recent years. This is not only a problem in the Netherlands, but all over the world. Because of these high levels of stress, the well-being and mental health of students is compromised, also leading to underperformance in their studies. Previous studies have shown that both individual and systemic/organizational aspects and the interaction between these aspects influence stress levels. However, we do not yet know what interventions are effective in reducing students' stress in higher education, especially in medical education.

Within the SHARE institute and the LEARN program – a multidisciplinary research group of medical specialists, nurses, social scientists (educational science, psychology, sociology, business and economics), linguists, basic and applied health scientists, teachers and students – several researchers and educators are working to improve understanding of student stress and are involved in designing and researching interventions that support students in reducing their stress levels. Also, the University of Groningen, as part of its Teaching Academy, is motivated to take action to help reduce stress. In 2019, SCOPE – the UMCG Center of Expertise for Personal Development – was founded within SHARE/LEARN & Health Psychology Research. Within [SCOPE](#), evidence-informed education that focuses on stress-management and personal development (including leadership development) has been made available for all students of the Faculty of Medical Sciences.

We recently designed and implemented a longitudinal cohort study ('the Juggle study') involving medical students from year 1 to 6. Our aim is to gain better insight into medical students' distress





and performance, the influencing factors and how this evolves and is influenced over time. Data collection is still ongoing, but preliminary analyses have shown that during the bachelor's phase, 67% of students experience low-level distress over time, 11% report a decrease in distress over time, and 11% an increase. Furthermore, the study showed that being more self-critical and having poor attention regulation (planning, concentration) are longitudinal predictors of distress.

Based on the outcome of our studies, for bachelor's students in Medicine, Dentistry and Human Movement Sciences, students in the GSMS CPE (Clinical and Psychosocial Epidemiology) and MMIT (Molecular Medicine and Innovative Treatment) Research Masters, and PhD students in the GSMS, training modules (workshops, courses) have been designed and implemented to support them in dealing with stress and personal development. The focus of the modules is on individual aspects such as increasing self-efficacy, self-compassion and mindfulness, as well as on systemic aspects including students' environment. For the bachelor's programs alone, we offer 500+ hours of teaching per academic year, serving over 500 students. For the GSMS (research masters and PhD students), a conservative estimate is that we offer 100+ hours of teaching per year, serving over 100 students in the past academic year. Courses are systematically evaluated, and the effectiveness of the stress management course in reducing stress levels is currently being investigated. The findings of our evaluations and research are used to improve courses and develop new plans for education and research.



## “Fit and Academically Proficient at School”. Fit en Vaardig

### Researchers involved

E Hartman (Associate Professor), Dr. JW de Greef and Prof. C Visscher of the Dept. of Human Movement Sciences, and Dr. MJ Mullender-Wijnsma, Prof. RJ Bosker and Dr. S Doolaard of the dept of Educational Sciences

### Research Program

Smart Movements

### Theme

Active learning, healthy lifestyle, cognitive development, innovation in education

Young children in primary school already experience many hours where they sit still in daily life. They are doing all the hard work in their heads while their bodies are inactive. The majority of the children do not achieve the National guidelines of 60 minutes of moderate to vigorous physical activity per day and their motor proficiency has decreased in the past 10 years. These developments place children at increased risk of becoming overweight and acquiring an inactive lifestyle, leading to chronic diseases such as cardiovascular disease, diabetes, depression and suboptimal cognitive functioning.



[https://www.youtube.com/watch?v=Fy\\_eL20Kvbg&list=PLGwSB4HVGqc00kUf1u4Q050Tb0SOVdl\\_O&index=4](https://www.youtube.com/watch?v=Fy_eL20Kvbg&list=PLGwSB4HVGqc00kUf1u4Q050Tb0SOVdl_O&index=4)





Besides the risks of physical inactivity, the academic performance of primary school children has also decreased over the past 10 years, placing them at risk of inadequate cognitive development and negative effects on their further school career and success on the job market.

Associate Professor Esther Hartman and her team have developed an innovative learning method for primary school children. To improve children's health and academic performance, a physically active learning approach has been developed. Previous studies have shown that children's physical activity levels with their cognitive functions and school achievements are linked. This is why it is important to break up the school day and alternate sedentary learning with physically active learning.

The "Fit and Academically Proficient at School" method entails a physically active approach for the language and math classes. A large scale randomized controlled trial in 12 primary schools in 500 children showed that children involved in the program are more physically active during classes and pay more attention to their school tasks than children that followed the regular program. Over the long term, these children had a lower body mass index and achieved learning gains of 4 months on mathematics and spelling. The learning method can be provided by teachers with an app and a digital board to children aged 6-12.

In order to facilitate the dissemination of the "Fit and Academically Proficient at School" learning method, an app has been developed that supports the communication from teachers to school classes for children at the age of 6 to 12 years. For teachers, an online platform is available to offer support (in Dutch) ([www.fitenvaardigopschool.nl](http://www.fitenvaardigopschool.nl)). "Fit and Academically Proficient at School"

is currently being used in many primary schools in the Netherlands. The Dutch Ministry of Education awarded a grant to the research proposal in 2011. In 2016 the research was nominated for the Klokhuis Science award, given by a popular children's television program. In 2017 the Dutch Research Council (NWO) recognized the research program with two awards, from the Scientific Board and the Public Board.

"Fit and Academically Proficient at School" was incorporated in the advice to the Dutch Parliament in 2018. The approach received substantial media attention in several television programs, radio broadcasts, newspapers, and professional and popular journals in sports and education. The partners involved provide workshops and lectures for scientific peers as well the general public in the Netherlands and abroad.

As a spin-off result of the research program, the Dutch Research Council and the Dutch Brain Foundation (Hersenstichting) funded two follow-up research projects: Learning by Moving and Move to Improve. In 2020 the Dutch Research Council also funded a follow-up research project aimed at developing a physically active learning method in special needs education ("Fit en Vaardig in het Speciaal Basisonderwijs").

The research on which the "Fit and Academically Proficient at School" learning method is based resulted from multi-layered collaborations between academic and non-academic partners. The academic partners involved are the UMCG (Dept. of Human Movement Sciences, UG, part the Dept. of Educational Sciences), and Preventieversneller (also at UG). We also collaborate with several institution of higher education: Academic PABO, ALOs, and Sport Innovator Center Groningen. The Noordelijk Onderwijs Gilde (NOG)



provides training programs for teachers, assistants, and school managers, regular primary schools and schools for special needs education. Societal partners involved in the project are Stichting Onderwijs & Samenleven (Innovatie BV), Klare Koek (company that developed the app), and Sport Fryslan.

### Some links of interest about this research

- Website [www.ftenvaardigopschool.nl](http://www.ftenvaardigopschool.nl)
- Article on [Unifocus RUG](#) “Learning through exercise”
- Article on [CBC News Canada](#) “Physically active math, spelling lessons multiply academic success”
- Article on [Leraar24](#) “Bewegend leren met Fit en Vaardig” (in Dutch)