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Untangling the adolescent internalizing brain: investigations on brain networks in youth with anxious and depressive problems

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Curriculum Vitae

Eline Roelofs was born in 1992 in 's-Hertogenbosch and raised in Berlicum, the Netherlands. In 2010, she completed her secondary education (gymnasium) at Gymnasium Beekvliet in Sint-Michielsgestel. Following graduation, she spent six months in Kelowna, BC, Canada, attending Kelowna Secondary School as part of an international exchange program.

In 2011, Eline commenced her medical studies at Leiden University Medical Center (LUMC). During her undergraduate years, she gained valuable research experience working as a student assistant at the Department of Clinical Genetics at LUMC from 2012 to 2016, where she contributed to database development for investigating the p16-Leiden mutation. Her growing interest in neurobiology led her to join the Department of Psychiatry at LUMC as a research assistant for the NESDA study from 2015 to 2017, where she served as a scan buddy for neuroimaging data collection.

Seeking to expand her research expertise internationally, Eline undertook a seven-month research internship in 2017 with the PsychoNeuroEndocrinology Group at the Centre for Psychiatry, Imperial College London. During this placement, she investigated the influence of nutritional state on inhibitory motor control, presenting her findings at the British Feeding and Drinking Group Annual Meeting in Lyon, France, in 2018.

After completing her medical degree in 2018, Eline began working as a junior doctor at the Department of Child and Adolescent Psychiatry at LUMC, gaining experience across various in- and outpatient clinics. Her continued fascination with the neurobiological underpinnings of psychiatric disorders motivated her to pursue doctoral studies, and in 2019, she commenced her PhD under the supervision of professor Robert Vermeiren and professor Nic van der Wee.

In 2021, Eline embarked on her specialist training as a Child and Adolescent Psychiatry resident at LUMC while simultaneously continuing her doctoral research, successfully combining clinical practice with academic investigation. She completed a EMDR course for children and adolescents in 2023. Her multidisciplinary approach to understanding the mind extended beyond traditional medical training when she completed a 200-hour vinyasa yoga teacher training in 2024, reflecting her holistic perspective on mental health and well-being.

Eline is currently in the final stages of completing her residency in Child and Adolescent Psychiatry at Youz, The Hague. She lives in Leiden with her partner Tom and cat Zeus.

List of publications

Roelofs E.F., Nestor L.J., Ali S.N., Lingford-Hughes A.R., Nutt D.J., Goldstone A.P. (2018). Active nutritional state and Body Mass Index influence Anterior Cingulate Cortex activation during motor response inhibition. *Appetite*. 313. <https://doi.org/10.1016/j.appet.2018.05.223>

Bas-Hoogendam J.M., **Roelofs E.F.**, Westenberg P.M., van der Wee N.J.A. (2020). Pathogenesis of social anxiety disorder. In: Simon N, Hollander E, Rothbaum BO, Stein DJ, editors. *The American Psychiatric Association Publishing Textbook of Anxiety, Trauma, and OCD-Related Disorders, Third Edition*. Washington, DC: American Psychiatric Association Publishing.

Roelofs E.F., Bas-Hoogendam J.M., van Ewijk H., Ganjgahi H., van der Werff S.J.A., Barendse M.E.A., Westenberg P.M., Vermeiren R.R.J.M., van der Wee N.J.A. (2020). Investigating microstructure of white matter tracts as candidate endophenotypes of Social Anxiety Disorder - Findings from the Leiden Family Lab study on Social Anxiety Disorder (LFLSAD). *Neuroimage Clin*. 28:102493. <https://doi.org/10.1016/j.nicl.2020.102493>

Roelofs E.F., Bas-Hoogendam J.M., van der Werff S.J.A., Valstar S.D., van der Wee N.J.A., Vermeiren R.R.J.M. (2022). Exploring the course of adolescent anxiety and depression: associations with white matter tract microstructure. *Eur Arch Psychiatry Clin Neurosci*. 272(5):849-858. <https://doi.org/10.1007/s00406-021-01347-8>

Roelofs E.F., Bas-Hoogendam J.M., Winkler A.M., van der Wee N.J.A., Vermeiren R.R.J.M. (2024). Longitudinal development of resting-state functional connectivity in adolescents with and without internalizing disorders. *Neurosci Appl*. 3:104090. <https://doi.org/10.1016/j.nsa.2024.104090>

Roelofs E.F., Groenewold N.A., Farkas K., Zhu A.H., Gao S., Borgers T., Dannlowski U., Flinkenflügel K., Grotegerd D., Hahn T., Jansen A., Leehr E.J., Kircher T.T.J., Meinert H., Nenadić I., Stein F., Straube B., Demiralp T., Tükel R., Westenberg P.M., Bauer J., Kraus A., Doruyter A.G.G., Lochner C., Hofmann D., Straube T., Zugman A., Calkins M.E., Gur R.E., Gur R.C., Larsen B.S., Sattertwaihe T.D., Slump T.M., Vogler R.A., Avery S.N., Blackford J.U., Clauss J.A., Lui S., Thomopoulos S.I., Vermeiren R.R.J.M., Jahanshad N., Kochunov P.V., Thompson P.M., Pine D.S., Stein D.J., van der Wee N.J.A., Bas-Hoogendam J.M. (2025). White matter microstructure alterations in social anxiety disorder - a mega-analysis across 12 cohorts in the ENIGMA-Anxiety Working Group. *Biol Psychiatry Cogn Neurosci Neuroimaging*. 1:S2451-9022(25)00364-7. <https://doi.org/10.1016/j.bpsc.2025.11.007>

Portfolio

PhD trajectory overview

My PhD trajectory commenced in 2019 at Leiden University Medical Center (LUMC) under the primary supervision of Prof. Dr. R.R.J.M. Vermeiren and Prof. Dr. N.J.A. van der Wee, with Dr. J.M. Bas-Hoogendam serving as co-promotor. My doctoral research is embedded within the research program “New methods for child psychiatric diagnosis and treatment outcome evaluation” and is summarized within the thesis “Untangling the adolescent brain – investigating neural networks in youth with anxious and depressive symptoms.”

In the foundational year of 2019, I established my methodological and regulatory framework. I completed mandatory training in “Basic Methods and Reasoning in Biostatistics” (42 hours) and “Responsible Research” (42 hours), with a particular focus on laws and regulations governing clinical research under relevant Dutch Acts (WMO, GDPR/AVG). I acquired advanced neuroimaging skills through the FSL course (42 hours) and initiated my teaching portfolio, contributing to courses for (bio)medical students on depression and translational neuroscience.

In 2020, I developed my scientific communication capabilities through specialized training (40 hours) and presented online at two major international conferences: the annual meeting of the Society of Biological Psychiatry (SOBP) and the annual congress of the European College of Neuropsychopharmacology (ECNP). I also published my first peer-reviewed publication as first author, in which I investigated white matter microstructure as candidate endophenotypes of social anxiety disorder (SAD) in the Leiden Family Lab study on SAD, advancing my understanding of familial anxiety mechanisms. I co-authored a book chapter on the pathogenesis of SAD and expanded my teaching responsibilities to over 60 hours, supervising medical and biomedical students.

The year 2021 demonstrated continued research productivity with a second first-author publication exploring adolescent anxiety and depression trajectories in relation to white matter microstructure. A significant milestone occurred in March 2021 when I commenced my Residency in Psychiatry at the LUMC, successfully combining clinical training with research activities. I maintained teaching commitments (10 hours) alongside these dual responsibilities.

During 2022-2023, I sustained engagement with the national research community through attendance at the NVVP spring conference (“voorjaarscongres”) while continuing student supervision and balancing research, clinical training, and educational duties.

The period spanning 2023 to 2025 featured a significant organizational achievement: I undertook a major leadership role coordinating and conducting a mega-analysis within the international ENIGMA Anxiety working group. This large-scale logistic operation involved collecting and managing international multi-site data, coordinating cross-cultural teams, and implementing quality control procedures to investigate

brain structural correlates of social anxiety at unprecedented scale. This project demonstrates my capacity to manage complex collaborative projects and my dedication to advance open science practices.

During 2024-2025, I presented at the EPA and SOBP congresses in Budapest and Toronto, respectively, and presented my work at the ENIGMA Developmental Group Leadership Summit in Amsterdam. Furthermore, I visited the ECNP congress in Amsterdam and completed the “Workshop Scientific Conduct for PhDs,” strengthening commitment to research ethics. Moreover, I received the Young Neurolab NL travel grant, facilitating international collaboration.

Regarding societal outreach, I participated in science communication at Corpus Kids Academy, an interactive event introducing brain research to over 200 children. This initiative exemplifies my dedication to making neuroscience accessible, fostering scientific curiosity in youth, and bridging academic research with public understanding of mental health.

Throughout my PhD trajectory, I accumulated over 400 hours of formal training across methodological coursework, scientific communication, teaching, and conferences. My work bridges clinical child and adolescent psychiatry with advanced neuroimaging, investigating white matter microstructure and neural networks underlying adolescent anxiety and depression. The trajectory showcases substantial development of scientific insight, from foundational analyses to leadership of an international collaborative project. The integration of extensive teaching and supervision, pioneering team science initiatives, clinical training, ethical research leadership, and public outreach positions me as an emerging researcher in developmental neuropsychiatry, committed to translating neuroscientific findings into improved approaches for youth mental health while engaging diverse audiences and maintaining rigorous research standards.

CRedit statement

CRediT table for the thesis of Eline Roelofs

[illegible]

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

Dissemination table

1.	Roelofs EF, Nestor LJ, Ali SN, Lingford-Hughes AR, Nutt DJ, Goldstone AP Active nutritional state and Body Mass Index influence Anterior Cingulate Cortex activation during motor response inhibition
<i>Chapter in this thesis</i>	Not in this thesis
<i>Conference contributions of the PhD candidate</i>	British Feeding and Drinking Group annual meeting 2018. DOI: 10.1016/j.appet.2018.05.223
2.	Bas-Hoogendam JM, Roelofs EF, Westenberg PM, van der Wee NJA Pathogenesis of social anxiety disorder
<i>Chapter in this thesis</i>	Not in this thesis
<i>Other forms of dissemination</i>	In: Simon N, Hollander E, Rothbaum BO, Stein DJ, editors. The American Psychiatric Association Publishing Textbook of Anxiety, Trauma, and OCD-Related Disorders, Third Edition. Washington, DC: American Psychiatric Association Publishing; 2020.
3.	Roelofs EF, Bas-Hoogendam JM, van Ewijk H, Ganjgahi H, van der Werff SJA, Barendse MEA, et al. Investigating microstructure of white matter tracts as candidate endophenotypes of Social Anxiety Disorder - Findings from the Leiden Family Lab study on Social Anxiety Disorder (LFLSAD)
<i>Chapter in this thesis</i>	4
<i>Conference contributions of the PhD candidate</i>	ECNP 2020. DOI: 10.1016/j.euroneuro.2019.12.070 SOBP 2020. DOI: 10.1016/j.biopsych.2020.02.641
<i>Publication in peer reviewed journal</i>	DOI: 10.1016/j.jnicl.2020.102493
4.	Roelofs EF, Bas-Hoogendam JM, van der Werff SJA, Valstar SD, van der Wee NJA, Vermeiren RRJM Exploring the course of adolescent anxiety and depression: associations with white matter tract microstructure.
<i>Chapter in this thesis</i>	2
<i>Publication in peer reviewed journal</i>	DOI: 10.1007/s00406-021-01347-8
5.	Roelofs EF, Bas-Hoogendam JM, Winkler AM, van der Wee NJA, Vermeiren RRJM Longitudinal development of resting-state functional connectivity in adolescents with and without internalizing disorders
<i>Chapter in this thesis</i>	3
<i>Publication in peer reviewed journal</i>	DOI: 10.1016/j.jnsa.2024.104090
6.	Roelofs EF, Groenewold NA, Farkas K, Zhu AH, Gao S, Borgers T, et al. White matter microstructure alterations in social anxiety disorder – a mega-analysis across 12 cohorts in the ENIGMA-Anxiety Working Group
<i>Chapter in this thesis</i>	5
<i>Pre-registration</i>	https://osfio/fkswz
<i>Conference contributions of the PhD candidate</i>	SOBP 2025. DOI: 10.1016/j.biopsych.2025.02.282
<i>Publication in peer reviewed journal</i>	Submitted

Overview of completed courses and other training

Mandatory activities		
Month/Year	Title	Hours
03/2019	Leiden University Onboarding Programme Inform & Connect (2 activities)	10
09/2019	Basic Methods and Reasoning in Biostatistics	42
11/2019	Responsible Research (2 activities)	42
05/2025	Workshop Scientific Conduct for PhDs	5
Scientific courses, workshops and other training activities		
Month/Year	Title and description	Hours
03/2019	FSL-course. Five-day theoretical and practical course on using the FMRIB Software Library (FSL) for structural, functional and diffusion image analysis	42
2019	Basic course on Regulations and Organization of Clinical Trials ("BROK"). Mandatory course focused on laws and regulations when conducting clinical research that falls under the scope of several Dutch laws	20
01/2020	Corsendonk course. Five-day course for researchers in psychiatry	40
06/2020	Communication in Science for PhD's. Seven sessions focused on scientific presenting and writing	40
Transferable skill courses, workshops and other training activities		
Month/Year	Title and description	Hours
2019	Teaching of FOS-course "Depression and other stress-related disorders", including supervision of master students writing their research proposal	14
2019	Teaching two classes of the half minor "Translational Neuroscience"	5
2020	Teaching (bio)medical students, including the same courses as those in 2019 and supervision of two medical students for their scientific research project for 4 to 6 months each	63
2021	Teaching medical students "Vraagstukken psychisch functioneren"	6
2023	Teaching FOS-course "Depression and other stress-related disorders"	5
2024	Corpus Kids Academy. One day to introduce brain research to children	8

Dissemination, acknowledgement, esteem and other relevant scientific activities

Other scientific activities related to this thesis		
Month/year	Description	Linked to chapter(s)
2020	ECNP. Poster presentation at the annual meeting of the European College of Neuropsychopharmacology, online due to the COVID-19 pandemic	4
2020	SOBP. Poster presentation at the annual meeting of the Society of Biological Psychiatry, online due to the COVID-19 pandemic	4
2022	Suffugium grant application for innovative projects in child- and adolescent psychiatry. Not awarded	5
2024	EPA. Oral presentation at the annual meeting of the European Psychiatry Association in Budapest, Hungary	2
2025	SOBP. Poster presentation at the annual meeting of the Society of Biological Psychiatry in Toronto, Canada	5
2025	Young Neurolab NL travelgrant, awarded	5

Dankwoord

Een promotietraject is lang en intens, zeker als deze gecombineerd wordt met een opleiding tot medisch specialist. Ik wil graag iedereen bedanken die hieraan heeft bijgedragen. Bij een aantal mensen wil ik graag in het bijzonder stilstaan.

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I'd like to thank these researchers for their expertise and relevant contributions to studies in this thesis: **Kinga Farkas** from Semmelweis University; **Habib Ganjahi** from the University of Oxford; **Nynke Groenewold** from Stellenbosch University; **Daniel Pine** from NIMH; **Steven van der Werff** and **Michiel Westenberg** from Universiteit Leiden; **Anderson Winkler** from Texas University.

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