Project title: Training smokers to quit by revaluing smoking- and non-smoking cues

Project leader: Dr. P. van Ruitenbeek

Function: Assistant professor

Collaborators: Prof. Dr. O.C.P. van Schayck, Dr. F.T. Smulders, Dr. C. Quaedflieg

Proposal (250 words):

Introduction: Worldwide over 1 billion people smoke causing a tremendous societal burden. Attempts to quit smoking result in poor abstinence rates, hardly exceeding 10%. Therefore, new ways to enhance success are highly needed. Smokers show an attention bias for addiction related cues (e.g. cigarettes) associated with craving and altered event-related-potentials (P300). Attention-Bias-Modification (ABM) and neurofeedback training may reduce the bias for these cues and associated P300 abnormalities, potentially reducing craving and increasing abstinence success. Finally, financial incentives modestly enhance abstinence success rates. This project additionally explores ABM effects on financial benefit cues associated P300 abnormalities. We ultimately aim to increase abstinence success by ABM training and neurofeedback.

Hypothesis and Objectives: Five objectives are formulated that will be achieved in experimental studies. It is hypothesized that: 1) P300 amplitudes for smoking-related cues are higher compared with neutral cues. 2 and 3) The P300 abnormalities following smoking-related cues are changed using ABM (2) and neurofeedback training (3). 4) Post ABM/neurofeedback, smoking-related cue induced P300 amplitudes predict abstinence success. 5) ABM training to attend financial reward cues induces changes P300 characteristics and predicts abstinence success.

Setting and Methods: Goals are achieved by performing electroencephalography and behavioral (reaction times) measurements in smokers and healthy controls per experimental study. The studies will be performed at Maastricht University, Faculty of Psychology and Neuroscience within a team of experienced researchers who have access to a faculty owned EEG laboratory.

Impact: Achieving our goals will result in a new and relatively inexpensive way to stimulate smoking abstinence success.

Requirements candidate: Highly motivated student with excellent English communication skills (verbal and writing) and proactive and resolute attitude.

Keywords: addiction, attention-bias-modification, ERP, EEG, P300, incentives

Top 5 selected publications:

Havermans, A., van Schayck, O. C. P., Vuurman, E., Riedel, W. J., & van den Hurk, J. (2017). Nicotine deprivation elevates neural representation of smoking-related cues in object-sensitive visual cortex: a proof of concept study. *Psychopharmacology (Berl), 234*(16), 2375-2384. doi: 10.1007/s00213-017-4628-3

Van Schayck, O. C. P., Williams, S., Barchilon, V., Baxter, N., Jawad, M., Katsaounou, P. A., . . . Ostrem, A. (2017). Treating tobacco dependence: guidance for primary care on life-saving interventions. Position statement of the IPCRG. *NPJ Prim Care Respir Med, 27*(1), 38. doi: 10.1038/s41533-017-0039-5

Jabben, N., Arts, B., Jongen, E. M., Smulders, F. T., van Os, J., & Krabbendam, L. (2012). Cognitive processes and attitudes in bipolar disorder: a study into personality, dysfunctional attitudes and attention bias in patients with bipolar disorder and their relatives. *J Affect Disord, 143*(1-3), 265-268. doi: 10.1016/j.jad.2012.04.022

Quaedflieg, C. W., Meyer, T., Smulders, F. T., & Smeets, T. (2015). The functional role of individual-alpha based frontal asymmetry in stress responding. *Biol Psychol, 104*, 75-81. doi: 10.1016/j.biopsycho.2014.11.014

Quaedflieg, C. W., Smulders, F. T., Meyer, T., Peeters, F., Merckelbach, H., & Smeets, T. (2016). The validity of individual frontal alpha asymmetry EEG neurofeedback. *Soc Cogn Affect Neurosci, 11*(1), 33-43. doi: 10.1093/scan/nsv090