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Offense-Related Biomarkers in Pedophilia

Symposium Chair: Boris Schiffer, PhD
LWL-University Hospital Bochum

Child sexual offending (CSO) is one of the most important risk factors for mental health disturbances in victims and moreover, associated with immense costs in the healthcare sector. While not each individual with a pedophilic sexual preference will commit sexual offenses against children, a diagnosis of pedophilia is related to an elevated risk to offend against children. During the last years, a multi-site research collaboration called NeMUP (Neural Mechanisms Underlying Pedophilia and Child Sexual Offending) aimed to elucidate neurobiological mechanisms of CSO and to contribute to the improvement of assessment, therapy and prevention of child sexual abuse. In the present symposium we are intended to present an overview of our recent results from different neurobiological domains like functional and structural brain imaging as well as epigenetic modalities. Our findings seem to converge to a model of neurobiological disturbances that are rather associated with offense status than with deviant sexual interests per se.

More Normal Than Abnormal? Clinical Characteristics and (Epi-)Genetical Findings in Pedophilia

Claudia Massau, MSc
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The first part of this presentation focuses on clinical markers associated with pedophilia and/or child sexual offending behavior. The NeMUP study assessed clinical characteristics including sociodemographics, clinical as well as sexual variables by the use of a semi-structured interview, the SKID interview as well as corresponding psychological questionnaires. Findings suggest that psychiatric diagnoses, sexual problems and negative childhood experiences were significantly more common among clinical groups (pedophiles and child sex offenders) than in healthy controls. Offenders and non-offenders differed regarding age, intelligence and experience of childhood sexual abuse, whereas pedophiles and non-pedophiles mainly differed regarding sexual characteristics. Moreover, regression analysis was able to predict offense status more successfully than sexual preference itself (mean classification accuracy: 76% versus 68%; Gerwinn et al., 2018).

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The second part presents a detailed investigation regarding the androgen system which is closely linked to sexual development and behavior. Therefore, markers of prenatal androgen exposure (2D:4D finger lengths ratio as a proxy), genetic parameters (CAG repeat lengths), epigenetic regulation (methylation status of the androgen receptor gene) as well as the acute plasma concentration of sex steroids were assessed. Our study showed evidence that only CSO was associated with higher prenatal androgen exposure, higher methylation status of the androgen receptor gene, indicating lower functionality of the testosterone system accompanied by lower peripheral testosterone levels. In addition, there was an interaction effect on methylation levels between offense status and androgen receptor functionality. None of these neurobiological findings were traceable to pedophilic preference (Kruger et al, 2019).

Overall, the world's most comprehensive study (NeMUP) of this population up to date reveals that the clinical picture is far more complex than previously thought: different clinical characteristics are shown to be specifically related to one of the two factors, others seem to be associated with both - pedophilia and CSO. In the field of prenatal and (epi-)genetic markers only associations with CSO could be detected. Therefore, the results show how important it is to separate pedophilia and CSO in research approaches and clinical practice, but also how limited our knowledge about the origins of pedophilic preference itself remains.

Literature:

- Gerwinn, H., Weiss, S., Tenbergen, G., Amelung, T., Fodisch, C., Pohl, A., **Massau, C.**, Kneer, J., Mohnke, S., Kärgel, C., Wittfoth, M., Jung, S., Drumkova, K., Schiltz, K., Walter, M., Beier, K. M., Walter, H., Ponseti, J., Schiffer, B., & Kruger, T. H. C. (2018). Clinical characteristics associated with paedophilia and child sex offending - Differentiating sexual preference from offence status. *European Psychiatry*, 51, 74-85. doi:10.1016/j.eurpsy.2018.02.002
- Kruger, T. H. C., Sinke, C., Kneer, J., Tenbergen, G., Khan, A. Q., Burkert, A., Muller-Engling, L., Engler, H., Gerwinn, H., von Wurmb-Schwark, N., Pohl, A., Weiss, S., Amelung, T., Mohnke, S., **Massau, C.**, Kargel, C., Walter, M., Schiltz, K., Beier, K. M., Ponseti, J., Schiffer, B., Walter, H., Jahn, K., & Frieling, H. (2019). Child sexual offenders show prenatal and epigenetic alterations of the androgen system. *Translational psychiatry*, 9(1), 28. doi:10.1038/s41398-018-0326-0

Learning Goals:

- Presenting a short overview of the currently available data regarding the clinical characteristics and (epi-)genetical findings on the road to pedophilia and CSO.
- To recognize the importance of studying the androgen system/different biological factors to deepen our understanding regarding CSO.
- To gain an in-depth understanding of the findings and its implications to better understand the factors sexual preference and offense behavior.

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Functional and Structural Imaging Markers of Child Sexual Offending

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To further the understanding of potential neural dysfunctions underlying pedophilia and/or CSO, the assessment of neuroimaging methods may be of high relevance. However, as compared to other psychiatric domains, studies addressing the neurobiological correlates in this regard are scarce and most of them showed inconsistent results. As a core feature, the NeMUP project comprised the assessment of multimodal brain-imaging techniques to describe markers of functional as well as structural aspects of deviant sexual behavior and interests. In particular, this presentation summarizes our recent findings from structural and functional magnet resonance imaging (MRI, fMRI), resting-state fMRI, diffusion tensor imaging (DTI), and cortical thickness analyses. In line with the epigenetical findings described above, we did not find substantial evidence for a pedophilia-related effect which means that pedophiles in general did not differ from controls. Instead, results indicate that offense status is associated with neural disturbances on a multimodal level. For instance, pedophilic offenders and non-offenders showed differential 1) brain activation during response inhibition, 2) gray matter volume in the temporal pole, 3) activation of the default mode network during rest, 4) cortical thickness in the right motor cortex. Taken together, structural and functional brain imaging differences between offending vs. non-offending pedophiles support that a sexual preference for prepubescent children may not automatically lead to CSO. It seems rather as if specific brain aberrations in pedophiles may increase the risk of CSO. Again, these results imply the importance to take into account offense status in future research on pedophilia and sexual offending.

Literature:

- Kärgel, C.,** Massau, C., Weiß, S., Walter, M., Kruger, T. H. C., & Schiffer, B. (2015). Diminished functional connectivity on the road to child sexual abuse in pedophilia. *Journal of Sexual Medicine, 12*(3), 783-795. doi:10.1111/jsm.12819
- Kärgel, C.,** Massau, C., Weiß, S., Walter, M., Borchardt, V., Krueger, T. H. C., Tenbergen, G., Kneer, J., Wittfoth, M., Pohl, A., Gerwinn, H., Ponseti, J., Amelung, T., Beier, K. M., Mohnke, S., Walter, H., & Schiffer, B. (2017). Evidence for superior neurobiological and behavioral inhibitory control abilities in non-offending as compared to offending pedophiles. *Human Brain Mapping, 38*(2), 1092-1104. doi:10.1002/hbm.23443
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Learning Goals:

- Providing fundamental information with regard to the most common imaging methods in modern (forensic)psychiatry
- Summary of the most recent neurobiological findings in the context of pedophilia and child sexual offending.
- Transmission of knowledge how important it is to consider both factors of sexual preference and sexual offending in the neurobiological understanding of deviant sexual interest/behavior.

Claudia Massau graduated in 2012 with the majors neuropsychology, clinical psychology and psychological assessment from the University of Constance, Germany. She completed different internships, where she gained experience in applied forensic research with special focus on the development and evaluation of forensic risk assessment instruments. She has been working as a research assistant at the Division of Forensic Psychiatry, Department of Psychiatry, Psychotherapy and Preventive Medicine, LWL-University Hospital Bochum, Germany since 2012. Her research foci are the neuronal and neurocognitive deficiencies in deviant sexual behavior and persons suffering from ASPD. In her doctoral dissertation she focuses on the neuronal mechanisms of moral judgment and executive functions in pedophilic men as well as child sexual abusers (advisor: Professor Boris Schiffer, University of Bochum, Germany).

Besides she is now completing her Master degree in Behavioral Psychotherapy at the German Association of Behavioral Therapy (DGVT) in Bonn, Germany and the University of Bern, Switzerland as well as a postgradual training program in applied forensic psychology at the Germany Psychologist Academy, Berlin, Germany.

Christian Kärigel studied psychology at the University of Wuppertal, Germany, with special focus on clinical psychology. From 2010 to 2012, he was employed at the clinic for psychiatry and psychotherapy, University of Duisburg-Essen, Germany, as a research associate and PhD student, focusing on the evaluation of a cognitive remediation program on event-related potentials in schizophrenia patients (PhD received April 2016). From 2012 until now he is serving as a member of the working group of Boris Schiffer at the university of Duisburg-Essen and Bochum, Germany, respectively. There, in the context of research projects on the neural mechanisms of pedophilia and/or sexual offense against children, he is responsible for the MRI assessments and subsequent analysis. Moreover, within this framework he is involved in the execution of clinical interviews and neuropsychological measures. Beyond that, since April 2015 he is working as a clinical psychologist in a forensic hospital focusing

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on the treatment of (child) sexual abusers. In addition, he is completing his master-degree in *Cognitive Behavioral Psychotherapy* at the *German Association of Behavioral Therapy* (DGVT) in Dortmund, Germany.