

The two subsequent chapters address a topic that is not commonly included in standard psychophysiology texts, namely premenstrual and postmenopausal physiological and psychophysiological changes. The first of these, by Inger Sundström Poromaa, focuses on premenstrual dysphoric disorder (PMDD). PMDD is common with onset of symptoms in the late luteal phase of the menstrual cycle and provides an important model for our understanding of the influence of ovarian steroids on mood and anxiety in women. She discusses physiological findings in PMDD women (e.g. altered cardiovascular responses to stress) that appear to represent vulnerability traits for PMDD (i.e. also present in asymptomatic menstrual phases), or alternatively, vulnerability traits for the depressive and anxiety disorders that are commonly associated with PMDD. She also presents a number of state-related findings (e.g. lower luteal phase prepulse inhibition) in PMDD. The next contribution by Robert Freedman addresses postmenopausal physiological changes. The hallmark of menopause is the marked reduction of estradiol levels due to ovarian failure. This, among other factors results in hot flashes, the most common menopausal symptom. This chapter reviews the pathophysiology of hot flashes and highlights the contribution of brain structures like the brainstem, the insula and the prefrontal cortex.

The next chapter, by Ian Kodish, Carol Rockhill and Sara Webb, reviews psychophysiological and neuroimaging findings in Autism Spectrum Disorder (ASD), describing alterations in local brain regions as well as coordination of brain activity during both rest and activation paradigms in ASD. They propose that new drug therapies for ASD should aim to realign ‘trajectories of network specialization across development’ by acting together with behavioural therapies to enhance social and emotional learning by potentiating the effect of experience-induced plasticity on neuronal network connectivity. The last contribution to this part of the volume comes from Timothy Rhoers and colleagues who provided an analysis of the physiological correlates of insomnia. This chapter describes the physiological correlates of insomnia expressed during sleep and during the daytime. Together, the data from nighttime and daytime electrophysiology, event-related brain potential recording, neuroimaging studies, sympathetic nervous system and HPA axis monitoring all suggest insomnia is a 24-h disorder of hyperarousal.

Part II of the volume starts with a contribution from Gregory Light and Neal Swerdlow. They propose a remarkable parading shift (focus more on what is “right” and less on what is “wrong” with the patients) and convincingly argue, with clear examples of more normal-like performance in specific neurophysiological and psychophysiological measures predicting a positive response to specific therapeutic interventions, for an alternative strategy of using psychophysiological measures to identify ‘spared neural and cognitive function’ and then using this information to optimize clinical outcomes in schizophrenia patients. The next contribution to this section comes from Susan Bowyer and addresses connectivity measurements for network imaging. As is well known, communication across the brain networks is dependent on neuronal oscillations. Detection of the synchronous activation of neurons can be used to determine the well being of the connectivity in the human brain networks. Well connected highly synchronous activity can be measured by

MEG, EEG, fMRI and PET and then analysed with several types of mathematical algorithms. A further contribution by Petr Bob provides a review of topics related to nonlinear measures and dynamics in psychophysiology of consciousness that represent important tools to understand certain specific changes in neural systems implicated in psychiatric disorders. These methods enable us to describe various levels of complex interactions that may influence patterns of temporal and spatial disorganization with decreased or increased functional connectivity and complexity that underlie specific perceptual and cognitive changes in psychopathological states. Martijn Arns and Sebastian Olbrich explore the role of pharmaco-EEG in personalized medicine for Attention Deficit Hyperactivity Disorder (ADHD) and Depression. This chapter summarizes recent developments on personalized medicine in psychiatry with a focus on ADHD and depression and their associated biomarkers and phenotypes. Several neuro-physiological subtypes in ADHD and depression and their relation to treatment outcome are reviewed. The final contribution to this volume comes from Nikolaj Bak and Bob Oranje. They describe the benefits of psychophysiology-informed imaging, an approach also advocated by many others in this volume, in particular how a combination of EEG and fMRI complements each other, allowing both high temporal (EEG) and spatial (fMRI) resolution to be achieved. They also discuss various approaches to combine psychophysiology (EEG, EMG) with fMRI and the issues that need to be dealt with when combining the two methodologies.

We hope this volume, with chapters from leaders in the field, will make a valuable contribution to the literature on proven utility as well as future applications of psychophysiological measures, combined with other methodologies, in the context of improved understanding, prevention and effective treatment of neuropsychiatric disorders.

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