**Summary**

**Significance of interoception in alcohol use disorder**

1. **Introduction**

Interoception is the ability of an organism to create cortical representations of its internal states, which includes physiological processes responsible for receiving, processing and cortical integration of signals arising from within the body. Its various domains, referring to one’s individual ability to properly identify internal states, were identified: [1] behaviorally measured **interoceptive accuracy**; [2] self-reported **interoceptive sensibility**, and [3] metacognitive **interoceptive awareness**. Current research shows that the importance of interoception extends beyond physiological mechanisms of homeostasis and is relevant to cognitive, emotional or behavioral regulatory processes. Interoceptive abnormalities have been recognized in many psychiatric disorders, including substance use disorders (SUD).

The current state of research suggests a potential interrelationship between interoception and alcohol use disorder (AUD), and it seems reasonable to assume that the relationship is bidirectional. A disturbance in the accurate perception of bodily signals may promote the development of AUD. Alcohol, in turn, may adversely affect interoceptive abilities. In addition, the theoretical links between interoception and identified AUD risk factors such as alexithymia and pain seem interesting.

Alexithymia, a difficulty in identifying one’s own emotional states, is found in 30-67% of individuals with AUD. Some theories of emotion assume that the perception of signals coming from inside the body is the basis for the proper identification of emotional states, suggesting a link between alexithymia and interoception. Interestingly, alexithymia is sometimes referred to in the literature as a "general deficit of interoception."

Individuals with AUD often report chronic pain. The problem may affect more than 30% of them. According to some conceptualizations, alcohol addiction can be described as a "chronic pain disorder." Moreover, pain is considered one of the interoceptive phenomena.

Both alexithymia and pain are associated with negative affect (unpleasant feelings such as tension or anxiety), which can contribute to the development of AUD. The importance of negative affect in this context is determined by negative reinforcement theories (they assume that alcohol helps reduce unpleasant emotional states).

Therefore, the evaluation of interoceptive abilities in individuals with AUD seems to be an important research direction, and while theoretical models convincingly point to the importance of these abilities in the development and course of AUD, there are actually few studies addressing this issue. This is particularly relevant for complex models that take into account the relationship between interoception and other variables in AUD individuals such as alexithymia, pain and negative affect. In addition, it is noteworthy that there have been no studies to date comparing the aforementioned relationships between AUD individuals and healthy controls. Moreover, the analyses of these relationships may have significant clinical value, and the results may potentially be applied to the treatment programs for AUD individuals.

1. **Objectives**

The purpose of this dissertation was to assess the relationship between interoceptive accuracy and alexithymia, negative affect (anxiety) and pain sensitivity in individuals with a diagnosis of AUD.

The following specific aims were defined:

1. To compare interoceptive accuracy between individuals with AUD and healthy controls.
2. To evaluate the relationship between interoceptive accuracy, alexithymia, and negative affect in individuals with AUD.
3. To investigate the associations between interoceptive accuracy and pain sensitivity in individuals with AUD and healthy controls.
4. **Material and methods**

In this study, the experimental group consisted of patients of 24-hour therapeutic unit who met the criteria for the diagnosis of alcohol dependence provided by the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10): F10.2. The control group consisted of individuals in whom the diagnosis of AUD and other mental disorders was excluded (healthy adults). A total of 165 patients with a diagnosis of AUD and 110 healthy adults were recruited for the study. The following questionnaires were used to assess the study variables: [1] Toronto Alexithymia Scale TAS-20 (the most commonly used tool to assess the severity of alexithymia); [2] Brief Symptom Inventory BSI (a questionnaire used to assess anxiety symptoms as a measure of negative affect); [3] Pain Sensitivity Questionnaire PSQ; [4] Visual Analogue Scale of Pain VAS; [5] Heartbeat Counting Task HCT (a behavioral test to assess interoceptive accuracy that involves counting heartbeats at designated intervals under ECG control).

1. **Results**

Statistical analyses showed that individuals with AUD had significantly worse interoceptive accuracy and higher alexithymia than healthy controls. In both groups, poorer interoceptive abilities were associated with significantly higher anxiety severity. In addition, there was a negative correlation between interoceptive accuracy and alexithymia in both groups – individuals characterized by poorer processing of bodily signals had significantly greater difficulty in recognizing their emotional states. In both groups, higher alexithymia was associated with higher anxiety severity, but the relationship proved statistically significant only in those with a AUD diagnosis. An analysis of the moderated mediation model found that alexithymia mediated the relationship between interoceptive accuracy and negative affect (anxiety). This effect was significantly greater in individuals with AUD.

In analyses reported in the second original paper, it was found that individuals with AUD reported significantly higher pain severity than healthy controls. The experimental group also showed significantly higher pain sensitivity compared to the control group. In individuals with AUD, lower interoceptive abilities measured behaviorally were associated with significantly greater pain sensitivity. In the control group of healthy adults, no statistically significant relationships were observed in these analyses, but a trend suggesting an inverse relationship (i.e., better interoceptive accuracy was associated with greater pain sensitivity) became apparent.

1. **Conclusions**
2. Individuals with a diagnosis of AUD have significantly worse interoceptive accuracy than healthy controls.
3. (A) Worse interoceptive accuracy is significantly associated with higher alexithymia and greater negative affect (anxiety) in individuals with AUD. (B) Alexithymia is a mediator of the relationship between interoceptive accuracy and negative affect (anxiety).
4. In individuals with AUD, worse interoceptive accuracy is significantly associated with greater sensitivity to pain, while the opposite relationship is observed in healthy controls.