SELINUS UNIVERSITY
OF SCIENCES AND LITERATURE

The Role of Emotional Awareness in the Processing of Emotional Information and Emotional Regulation

By Olga Sakharova

A DISSERTATION

Presented to the Department of
PSYCHOLOGY
program at Selinus University

Faculty of PSYCHOLOGY
in fulfillment of the requirements
for the degree of Doctor of Philosophy
in PSYCHOLOGY

2026

TABLE OF CONTENTS

INTRODUCTION 3

Chapter 1. THEORETICAL PART 10

1.1. General conceptions of emotions 10

1.2. Processing of emotional information 15

1.3. Emotional awareness and alexithymia 27

1.4. Emotional awareness and alexithymia in research on emotional information processing 36

1.5. Key conclusions of the theoretical analysis 42

Chapter 2. EMPIRICAL PART 49

2.1. Development of an integral index of emotional awareness 49

2.1.1. Statistical Analysis Strategy 50

2.2. Study 1. Emotional awareness in the emotional Stroop task 73

2.3. Study 2. Emotional awareness in the affect verbalization task 85

Conclusion 97

References 102

Appendices 123

Appendix A. 123

Appendix B. 125

INTRODUCTION

The processing of emotional information is a fundamental process that underpins adaptive behavior, effective decision-making, and the maintenance of mental health [87, 15, 43]. This process is not monolithic: even in early theories of emotion, a dual nature was implicitly assumed – namely, a bodily, physiological component and a component of cognitive appraisal [57, 154]. This idea was developed in subsequent research, culminating in the formulation of dual-process models in contemporary cognitive psychology. According to these models, cognitive processing in general encompasses automatic processes – fast, involuntary, and resource-free – as well as controlled processes – slow, deliberate, and resource-demanding [19, 19].

Applied to the emotional domain, this logic is elaborated in the distinction between the automatic capture of attention by emotionally significant stimuli and the controlled appraisal, formation of judgments, and regulation of emotions [150, 208, 139]. This processing duality is also confirmed by neurobiological research: automatic attentional capture is supported by subcortical pathways, including the amygdala, while controlled processing engages prefrontal systems [15, 139, 180].

The canonical experimental embodiment of the involuntary component is the emotional Stroop test – a paradigm in which a participant must name the ink color of an emotionally valenced word while ignoring its meaning. The resulting delay in responding to emotional stimuli compared to neutral ones – the emotional interference effect – reflects the operation of automatic attentional capture that cannot be voluntarily suppressed [217, 109, 175].

Beyond the processing of emotional information per se, another crucial component of adaptive functioning is emotional regulation – the set of processes through which individuals influence which emotions they experience, their intensity and duration, when they occur, and how they are experienced and expressed [43, 40]. Among the various emotional regulation strategies, a special place is occupied by affect labeling – a strategy of verbalizing the emotional content of a stimulus or one's own experience in response to the presentation of emotional images. Several studies have shown that such verbalization can reduce subjective distress and is accompanied by decreased amygdala activity [105, 162]. Unlike cognitive reappraisal or expressive suppression, affect labeling is regarded as a form of regulation in which the regulatory effect arises as a by-product of verbalization and does not require an explicit intention to regulate the emotion [105, 193].

A number of studies have demonstrated that the effectiveness and direction of affect labeling are not universal: in some cases it may not reduce, but instead intensify, subjective experience [96, 132]. The strength and direction of this effect depend on a range of factors [96, 132], as well as on individual characteristics of the subject [13, 23]. However, the factors and conditions that determine these effects remain insufficiently understood.

It should also be noted that, despite considerable interest in the phenomenon of affect labeling abroad, Russian-language experimental studies conducted in strict accordance with the foreign affect labeling paradigm are virtually absent in the literature in systematic form.

Several studies have shown that a key factor modulating both emotional information processing [70] and the effectiveness of emotional regulation [176, 177] is emotional awareness.

This construct may be defined as the capacity to recognize, identify, differentiate, and verbalize one's own emotional states, as well as to understand the relationship between emotions, bodily sensations, and cognitive processes [101]. According to the level-based model of R. Lane and G. Schwartz, emotional awareness develops over the course of a person's life, progressing from lower levels – awareness of bodily changes and diffuse arousal – toward higher ones associated with the differentiated description of complex emotional states and understanding of others' emotions [74].

Based on an analysis of the literature, two interrelated but relatively independent components of emotional awareness can be distinguished. The somatic-perceptual (interoceptive) component encompasses sensitivity to the bodily signals that underlie emotional arousal, and is addressed in research on interoceptive awareness [123, 63, 2]. The verbal-cognitive component encompasses the ability to identify, differentiate, and verbalize emotional states.

The question of how emotional awareness is related to the effectiveness of emotional processing and emotional regulation has not yet been fully resolved [50]. This is attributable both to the wide variability of experimental paradigms [50] and to the ambiguity of empirical findings.

A construct closely related to emotional awareness is alexithymia – a personality trait characterized by difficulty identifying and verbally describing one's own emotional experiences [206, 44]. From this perspective, alexithymia is characterized by a lower level of emotional awareness, which is confirmed empirically [176], representing awareness with a reversed sign [74].

The primary instrument for measuring alexithymia is the Toronto Alexithymia Scale TAS-20, a brief and widely used questionnaire [206, 44]. In research on emotional regulation and emotional information processing, the TAS-20 appears considerably more frequently than instruments measuring awareness (e.g., MAIA, LEAS) [112]. The TAS-20 is sufficiently simple to administer and score, which has made it the most popular instrument in studies related to emotional information processing [66, 163].

There is no consensus regarding the relationship between alexithymia and the characteristics of emotional information processing and the effectiveness of emotional regulation. For instance, some studies have shown that high alexithymia is associated with enhanced emotional interference [124], others with its attenuation [89], and still others found no significant relationship [156]. The same applies to affect labeling research: some studies demonstrate an association between alexithymia and difficulty in verbalization [13], while others find no such association [23].

Thus, the literature contains no established understanding of how emotional awareness – or its deficit – is related to emotional information processing and emotional regulation. One possible source of inconsistent findings is the choice of instruments for assessing awareness. A relatively limited number of measures have been used: TAS-20 [124, 89, 13], LEAS [176], and MSCEIT [22]. Common to all these instruments is that they primarily operationalize emotional awareness through its verbal-cognitive component — that is, the ability to identify, differentiate, and verbalize one's own emotional states, as well as to understand others' emotions — leaving the somatic-perceptual component largely unaddressed.

At the same time, the somatic-perceptual component of awareness — the ability to notice, differentiate, and trust one's own bodily signals (changes in heart rate, respiration, muscle tone) associated with emotional arousal — is used to a lesser extent in research (even at the level of individual scales).

Yet there are grounds for believing that ignoring the somatic-perceptual component leads to an incomplete measurement of the construct of emotional awareness.

First, A. Damasio’s somatic marker theory explicitly points to the fundamental role of bodily feedback: emotional stimuli automatically elicit bodily reactions that are represented in the brain as “somatic markers,” and without access to these signals, full emotional awareness and effective regulation become impossible [36, 37]. Second, L.F. Barrett’s influential theory of constructed emotion posits that interoceptive sensations are a fundamental “first-order ingredient” upon which discrete emotional experience is built using categorical knowledge about emotions [10]. Third, a compelling basis is provided by the level-based model of R. Lane and G. Schwartz itself, in which verbal differentiation of emotions is grounded in the somatic-perceptual component: without the ability to distinguish bodily sensations, it is impossible to progress to differentiated verbal description of emotions [101].

One of the most psychometrically well-founded instruments for assessing the somatic-perceptual component of awareness is the Multidimensional Assessment of Interoceptive Awareness (MAIA) questionnaire, which has already been adapted for Russian-speaking samples [123]. The combination of MAIA, which operationalizes the somatic-perceptual component of awareness, and TAS-20 as the most widely used instrument operationalizing the verbal-cognitive deficit, would allow for a more complete and balanced assessment of the construct of emotional awareness.

Object of study: emotional regulation and emotional information processing in the context of individual differences.

Subject of study: the role of emotional awareness (operationalized through its somatic-perceptual component) in the processes of emotional information processing and emotional regulation.

Aim of the study: to investigate the role of emotional awareness in emotional information processing and emotional regulation.

Research objectives:

1. To conduct a theoretical analysis of the construct of emotional awareness, its components, and existing data on the relationship between awareness and emotional information processing and emotional regulation.
2. To develop and psychometrically validate an integral index of emotional awareness based on the MAIA-R and TAS-20-R questionnaires.
3. To examine the relationship between emotional awareness and the magnitude of

emotional interference in the emotional Stroop task.

4. To examine the relationship between emotional awareness and the behavioral and subjective indicators of the effectiveness of affect labeling as an emotional regulation strategy.

5. To synthesize the findings and provide their theoretical interpretation, drawing primarily on dual-process models and the theory of constructed emotion as relevant theoretical frameworks.

Research hypotheses:

General hypothesis. It is hypothesized that emotional awareness contributes both to the automatic processing of emotional information (emotional Stroop test) and to the effectiveness of implicit emotional regulation (affect labeling).

Specific hypotheses:

1. The developed integral index of emotional awareness, based on the MAIA-R and TAS-20-R questionnaires, will possess sufficient psychometric reliability and criterion validity for use in experimental research.

2. The level of emotional awareness, assessed through the integral index, is reflected in the processes of emotional regulation – specifically in the behavioral and subjective indicators of the effectiveness of affect labeling.

3. The level of emotional awareness, assessed through the integral index, is reflected in the processes of emotional information processing in the emotional Stroop task.

Scientific novelty

A composite indicator of emotional awareness (EA_Index) has been developed and psychometrically validated, which operationalizes emotional awareness through its somatic-perceptual component. Using the EA_Index, a study was conducted examining the relationship between emotional awareness and the magnitude of emotional interference in the emotional Stroop task. A study of the affect labeling strategy and its relationship to emotional awareness was conducted on a Russian-speaking sample.

Theoretical significance

It has been demonstrated that emotional awareness is not a homogeneous construct: within its structure, somatic-perceptual and verbal-cognitive components can be distinguished. It has been empirically confirmed that the somatic-perceptual component is foundational, while the verbal-cognitive deficit (alexithymia) contributes redundant variance in the algebraic composition of indicators. The differentiated influence of emotional awareness on distinct stages of emotional processing has been demonstrated: it modulates automatic (uncontrolled) processes, but is weakly associated with cognitively controlled processes (subjective appraisal, voluntary categorization).

Practical significance

The developed EA_Index permits rapid diagnostic assessment of an individual's capacity for emotional self-awareness. It may be recommended for professional psychological screening in positions entailing high emotional demands (healthcare workers, emergency responders, psychologists), as well as for predicting the effectiveness of emotional regulation training programs.

Methodology and methods of study

The primary interpretive frameworks were the level-based model of emotional awareness by R. Lane and G. Schwartz (Lane, Schwartz, 1987), the somatic marker theory of A. Damasio (Damasio, 1996), the theory of constructed emotion by L.F. Barrett (Barrett, 2017), and dual-process models (Strack, Deutsch, 2004; Evans, 2008). The study comprised three phases employing: theoretical analysis of the literature; psychometric testing using the MAIA-R (Mehling et al., 2012) adapted by Popova and Lopukhova (2022) [144] and the TAS-20-R (Bagby, Parker, Taylor, 1994) adapted by Starostina and colleagues (2010) [186]; a laboratory experiment with reaction time recording; and subjective scaling methods. Statistical analysis was performed in R using exploratory and confirmatory factor analysis, linear mixed models, t-tests, ANOVA, non-parametric tests, post-hoc power analysis, and cross-validation.

Propositions submitted for defense:

1. In the structure of emotional awareness, two components can be distinguished: verbal-cognitive and somatic-perceptual. The somatic-perceptual component is the foundational element of emotional awareness.

2. The verbal-cognitive component, operationalized through its deficit (alexithymia), shows a substantive relationship with the somatic-perceptual component but is not necessary for the valid assessment of emotional awareness.

3. Emotional awareness, assessed through the somatic-perceptual component, exerts an influence on both the automatic processing of emotional information (emotional interference)

and the effectiveness of implicit emotional regulation (affect labeling).

4. Emotional awareness is not equally associated with all stages of emotional processing. It is more strongly associated with automatic, uncontrolled stages, whereas cognitively controlled processes (subjective appraisal, voluntary categorization) show a weaker association with it.

Reliability and dissemination of results

The reliability of the research findings is ensured by a methodological approach that incorporates the foundational tenets of leading scientific frameworks. The empirical base comprised 186 respondents for the psychometric phase, 86 participants for the Stroop study, and 91 participants for the affect labeling study. Three articles on the dissertation topic have been submitted to peer-reviewed scientific journals.

Structure and scope of the dissertation. The dissertation consists of an introduction, two chapters, a conclusion, a reference list, and appendices. Total length: 172 pages.

Chapter 1. THEORETICAL PART

1.1. General Conceptions of Emotions

Emotions constitute one of the fundamental psychological phenomena linking a person's subjective experience with their physiological state and behavior. In contemporary psychology, emotions are defined as multi-component processes encompassing neurophysiological, expressive, and subjective components [86].

For a long time, philosophical and early psychological thought was dominated by the view of emotions as a phenomenon standing apart from rational cognition and adaptive behavior. In the intellectualist tradition tracing back to Plato and Aristotle – but most fully expressed in the works of R. Descartes – affects were interpreted as "passions of the soul": vague, bodily disturbances capable of distorting the workings of pure reason. While Descartes did acknowledge that the passions could serve useful purposes by connecting the soul to the body, he nonetheless regarded them primarily as a potential impediment to rational cognition, which long established the subordinate position of emotions relative to intellect [42].

The rise of evolutionism changed the approach to the nature of emotions. In his work The Expression of the Emotions in Man and Animals, C. Darwin first applied the evolutionary principle to the analysis of mental phenomena. Observing the external manifestations of emotion (facial expressions, vocalizations, postures) across different animal species and in diverse cultures, he concluded that they are innate in character and laid the groundwork for understanding their universality. Darwin showed that emotions are not a by-product of mental activity but specialized adaptive mechanisms shaped by natural selection to address fundamental life tasks. Their expressive manifestations serve to transmit vital information to members of the same species, thereby increasing chances of survival and reproduction [40].

These ideas subsequently received scientific development in the works of many researchers. P. Ekman demonstrated the existence of basic emotions (joy, anger, fear, sadness, surprise, disgust) that are universally recognized by representatives of the most diverse cultures, including isolated ones. This finding permitted two fundamental conclusions. First, the innate, biological foundation of emotions – not reducible to cultural learning – was confirmed. Second, their universal signaling function was empirically established: the capacity to serve as an effective means of nonverbal communication, allowing the instantaneous and accurate transmission of information about an individual's internal state and appraisal of the environment [48].

In the research of C. Izard, the motivational function of affect was elaborated in detail within the framework of the differential theory of emotions. Izard identified ten fundamental emotions (interest, joy, surprise, grief, anger, disgust, contempt, fear, shame, guilt), each possessing its own specific motivational potential that directly drives the organism toward adaptive action. For instance, the emotion of fear activates self-preservation behavior, interest activates exploratory activity, and anger activates the overcoming of obstacles. Izard convincingly demonstrated that emotions do not merely signal a state but themselves function as a primary motivational system organizing perception, cognition, and behavior [86]. Similarly, in his information theory of emotions, P.V. Simonov treated an emotion as a mechanism driving the subject toward action to eliminate an information deficit or satisfy a need, which likewise underscores the motivational function of affect [182].

Subsequently, the conception of yet another important function – the appraisal function – received further development. The most prominent researcher of emotions from this perspective is R. Lazarus. According to his account, an emotion arises not from an event itself but from its subjective interpretation – the cognitive appraisal of how relevant that event is to a person's well-being. In primary appraisal, the person determines whether a situation threatens their goals. In secondary appraisal, they evaluate their resources and coping possibilities. Lazarus defined an emotion as an integrated response pattern (subjective, physiological, behavioral) arising on the basis of the cognitive appraisal of the significance of an event. It is precisely the character and outcome of these appraisal processes that determine which specific emotion (fear, anger, hope) the person experiences [112]. A.N. Leontiev held an analogous position: within the activity-theory framework, he defined emotions as internal signals reflecting the relationship between the motives of activity and the success of their realization, thereby likewise emphasizing their appraisal function [118, 119].

Thus, three principal functions are today ascribed to emotions: signaling (providing communication and the exchange of information about internal state), motivating (driving adaptive actions), and appraising (reflecting the relationship between the motives of activity and the success of their realization).

Beyond their functions, a crucial question in the psychology of emotions has concerned the relationship between bodily and cognitive components. This question began to be actively investigated with the development of physiology in the late nineteenth and early twentieth centuries, when scientists gained the ability to study emotions not only on the basis of self-reports but also to observe the physiological changes accompanying emotional affect.

In the work of C. Lange, the vascular reactions arising during various emotions were first systematically described [109]. On the basis of these and other observations, W. James and, independently, C. Lange formulated the theory that became known as the James–Lange theory. According to this theory, bodily changes are primary and emotional experience secondary. James argued that a person does not cry because they are sad; rather, they are sad because they cry. In other words, the emotional feeling arises as a consequence of the brain's perception of the physiological changes occurring in the body. Without this bodily feedback, in James's view, emotional experience would be "cold" and devoid of qualitative specificity [87, 109].

An alternative position was taken by W. Cannon and P. Bard. In a series of animal experiments and clinical observations of patients with spinal cord injuries, they showed that physiological arousal and emotional experience arise simultaneously, not sequentially. According to the Cannon–Bard theory, the thalamus independently receives sensory information from the stimulus and simultaneously sends signals to the cerebral cortex (where the subjective experience of emotion arises) and to the hypothalamus with the autonomic nervous system (where physiological changes arise). Thus, bodily reaction and psychological experience arise in parallel and independently [26, 9].

By the late 1950s it had become evident that neither the purely bodily James–Lange theory nor the Cannon–Bard parallel-processes model could explain why, in similar physiological states, people may experience entirely different emotions. This conceptual gap was bridged by recourse to cognitive processes – specifically, the cognitive appraisal of one's state.

The most influential experimental demonstration of the leading role of cognitive appraisal in the emergence of emotion was the classic experiment of S. Schachter and J. Singer. They injected participants with adrenaline producing nonspecific physiological arousal and placed them in different social situations – either euphoric (with a cheerful confederate) or angry (the confederate displayed irritation). Participants who did not know they had been injected with adrenaline interpreted their arousal according to context: in the euphoric situation they reported joy, in the angry situation they reported anger. Participants in the control group (placebo) showed no such shifts. Participants who received adrenaline and had been informed of its physiological effects (elevated heart rate, respiration) also showed no effect, since they attributed their arousal to the drug rather than to the situation. Schachter and Singer concluded that physiological arousal in itself does not determine the quality of emotion – it merely gives it intensity. What specific emotion the person experiences is decided by the cognitive interpretation (appraisal) of the situation in which the arousal occurred. This was the formulation of the two-factor theory of emotions, according to which emotion is the product of physiological arousal and its cognitive appraisal [171].

At the contemporary stage, these classical conceptions of emotions have received further development in a number of influential theories that integrate the bodily and cognitive components in new ways.

The notion of the two-factor structure of emotions – comprising bodily (physiological) arousal and subjective (cognitively appraised) experience – gained wide acceptance in contemporary science and was subsequently combined with conceptions of controlled and uncontrolled (automatic) processes in cognitive psychology [176, 166, 50]. As a result, emotions also came to be viewed as a phenomenon in which both automatic (uncontrolled) components can be distinguished (e.g., the rapid, involuntary onset of bodily arousal in response to a threatening stimulus) as well as controlled components (e.g., the conscious appraisal of a situation and voluntary regulation of the emotional response) [148].

One of the most authoritative contemporary theories – the somatic marker theory [36] – in many respects develops the ideas of W. James and C. Lange on the primacy of bodily reactions, but places them on a modern neurobiological level. According to this theory, emotional stimuli automatically elicit bodily reactions: changes in heart rate, respiration, muscle tone, smooth muscle activity, and the endocrine system. These bodily changes are represented in the brain as "somatic markers" – images of bodily states that are formed in the somatosensory areas of the cortex (including the insular lobe) and are associated with activity of the amygdala and ventromedial prefrontal cortex. The key claim of the theory is that bodily signals are a necessary condition for the emergence and awareness of emotions. Without access to somatic markers, full emotional awareness becomes impossible [36]. In later work, Damasio and colleagues emphasize that feelings represent the mental mapping of bodily changes, not isolated cognitive constructions [38].

Another influential contemporary theory is L.F. Barrett's theory of constructed emotion [10]. According to this theory, emotions are not innate and universal programs but are actively constructed by the brain from more fundamental components. A central role in this process is played by interoception – the perception and interpretation of signals from the internal organs. Barrett argues that interoceptive sensations are a "first-order ingredient" for the construction of discrete emotional experiences. The construction process involves two principal "ingredients": interoceptive sensations, which generate a core affect – a basic neurophysiological state characterized along the dimensions of valence (pleasant–unpleasant) and activation (calm–aroused) – and categorical knowledge of emotions – concepts acquired through socialization that allow the interpretation of core affect as a specific emotion (e.g., "fear," "anger," or "joy"). Without access to interoceptive signals, the categorization of emotions becomes impossible.

The importance of bodily (interoceptive) signals, emphasized in the work of classical psychologists, has become universally recognized in contemporary science and has received numerous confirmations. A.M. Vein, in researching the autonomic nervous system and psychosomatic disorders, showed that disturbances of autonomic regulation are often accompanied by a reduced capacity for emotional awareness and verbalization, connected precisely with a disruption of the link between bodily changes and their recognition [207]. Critchley and Garfinkel demonstrated that individual differences in interoceptive accuracy (the ability to perceive one's own bodily signals, such as heartbeats) are associated with the intensity of emotional experiences and the effectiveness of emotional regulation. People with higher interoceptive sensitivity demonstrate more differentiated awareness of their emotional states, confirming the link between the somatic-perceptual component and the overall level of emotional awareness [35, 35].

Thus, in psychology, emotions are viewed as a phenomenon linked to the organism's adaptation to its environment, performing three principal functions: signaling (transmitting information about internal state through universal expressive manifestations), motivating (driving adaptive actions), and appraising (reflecting the relationship between the motives of activity and the success of their realization).

In the structure of emotions, two interrelated components are distinguished – bodily (physiological) and cognitive (evaluative). The bodily component encompasses changes in the cardiovascular, respiratory, muscular, and endocrine systems; the cognitive component is associated with the subjective interpretation and appraisal of a situation.

In the processing of emotional information, two types of processes are distinguished – automatic (uncontrolled) and controlled (voluntary). Automatic components encompass the rapid, involuntary onset of bodily arousal; controlled components are linked to conscious appraisal of the situation and voluntary regulation of the emotional response.

Interoceptive (bodily) signals play a particularly important role in the functioning of emotions. The ability to perceive and interpret these signals is associated with the intensity of emotional experiences and the effectiveness of emotional regulation.

1.2. Processing of Emotional Information

Processing of emotional information is a multi-stage process that unfolds over time [71, 73, 174, 114]. Within the structure of this process, several sequential stages are conventionally distinguished: the perception of an emotionally significant stimulus, its cognitive appraisal, the activation of an emotional reaction, and its regulation

Perception of emotionally significant stimuli differs fundamentally from the perception of neutral objects in terms of speed, automaticity, and neurobiological mechanisms. While the perception of neutral stimuli requires sequential, resource-demanding processing and can be voluntarily directed or suppressed [26, 165], emotional stimuli – especially those associated with threat – have processing priority [150, 209]. They are perceived more rapidly, attract attention automatically [79, 29], and can be processed even without conscious awareness [193, 211].

The key phenomenon demonstrating this distinction is "attentional capture" – a process in which a stimulus involuntarily attracts the focus of attention, diverting it from the current task irrespective of the subject’s intentions. In a study by A. Öhman and S. Mineka [150], it was shown that threatening stimuli – images of snakes, spiders, angry faces – capture participants' attention more rapidly than neutral stimuli, even when they are irrelevant to the ongoing task and the participant is unaware of their content. This effect develops within the first 100–200 milliseconds after stimulus presentation, requires no cognitive resources, and cannot be voluntarily stopped – indicating the deeply automatic, "preattentive" nature of the process [150].

The neurobiological basis of this perception comprises evolutionarily consolidated subcortical structures. According to J. LeDoux's "two-pathway" model, there is a fast "low road" – direct signal transmission from the thalamus to the amygdala, bypassing the cortex – and a slow "high road" – signal transmission through the cortex, providing more detailed processing. The short-circuit via the low road is activated as early as 20–30 milliseconds after the stimulus [129], enabling the organism to react instantly to a potential threat by triggering physiological fear responses before the stimulus is consciously perceived

Cognitive appraisal serves to rapidly determine the significance of a stimulus for the organism's well-being and needs – that is, answering the questions "is this beneficial or harmful to me?", "how important is this?", "can I cope with it?" [197, 112]. The character of the emotional response is largely determined by the outcomes of cognitive appraisal. Empirical confirmation of this comes from experiments by K. Scherer and colleagues. Participants were shown emotional images while their physiological reactions were recorded (EEG, skin conductance response, facial EMG, pupil diameter). By manipulating stimulus parameters affecting appraisal outcomes (e.g., novelty and pleasantness), the researchers demonstrated that different appraisal outcomes (a stimulus appraised as novel or familiar, pleasant or unpleasant) elicit different patterns of physiological activation – and that these activations occur automatically, without participants' conscious control [174, 203].

Activation of the emotional reaction is the stage of emotional information processing at which, following the appraisal of the stimulus, physiological changes (changes in heart rate, respiration, muscle tone, hormonal release) and behavioral tendencies (e.g., flight upon fear, attack upon anger) are triggered [25, 59]. This stage is necessary to prepare the organism for adaptive action – avoidance of threat, approach toward the desired, or active overcoming of an obstacle [25, 181, 59].

This stage may also proceed involuntarily. In experiments by J. LeDoux, it was shown that there are two pathways for the transmission of emotional information in the brain: a fast (subcortical) pathway, allowing response to a threat before the stimulus is consciously perceived, and a slow (cortical) pathway, providing more detailed appraisal. Upon damage to cortical pathways (pathways from the cortex associated with controlled reactions), animals still continued to display emotional reactions (e.g., freezing at a sound associated with an electric shock), proving the involuntary, automatic nature of activation via the fast pathway [114].

A separate stage, which several authors treat as an independent act, is emotion regulation

Emotion regulation is the process by which a person consciously or automatically modulates an already-occurring (or still-forming) emotional reaction with the aim of changing its intensity, duration, quality, or outward expression in accordance with current goals, social norms, or personal preferences [71, 73]. Regulation permits the suppression of situationally inappropriate emotional expressions, the amplification of useful reactions, or the reinterpretation of events so as to reduce their negative impact [73].

Unlike the earlier stages of processing (perception, appraisal, activation), regulation engages predominantly controlled, voluntary mechanisms associated with prefrontal cortex functioning [148]. Yet regulation may also proceed automatically in certain cases – for example, as the result of habitual, well-learned behavioral strategies [139]. Traditionally, experimental psychology has employed a range of experimental paradigms for the empirical study of emotional information processing. Among the most widely used are the dot-probe task [132], affective priming [51], the presentation of affective images [108], and the emotional Stroop test [188].

The dot-probe task was first used in a study by C. MacLeod and colleagues. In it, participants with generalized anxiety disorder and healthy controls were shown a threatening word and a neutral word simultaneously; after both disappeared, a "probe" appeared in the location of one of them. The probe was a visual dot presented briefly (typically 25–100 ms) in the position of one of the two stimuli. The participant was required to press the key corresponding to the dot’s position as rapidly as possible. It is assumed that if the threatening stimulus has captured attention, response time to the probe appearing in its location will be shorter than to the probe appearing in the neutral location [132]. The original study found that anxious patients responded more rapidly to probes appearing in the location of the threatening word, indicating a bias toward threat [132]. A subsequent meta-analysis by Bar-Haim and colleagues, synthesizing data from 172 studies, confirmed that this effect is reliably reproduced in research on anxiety disorders [7]. Subsequently, the dot-probe paradigm was widely used to assess selective attention toward threatening stimuli in various anxiety disorders [7], as well as in research on specific phobias (e.g., of spiders or blood) [214], and to study the relationship between emotional intelligence and selective attention to different emotional stimuli [152, 192].

The most direct approach to studying emotional information processing is the experimental paradigm involving the presentation of emotionally valenced images. This method allows researchers to examine how visual stimuli of varying valence and intensity activate different components of the emotional response: physiological, behavioral, and subjective. In describing images and interpreting results, the concepts of "valence" (pleasant–unpleasant) and level of arousal (calm–tense) are frequently used – borrowed from dimensional models of emotion, which describe emotional states not as discrete categories but as a continuous multidimensional space. The first dimensional model was proposed by W. Wundt, who distinguished three dimensions: pleasure–displeasure, arousal–calm, and tension–relaxation [219]. In contemporary two-dimensional models, Wundt's second and third dimensions were combined into a single dimension of arousal

In such studies, researchers may independently select and validate stimuli for their specific tasks. Stimuli may include photographs of faces with different emotional expressions, images of complex social scenes [108], images of specific threat-related objects (e.g., snakes, spiders, weapons), or individually selected stimuli relevant to a specific sample [30]. More often, however, researchers use existing standardized systems, such as the International Affective Picture System (IAPS), developed by P. Lang, M. Bradley, and B. Cuthbert [108]. IAPS is the most widely used standardized stimulus set for studying emotions in laboratory conditions, enabling the reproduction of emotional reactions in a controlled environment. It contains color photographs spanning a wide range of semantic categories – from pleasant (landscapes, infants, attractive faces) to unpleasant (scenes of violence, injury, threatening animals) and neutral (household objects, geometric shapes). IAPS stimuli are normed on two principal dimensions of emotional space – valence and arousal – enabling researchers to select images with specified emotional characteristics [108]. However, IAPS has known limitations: the normative ratings of valence and arousal were obtained on Western samples in the 1990s and may not fully correspond to Russian cultural norms, as confirmed by studies showing differences in emotional stimulus ratings in Russian-speaking samples [204, 205].

In addition to IAPS, other standardized sets exist, such as the Nencki Affective Picture System (NAPS), created to expand the available visual stimuli with an emphasis on high image quality, and OASIS (Open Affective Standardized Image Set), which is openly accessible [99]. NAPS, comprising 1,356 high-resolution images divided into categories (people, faces, animals, objects, landscapes), is also validated on the dimensions of valence, arousal, and approach–avoidance

Studies using emotional images demonstrate that unpleasant stimuli reliably elicit increased skin conductance responses, changes in heart rate, and facial muscle activation [18, 107]. Image presentation is also associated with the activation of specific brain regions, such as the amygdala and ventromedial prefrontal cortex [16, 58]. This method is widely used in psychological and psychophysiological research for assessing emotional reactivity [98], as well as in studies of emotional regulation [73].

Another paradigm used in research on the automatic processing of emotional information is affective priming. In the work of R. Fazio and colleagues [51], participants were shown two stimuli in succession. The first stimulus (prime) was a word with positive or negative valence (e.g., "flower" or "cockroach"). The second stimulus (target) was an adjective also carrying positive or negative valence. Prime and target could be congruent in valence (both positive or both negative) or incongruent (e.g., a positive prime with a negative target). The participant was required to determine the valence of the target stimulus (positive or negative) as rapidly and accurately as possible. It was found that response to the target is facilitated when prime and target valence match, and slowed when they do not. This effect was explained as a consequence of automatic activation of emotional meaning: the presentation of an emotionally valenced prime automatically activates corresponding emotional information in memory – without conscious awareness – thereby facilitating processing of a subsequent stimulus of the same valence [51]. Subsequently, the affective priming paradigm was widely used to study the automatic activation of attitudes and emotional evaluations, including in research on social stereotypes [52, 219], and to assess the effectiveness of different types of emotion regulation. Additionally, on the basis of this paradigm, the Affect Misattribution Procedure (AMP) was developed, enabling the measurement of implicit attitudes [154].

One of the most widely used experimental paradigms for studying automatic stages of emotional processing is the emotional Stroop test. In J.R. Stroop’s original experiment, participants were shown color-name words printed in ink of either the same color (congruent condition) or a different color (incongruent condition). Color-naming times were found to be significantly longer in the incongruent condition than in the congruent condition [188]. A meta-analytic review by C. MacLeod, covering more than 400 studies, demonstrated that the Stroop effect is highly reliable and is observed across a wide range of conditions, confirming the automatic nature of semantic processing of word content [133].

The emotional version of the Stroop test replaces color words with emotionally valenced words (negative, positive) and neutral words. In the work of J.M.G. Williams and colleagues, it was demonstrated that anxious patients show significantly longer response times to negative words compared to neutral ones, which was interpreted as the automatic capture of attention by threatening information [216].

In analyzing data from studies using the emotional Stroop test, two primary measured components are typically distinguished: response time (response latency), reflecting the emotional interference effect itself, and errors, indicating loss of control. Like the classical effect, the emotional Stroop effect is reliably replicated, especially for negative stimuli [158].

Numerous studies show that the magnitude of emotional interference is influenced by a wide range of factors. For example, in a meta-analysis by R. Phaf and K. Kan, synthesizing data from 63 studies, the intensity of the emotional stimulus (valence and arousal) was shown to be a key factor: negative stimuli with a high degree of threat elicit greater interference than positive or neutral ones [158].

A study by C. Burt demonstrated that interference magnitude depends on linguistic factors such as word frequency (frequency of occurrence in texts) and word length [23]. This finding is entirely expected, as linguistic characteristics such as frequency, length, and age of acquisition always manifest in studies using verbal stimuli [88].

Individual characteristics of participants exert a significant influence on the magnitude of emotional interference. The meta-analysis by Bar-Haim and colleagues, covering 172 studies, established that individuals with anxiety disorders demonstrate an enhanced emotional interference effect compared to healthy participants [7]. A study by Robinson and colleagues found that interference magnitude correlates positively with neuroticism in a nonclinical sample [168]. Notably, age also influences the magnitude of the Stroop effect. For example, a larger effect size is found in younger schoolchildren compared to adults and adolescents, which is linked to the incomplete development of cognitive control systems [76].

The study of strategies and mechanisms of emotion regulation is a separate area within the psychology of emotions. Gross's model distinguishes two classes of strategies: antecedent-focused strategies and response-focused strategies [71, 74]. Antecedent-focused strategies are applied before an emotional reaction has fully formed, and are directed at changing the situation, attention, or cognitive appraisal of the stimulus. Within this class, several strategies are distinguished

Situation modification involves changing external circumstances to influence their emotional impact. An example is problem-focused coping – a strategy aimed at eliminating the source of stress through logical analysis and active situational change [111, 12]. When a presentation fails, problem-focused coping means not dwelling on the stress but analyzing one's shortcomings and taking active steps to address them [113]. A meta-analysis by A. Aldao and S. Nolen-Hoeksema, synthesizing data from 111 samples, established that problem-focused coping is associated with lower levels of psychopathology compared to passive avoidance [2].

Attentional deployment is another strategy involving distraction from an emotionally significant stimulus. For example, a person waiting in a dentist's office might study a picture on the wall in detail so as not to think about the upcoming discomfort

Cognitive reappraisal involves changing the interpretation of a situation in order to alter its emotional meaning. A person stuck in traffic, for instance, might reframe the situation positively – "I have an extra 15 minutes to catch up on my phone" – rather than getting angry or panicked. In a study by J.J. Gross, participants were shown films eliciting disgust or sadness. One group was asked to reinterpret what was happening (e.g., a vomiting scene as an actor's performance), another group was asked to suppress outward expressions of emotion, and a third simply watched. Subjective reports, skin conductance responses, and heart rate were assessed. Cognitive reappraisal was shown to reduce both subjective experience and physiological activation [69]. Response-focused strategies are applied after the emotional reaction has occurred and are directed at modulating its behavioral, physiological, or subjective manifestations. The best-known strategies of this type are expressive exaggeration and deep breathing

Expressive exaggeration is a regulation strategy aimed not at reducing but at amplifying the experience. A study by Lee and colleagues showed that deliberate imitation of anger expressions (amplification of expressivity) produces a reliable increase in sympathetic nervous system activity and intensification of the mimetic pattern corresponding to the emotion [115]. This strategy may be beneficial in situations requiring enhanced emotional expression (e.g., in acting or psychotherapeutic interventions). Deep breathing* is a physiological modulation strategy widely used in clinical practice and shown to be effective in reducing physiological arousal and subjective distress. Several studies have demonstrated that one minute of slow deep breathing with visual accompaniment (imagining inhaling the scent of a flower and blowing out a candle) significantly reduced heart rate and increased respiratory sinus arrhythmia (RSA) in seven-year-old children, indicating a reduction in physiological arousal [147].

At the neurobiological level, emotion regulation depends on the activity of the prefrontal cortex (PFC), which exercises top-down control over the amygdala – the structure responsible for the rapid, automatic appraisal of the emotional significance of stimuli [148]. In one study, participants were asked to reappraise negative images (cognitive reappraisal) or simply view them. Reappraisal was found to be accompanied by enhanced activity in the dorsolateral and ventrolateral PFC, along with concurrent decreased amygdala activity [148]. It is important to note that different regulation strategies differ in the neurophysiological parameters of the brain regions they engage. For example, in one fMRI study, participants were asked either to reappraise negative images or to suppress outward emotional expression. Expressive suppression was found to activate the ventrolateral PFC but did not reduce amygdala activity, in contrast to reappraisal [159]. A meta-analysis summarizing 41 neuroimaging studies confirmed that cognitive reappraisal consistently activates lateral and medial regions of the PFC and reduces amygdala activity, while suppression activates the ventrolateral PFC but does not affect the amygdala [149].

The effectiveness of emotion regulation depends on numerous factors, including individual characteristics. In one study, participants were shown images of varying valence (from mildly to strongly unpleasant). Reappraisal was shown to effectively reduce negative emotions at low and moderate intensities, but not at high intensity [65]. Another study found that the success of cognitive reappraisal was significantly higher in individuals with high susceptibility to emotional contagion – the ability to "catch" others' emotions and become deeply immersed in the emotional context. This indicates that even the effectiveness of adaptive regulation strategies depends on stable individual characteristics, including the capacity for empathic engagement [97]. Furthermore, a study by Lopez-Perez and colleagues showed that persons with difficulties in emotion identification and higher levels of distress prefer attentional deployment (rather than reappraisal) [127].

A particularly interesting and understudied strategy is the verbalization of emotional states, known as "affect labeling." This term refers to the process in which the subject identifies and names the emotional content of a perceived stimulus (e.g., an image).

The principal distinguishing feature of affect labeling relative to other regulation strategies is that it does not require conscious alteration of the meaning of a situation (as in cognitive reappraisal) or suppression of outward manifestations (as in expressive suppression). Instead, affect labeling is treated as a form of implicit regulation: it is capable of reducing emotional arousal without an explicit intention to regulate the emotion [199].

In this strategy, the participant does not attempt to change the situation or their attitude toward it (as in cognitive reappraisal). Instead, they simply name the emotion evoked by the stimulus (e.g., "fear," "sadness," "disgust"). In an fMRI study by M. Lieberman and colleagues, participants were shown negative images. In the affect labeling condition, they chose from two offered words the one that best described the emotional content of the image; in control conditions, they named the color of the image or passively observed it. The study found that this strategy reduces amygdala activity and activates the right ventrolateral prefrontal cortex (RVLPFC), with RVLPFC activity negatively correlated with amygdala activity. A reduction in subjective distress associated with viewing the images was also reported by participants [126].

The literature proposes several mechanisms explaining why the simple naming of emotions leads to reduced emotional arousal and amygdala activity. These mechanisms are not mutually exclusive and likely operate in concert, although they differ in their specificity to affect labeling

The first mechanism involves the redistribution of attention. According to the distraction hypothesis, performing a verbal task – naming an emotion – diverts cognitive resources away from processing the affective properties of the stimulus, thereby reducing the depth of processing of its emotional content. This mechanism is similar to effects observed with any distracting task, and is considered non-specific to affect labeling [126, 199].

The second and more specific mechanism is the reduction of uncertainty through the categorization of the emotion. An emotional stimulus – especially a negative one – creates a state of uncertainty that can itself intensify affective arousal. Assigning a verbal label to an emotion (e.g., "fear," "anger," "sadness") enables the categorization of the experience, reducing its uncertainty and, consequently, its intensity. The uncertainty-reduction hypothesis is supported by several studies. For instance, R. Katz tested the hypothesis empirically: participants received electric shocks that were predictable in some conditions (an auditory signal 8 seconds before the shock) and unpredictable in others. Predictability was found to reduce the physiological response (skin conductance response) to the shock [91]. It is important to note that the effectiveness and direction of affect labeling depend on a number of factors. In a study by E. Levy-Gigi and S. Shamay-Tsoory, the intensity of negative stimuli (low vs. high threat) was varied. Participants performed an affect labeling task (naming emotions) or a control task (naming the color). At high stimulus intensity, affect labeling reduced subjective distress, whereas at low intensity it increased it [122]. In a study by K. Ortner, two emotion regulation strategies in response to negative images were compared: cognitive reappraisal (e.g., when viewing a scene of violence, thinking of it as a film shot) and the naming of internal affective feelings. In the reappraisal condition, participants were asked to reinterpret the situation so that it evoked less negative emotion; in the feeling-naming condition, they were asked to verbalize their current internal experiences evoked by the image. The control condition was passive viewing

A crucial difference between this procedure and the classic affect labeling paradigm lies in the focus of verbalization: in the classic paradigm, the participant categorizes the emotional content of the image itself ("this image is best described as fear"), whereas in Ortner’s study, they verbalize their own experience evoked by the stimulus ("I feel fear").

The results showed that cognitive reappraisal, as expected, significantly reduced negative emotional ratings compared to passive viewing. However, the feeling-naming strategy produced the opposite effect: participants rated negative stimuli as even more unpleasant than did the control group. In other words, rather than reducing distress, verbalizing internal affective states intensified the negative experience [151].

There is also evidence that the effect of affect labeling is modulated by individual differences. For example, a study by C. Hu and colleagues found that in patients with major depressive disorder, the affect labeling strategy produced a smaller reduction in amygdala activity than in healthy participants. The authors attribute this to impaired top-down prefrontal control in depression [82].

At the same time, there are grounds to suggest that affect labeling may depend on cultural-linguistic context [33]. In a study by A. Fuji and A. Nakagawa on a Japanese sample, participants were also shown images and asked to name the emotion evoked. Verbalization of emotions was found to increase subjective emotional ratings (both valence and arousal) for both positive and neutral images compared to passive viewing [61].

In light of the above, it is necessary to consider separately the research on affect verbalization in Russian-language psychological science

As noted above, affect labeling in contemporary experimental psychology refers to a specific experimental paradigm in which the effectiveness of this emotion regulation strategy is studied: a participant is shown an emotional stimulus and then either verbally evaluates its emotional valence by choosing from offered options [126], or verbalizes the emotion arising upon perception of the stimulus [151], after which the effectiveness of the emotional state change is measured using neurophysiological methods or subjective reports

A number of Russian-language studies were found that have certain similarities in organization and aims to the described paradigm, but none represents a complete analogue. Common to all these studies is that verbalization of emotions was not used as a tool for regulating emotional state in response to a standardized stimulus, and the effectiveness of emotional state change was not measured

For example, in a study by E.S. Ivanova, the goal was to investigate the relationship between verbalization of emotions and recognition of facial expression. Participants were required to name emotions in response to photographs of faces with different expressions. However, the study was not aimed at investigating emotion regulation, and the only similarity to the affect labeling paradigm was the act of verbalization itself [85]. In a study by E.V. Golovina, verbalization was used to describe sensations when rating musical fragments. Participants evaluated their own sensory impressions (loudness, timbre, duration), not emotional states, and verbalization was treated as a means of improving perceptual analysis rather than as affective regulation [66].

Similar manipulations involving the verbalization of one's own emotional state can be found in studies by D.A. Leontiev, where participants described life events and their attitudes toward them, integrating experiences into a life narrative. The researchers hypothesized that finding a coherent explanation increases psychological well-being (reduced anxiety, increased life satisfaction) [120]. In these studies, however, verbalization was directed at making sense of past experience and forming narrative identity, not at changing emotional state in response to a presented stimulus [120, 121].

Similar tasks involving the regulation of emotions were also set in clinical-psychotherapeutic studies of the verbalization of experiences. In research by E.T. Sokolova and in joint studies with V.V. Nikolaeva, the influence of verbalizing emotional states on their awareness and integration into the self-structure in the course of psychotherapeutic sessions was examined. However, no emotional stimuli (images, words) were presented and there was no task of naming an emotion for the purpose of regulating one's own state. Verbalization occurred during a therapeutic conversation, not in response to a standardized stimulus [183, 184].

In the work of N. Peseschkian, the verbalization of conflicts and experiences in positive psychotherapy was considered. In this case, verbalization served as an instrument for identifying and working through psychosomatic symptoms during therapeutic sessions, not in response to the presentation of an emotional stimulus [155].

In the work of N.L. Vasilieva, the verbalization of experiences in child psychotherapy was described as facilitating the symbolization of affect and the reduction of psychosomatic symptoms. Here, too, emotions were not induced by the presentation of stimuli but arose spontaneously in the course of therapeutic interaction. Verbalization was a therapeutic technique in free dialogue, not the regulation of an emotion in response to an emotionally evocative stimulus [206]. Thus, the analysis allows the conclusion that studies of the affect labeling effect in strict accordance with the affect labeling paradigm on a Russian-speaking sample are not represented in the available literature

In summary, emotional information processing is a multi-stage process in which stages may be either controlled and conscious or uncontrolled and unconscious. The emotional Stroop test and the observed emotional interference effect are among the clearest examples of uncontrolled stages of emotional processing, with the magnitude of the effect potentially depending on individual characteristics. Emotion regulation is a distinct, well-studied stage that, unlike earlier stages (perception, appraisal, activation), engages predominantly controlled, voluntary mechanisms. Affect labeling is one of the studied strategies, with its effect depending both on individual characteristics and on cross-cultural context. In Russian-language psychology, studies corresponding to the affect labeling paradigm are virtually absent.

1.3. Emotional Awareness and Alexithymia

Emotional awareness is defined as a person's capacity to recognize, identify, and verbalize their own emotional states. It is a specialized psychological construct describing the level of development of one's reflexive engagement with one's own feelings and experiences [101].

The term "emotional awareness" was introduced by R. Lane and G. Schwartz within the framework of the model they developed – created to describe the development of the capacity for emotional awareness from early childhood to adulthood: from diffuse bodily sensations to the differentiated verbalization of complex emotional states [101].

According to this model, emotional awareness develops throughout life, passing through five hierarchically organized levels, each of which integrates and supersedes the previous one, providing more differentiated and integrated representation of emotional experience.

Level 1 – bodily sensations. At this level, emotional experience is represented primarily as diffuse bodily sensations – "I feel good" or "I feel bad" – without differentiation of the quality of the emotion. The person is aware of changes in their body but does not link them to specific emotional states.

Level 2 – action tendencies. Emotional experience is connected with an impulse to act: upon fear, a desire to run away arises; upon anger, a desire to strike. However, differentiated awareness of the quality of the emotion as such is still absent at this level.

Level 3 – individual emotions. The person begins to distinguish basic emotions (fear, anger, sadness, joy) as separate, qualitatively distinct experiences, and develops the ability to verbally label these emotions.

Level 4 – blended emotions. The capacity to recognize and differentiate complex, mixed emotional states emerges – for example, "I feel sadness and anger at the same time."

Level 5 – integration of complex emotional states. The highest level. The person can not only differentiate mixed emotions but also understand their causes, dynamics, and interrelationships, and recognize the emotional states of others with a high degree of accuracy and differentiation [101].

The level that is preferred or most accessible for an individual is determined by individual differences. People with a high level of emotional awareness are able to use higher levels when needed. People with a low level, conversely, become "stuck" at the lower levels and cannot rise above them, even when the situation demands it [101].

It would be incorrect, however, to treat the levels of emotional awareness simply as developmental stages. According to Lane and Schwartz, the levels represent a hierarchically organized system of representation of emotional experience [101]. Depending on the situation, a person uses different levels of awareness. Under conditions of intense stress or strong affect, even an emotionally mature person may "regress" to the level of bodily sensations ("I'm trembling," "my heart is pounding") or to the level of action tendencies ("I want to run away"). In a calm, reflective situation, the same person may function at the fifth, highest level, integrating complex mixed emotions.

The aspiration to operationalize the construct of emotional awareness and create an instrument for determining its level has led to the development of a number of psychometric tools.

One such instrument is the Levels of Emotional Awareness Scale (LEAS), developed by R. Lane and colleagues in 1990 [102]. In developing LEAS, the authors drew on their own level-based model [101]. Unlike traditional questionnaires, LEAS does not use formalized scales. Instead, participants are shown 20 hypothetical scenarios describing various emotionally significant events, and their verbal responses are coded by a trained expert on five levels of awareness. Coding assesses how differentiated and integrated the person's description of their emotional experiences is: whether they can distinguish different emotions in a single situation (e.g., "I feel sadness and anger at the same time"), understand their causes, link them to personal and situational factors, and recognize and describe the emotions of others in those situations [102]. LEAS is thus primarily aimed at assessing the quality of verbal description of emotional experience.

To date, LEAS remains the "gold standard" – the most valid and theoretically grounded instrument for measuring emotional awareness, as it reflects the level-based model and does not rely on self-report, which may be distorted by the respondent's inability to introspect [106]. However, LEAS has significant limitations in terms of ease of use: the procedure requires a written response from the participant and subsequent expert coding, making the technique labor-intensive and time-consuming [102]. These features render LEAS impractical in large-scale experimental research with substantial samples. An additional drawback is that LEAS has not been adapted for Russian-speaking samples.

Another instrument is the Body Perception Questionnaire (BPQ), developed by S. Porges in 1993. Porges developed BPQ in the context of his polyvagal theory, which emphasizes the role of the autonomic nervous system in regulating emotional behavior and social interaction [164]. The author defined body perception as a person's ability to recognize and monitor signals from various body systems, primarily those associated with autonomic regulation. Unlike later instruments, BPQ was oriented not so much toward emotional awareness in the narrow sense as toward general sensitivity to bodily processes, which – in the author's conception – underlies the capacity for self-regulation and social interaction. BPQ includes three main scales: Awareness of Bodily Processes, Supradiaphragmatic Reactivity, and Subdiaphragmatic Reactivity – assessing the extent to which a person tends to notice and monitor various bodily processes, from heartbeat and respiration to gastrointestinal activity. The instrument does not directly assess the connection between bodily sensations and emotional states. Despite this, it is actively used as an instrument for assessing emotional awareness [24]. A validated Russian-language version of BPQ does not exist.

Another questionnaire used for the same purpose is MAIA (Multidimensional Assessment of Interoceptive Awareness), developed by V. Mehling and colleagues in 2012 [143]. Version MAIA-2 was published in 2018 [144]. In developing this psychometric instrument, the authors did not aim to create a tool for assessing emotional awareness per se; their goal was to create a measure of interoceptive awareness – defined as the ability not only to perceive bodily sensations but also to regulate attention toward them, trust them, and use them for self-regulation. Importantly, the authors of MAIA explicitly included an emotional component in their construct: one of the questionnaire's scales – Emotional Awareness – was specifically designed to assess the ability to recognize the link between bodily sensations and emotional states [143]. MAIA includes 8 scales covering various aspects of interoceptive awareness: the ability to Notice bodily sensations, to engage in Attention Regulation toward them, Emotional Awareness (recognizing the connection between bodily sensations and emotional states), Self-Regulation (using bodily signals for self-regulation), Trusting them, as well as Not-Distract, Not-Worry, and Body Listening scales [143, 144]. The scales are directed not at assessing verbal description of emotions, but at assessing the practical use of bodily information in self-regulation processes.

Validation studies showed that not all MAIA scales have equal reliability: the Not-Distract and Not-Worry scales have low internal consistency [143], though these psychometric properties were improved in MAIA-2 [144]. MAIA is convenient to use: the questionnaire requires no interviewer, takes 10–15 minutes to complete, and results are straightforward to score. MAIA has been translated into many languages and is widely used in clinical psychology and psychosomatics [93, 44]. An adapted version for Russian-speaking samples – MAIA-R – exists [162].

A number of studies directly link MAIA with the construct of emotional awareness. In an overview by S. Durán and colleagues, it is noted that MAIA "allows assessment of aspects of body perception and emotional awareness – key areas influenced by interoceptive mechanisms" [194, p. 5]. The authors emphasize that the MAIA Emotional Awareness scale was specifically developed to assess the ability to recognize the connection between bodily sensations and emotional states – a central component of emotional awareness [143, 44]. An important empirical confirmation of MAIA's validity as a measure of emotional awareness comes from studies comparing it with LEAS. In a study by K. Vig and colleagues comparing various interoceptive awareness questionnaires, MAIA and LEAS were found to exhibit weak to moderate positive correlations, indicating that they measure different facets of a single multidimensional construct [208].

Similar in basic ideology to MAIA is the Interoceptive Awareness Scale (IAS). The best-known version was developed in 2012 in sport psychology [12]; several versions were developed in the 2010s [146, 63]. The developers were motivated by the need for an economical instrument for rapid assessment of a person's ability to monitor bodily signals. In the sport-psychology version, IAS authors defined interoceptive awareness as an athlete's capacity to perceive and interpret their body's signals, which is necessary for fine motor control [12]. In several versions, the emphasis was placed on the relationship between interoception and emotion regulation and psychological well-being [146]. Common to all versions is the understanding of interoceptive awareness as a predominantly perceptual ability, not requiring elaborate verbal differentiation.

IAS is a brief questionnaire containing 5–10 items directed at assessing the general ability to notice bodily signals (e.g., heartbeat, respiration, muscle tension) in everyday life. Unlike MAIA, IAS does not include scales assessing trust in bodily signals, attention regulation, or awareness of the body–emotion connection. Most versions employ a single summary score [12, 146].

Despite being developed primarily as a tool for assessing general interoceptive sensitivity, IAS is also used in research on emotional awareness. In a study by Murphy and colleagues validating a brief version of IAS, the measured construct was directly linked to emotion regulation and psychological well-being, with accurate perception of bodily signals treated as fundamental to awareness of one's own emotional states [146]. In clinical research, IAS is used to assess deficits in emotional awareness in patients with anxiety and affective disorders [12]. A study by Vig and colleagues showed that IAS displays moderate positive correlations with MAIA, especially with the Noticing and Attention Regulation scales [208]. A study by Schulz and Vögele found that IAS is positively correlated with LEAS ($r = 0.31$, $p < 0.01$), indicating some proximity between the tests [178]. IAS is very convenient to use (2–5 minutes), but has not gained wide currency in emotional awareness research due to its brevity preventing differentiated assessment of various interoception aspects [93]. No validated Russian-language version exists.

Among "objective methods" for assessing emotional awareness, the heartbeat detection task, proposed by R. Schandry in 1981, deserves attention [173]. Schandry developed this method for the objective measurement of "interoceptive accuracy" – the ability to accurately perceive one's own heartbeats without external aids. The author's key assumption was that emotional experience is inseparably linked to the perception of bodily processes. In the original study, the group with more accurate perception of heartbeats showed statistically significantly higher state anxiety and emotional lability [173]. The measurement procedure involves the participant mentally counting their heartbeats within specified intervals without palpating the pulse; accuracy is compared with objective ECG data. The method assesses the sensory accuracy of perceiving one type of bodily signal (heartbeat) and does not directly assess the ability to verbalize emotions. However, as contemporary researchers note, this sensory accuracy creates the foundation for physiological arousal to be recognized as an emotional experience [17].

While this method provides a more objective assessment of interoceptive sensitivity compared to questionnaires, it is extremely impractical: it requires ECG equipment, strict standardization of conditions, and is labor-intensive for large samples [93]. A study by Bodart and colleagues emphasizes that cardiac interoceptive accuracy plays an important mediating role between the physiological emotional response and its subjective awareness [15]. In the study by Vig and colleagues, correlations between the Schandry task and interoceptive sensitivity questionnaires (including MAIA and IAS) ranged from $r = 0.10$ to $r = 0.25$, confirming that these methods measure related but not identical constructs [208].

For measuring emotional awareness, emotional intelligence tests are sometimes used, since emotional intelligence is a broader construct that includes emotional awareness as a basic component [31]. In several studies, particular subscales of the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) are used, specifically the Perceiving and Understanding Emotions branches [56]. MSCEIT was developed in the early 2000s and is the most comprehensive and theoretically grounded measure of ability-based emotional intelligence [141]. It is based on the four-branch model by D. Mayer and P. Salovey and includes 8 subscales grouped into 4 branches: Perceiving Emotions; Using Emotions to Facilitate Thought; Understanding Emotions; Managing Emotions. The Perceiving and Understanding Emotions branches are most relevant to emotional awareness research. The test contains 141 items, requires a specialized scoring procedure, and takes 30–45 minutes [141].

The Perceiving Emotions branch is operationalized through tasks in which the participant identifies emotions from photographs of faces (assessing to what degree a face expresses joy, anger, sadness, etc.) and from abstract images and landscapes [140]. The Understanding

Emotions branch is operationalized through tasks requiring comprehension of how one emotion may transition into another (e.g., how anger escalates with increasing provocation) and identification of complex emotions arising from combinations of basic ones (e.g., which emotions blend to form contempt).

Studies show significant positive correlations between LEAS and MSCEIT subscales: the Perceiving Emotions, Understanding Emotions, and Managing Emotions branches correlate with LEAS in the range r = 0.20–0.35 [8]. In a review chapter on the measurement of ability-based emotional intelligence, the authors directly state that the first branch (Perceiving Emotions) is associated with greater emotional awareness and lower levels of alexithymia, referencing LEAS as a measure of emotional awareness and showing that MSCEIT and LEAS measure related constructs [17].

Alexithymia is a personality trait characterized by difficulty identifying and verbally describing one's own emotional experiences, as well as externally oriented thinking [180]. Alexithymia was first described in clinical practice by P.E. Sifneos in observations of patients with psychosomatic disorders [180]: he noted that these patients showed characteristic difficulties in verbally expressing emotions, limited imagination, and concrete, externally oriented thinking. To designate this symptom complex, Sifneos proposed the term "alexithymia" – from Greek words meaning "absence of words for feelings" [180].

Despite its clinical origins, alexithymia is now understood not as a clinical sign but as a continuous trait distributed in the population [6], making it measurable in healthy individuals without clinical diagnoses.

The most popular and widely used instrument is the Toronto Alexithymia Scale TAS-20, developed by G. Taylor, R. Bagby, and J. Parker [4], with three factors: Difficulty Identifying Feelings (DIF), Difficulty Describing Feelings (DDF), and Externally Oriented Thinking (EOT). TAS-20 has high practical convenience: 20 items, 5–10 minutes to complete, straightforward scoring. Total scores range from 20 to 80; values ≥ 61 indicate a high level of alexithymia. An adapted Russian-language version – TAS-20-R – exists [186]. The earlier TAS-26 version is also found in Russian-language research [221].

In addition to questionnaire methods, more complex procedures exist, including the Toronto Structured Interview for Alexithymia (TSIA), developed by R. Bagby and colleagues

[5], which requires trained interviewer administration and is more time-consuming. The Modified Beth Israel Hospital Psychosomatic Questionnaire (M-BIQ), developed by G. Taylor and colleagues [194], is a similar structured interview. Russian-language adaptations of TSIA and M-BIQ do not exist.

The Rorschach Alexithymia Scale (RAS), developed by P. Porcelli and J. Mihura [163], assesses alexithymic traits through projective Rorschach responses and requires a skilled projective psychologist; no Russian adaptation exists.

In research, alexithymia and emotional awareness demonstrate a certain relationship. A meta-analysis synthesizing results from 21 studies (total sample $n = 2{,}857$) found a correlation between TAS-20 and LEAS of $r = -0.122$, indicating a significant, though weak, negative relationship [135]. A study by Subic-Wrana and colleagues also established a significant negative correlation between alexithymia and emotional awareness in patients in a psychosomatic unit [189]. A study by Lane and colleagues showed that alexithymia is associated with deficits in emotion recognition, consistent with low levels of emotional awareness [104].

An important contribution to understanding which components of alexithymia are linked to emotional awareness comes from studies comparing TAS-20 with LEAS. In the cited study by Subic-Wrana and colleagues, the EOT factor of TAS-20 was found to correlate negatively with LEAS, leading the authors to treat this subscale as an indicator of a cognitive emotion-processing deficit, while DIF and DDF factors more strongly reflect negative affect [189]. A study by E. Waller and K. Scheidt on multimethod assessment in patients with somatoform disorders confirmed that the cognitive facet of TAS-20 (EOT) is related to LEAS, while the affective facets (DIF and DDF) are related to negative affectivity [212]. Lichev and colleagues (2014) confirmed the three-factor structure of alexithymia and showed that TAS-20 measures "an aspect of emotional awareness," justifying its use in research on emotional awareness deficits [124].

Thus, the literature shows that alexithymia can be described as a deficit of emotional awareness – "emotional awareness with a negative sign."

In this connection, some studies treat alexithymia itself as a measure of emotional awareness. For example, a study by S. Kang and colleagues examined the relationship between emotional awareness deficits and somatic symptoms in two populations: a community sample of individuals with high somatic burden and a clinical sample of patients with somatic symptom disorder. To assess the deficit in emotional awareness, the authors used the Toronto Alexithymia Scale (TAS-20). The article explicitly states that TAS-20 “was developed to measure alexithymia, which represents the difficulty of being aware of one’s own emotions” [90].

Based on the analysis of the construct and associated psychometric instruments, several conclusions can be drawn:

The primary instrument for assessing emotional awareness is LEAS. However, many alternative instruments are complex to administer or lack validated Russian-language adaptations. From this standpoint, the most accessible instrument is MAIA, as it demonstrates reliable correlations with LEAS, is straightforward to score, and has been adapted for Russian-speaking samples.

Alexithymia is linked to the level of emotional awareness, reflecting a deficit in the identification and verbal description of emotional experiences. The most widely used instrument is TAS-20, also adapted for Russian-speaking samples.

First, the development of emotional awareness itself, according to the Lane and Schwartz model [101], proceeds through two generalized stages: the first may be termed the somatic-perceptual stage (levels 1–2), in which emotions are grounded in diffuse bodily sensations and action tendencies; the second may be termed the verbal-cognitive stage (levels 3–5), in which the capacity for verbal differentiation of discrete, mixed, and integrated emotional states emerges. It can be said that these stages are precisely what the Levels of Emotional Awareness Scale (LEAS) assesses, having been constructed in accordance with the level-based model [102]. At its lower levels, LEAS assesses the ability to describe diffuse bodily sensations (“I feel good” or “I feel bad”) and action tendencies (“I want to run away”), corresponding to the somatic-perceptual stage [102]. At its higher levels, LEAS assesses the ability to verbally differentiate individual emotions (“I feel fear”), then blended emotions (“I feel sadness and anger at the same time”), and, at the highest level, the integration of complex emotional states with an understanding of their causes and interrelationships, corresponding to the verbal-cognitive stage [102].

Analysis of the psychometric instruments used to assess emotional awareness supports the view that the construct is not homogeneous: its structure encompasses two components. The somatic-perceptual component – assessed by MAIA, BPQ, IAS, and objective methods – involves the ability to notice, differentiate, and trust bodily signals arising in response to emotionally significant stimuli – including changes in heart rate, respiration, muscle tone, and body temperature. The verbal-cognitive component – assessed by MSCEIT branches and alexithymia tests (TAS-20, TSIA, M-BIQ, RAS) – involves the ability to recognize, understand, identify, differentiate, and verbalize emotional states, or reflects a deficit of that ability. The somatic-perceptual component corresponds to lower levels of awareness (levels 1–2) and is the foundational basis on which verbal differentiation of emotions is built; the verbal-cognitive component corresponds to higher levels (levels 3–5).

This division is partly confirmed by neurophysiological research: higher levels of emotional awareness correlate with enhanced activation of the prefrontal cortex and anterior cingulate cortex [103, 105], while the processing of bodily signals (interoception) is associated with insular cortex activation [34], with the anterior insula regarded as the neural correlate of awareness generally [34].

1.4. Emotional Awareness and Alexithymia in Research on Emotional Information Processing

As noted, emotional information processing depends on the individual characteristics of the subject. Emotional awareness – or its deficit – may plausibly be associated with the features of these processes, and a number of studies do confirm this.

However, reviewing this literature reveals a significant bias: the overwhelming majority of studies addressing this topic focus not on emotional awareness itself but on its deficit – alexithymia. This is acknowledged by the authors themselves. For instance, a theoretical review by M. Lumley and colleagues directly states that the vast majority of empirical research on the relationship between emotional processes and health focuses on alexithymia as a measure of emotional processing deficits, and that the study of the positive pole – high emotional awareness as a facilitating factor for adaptive emotion processing – remains at the periphery of research attention [128]. Taylor and Bagby, in a review summarizing twenty-five years of research since TAS-20's creation, note that while alexithymia – originally described as a clinical phenomenon – gradually became one of the most studied constructs in emotion research, studies of normative emotional awareness, especially in nonclinical populations, have not received comparable development; this they attribute to the absence of comparably convenient standardized instruments for measuring high levels of awareness [195].

High emotional awareness, measured by LEAS, is associated with better emotion recognition from facial expression. Lane and colleagues (2000) demonstrated that participants with high LEAS scores more accurately identified emotions from photographs compared to those with low scores – interpreted as indicating that the capacity to recognize one's own emotional states transfers to the recognition of others' emotions [104].

Lichev and colleagues examined whether LEAS is associated with the intensity of automatic affective reactions to unconsciously perceived emotional stimuli. In an fMRI study with 46 healthy volunteers, masked images of happy, angry, fearful, and neutral faces were presented such that the emotional faces were not consciously perceived. Higher emotional awareness was associated with enhanced activation of primary somatosensory cortex, which transmits information about physical sensations – interpreted as indicating that persons with high emotional awareness have finer-tuned bodily feedback even during unconscious emotion processing, especially for positive stimuli (happy faces) [125].

Studies assessing deficits of emotional awareness show that persons with high alexithymia have difficulty understanding others' emotions in social contexts. Taylor, Bagby, and Parker's monograph reports that participants with high TAS-20 scores performed worse than controls at determining which emotions situational participants experience when presented with descriptions of social scenarios [194]. A study by Lane and colleagues found that alexithymia is associated with deficits in emotion recognition consistent with low LEAS levels, interpreting these data as indicating that low emotional awareness manifests in impaired ability to identify one's own emotional experiences even when physiological reactions remain intact [104]. A study by O. Pallatos and K. Gramann on alexithymia and interoceptive awareness found that, at high alexithymia, there is a discrepancy between physiological reactivity and the ability to verbally categorize: the body reacts, but the person cannot verbalize these sensations – a key demonstration that alexithymia measures primarily the verbal-cognitive deficit, not bodily sensitivity directly [161]. A meta-analysis by Van der Velde and colleagues, synthesizing data from 15 neuroimaging studies, found that at high alexithymia, processing of negative emotional stimuli is associated with decreased amygdala activity and dorsomedial PFC activity – indicating reduced attention to emotionally significant stimuli and difficulties in emotion regulation [202].

Thus, in some studies, the relationship between emotional awareness (or its deficit) and emotional information processing is quite clear-cut. High awareness measured by direct methods (LEAS) is associated with more accurate emotion recognition and enhanced somatosensory cortex activation during unconscious processing of positive stimuli; alexithymia is associated with difficulties understanding emotions in social contexts, a discrepancy between physiological reactivity and verbal categorization, and reduced amygdala and PFC activity.

Regarding the emotional interference effect in the Stroop test, the picture is more contradictory. Three different result patterns have been observed for alexithymia.

In the first pattern, high alexithymia is associated with enhanced interference for negative stimuli. For instance, in a study by Martínez-Velázquez and colleagues, participants with high and low alexithymia scores were shown emotional and neutral words printed in different colors and asked to name the color. Participants with high alexithymia took significantly longer to name the color of negative words compared to neutral ones, which the authors interpret as heightened emotional interference linked to a deficit in emotion identification [137]. Similar findings were obtained by J. Müller and colleagues, who likewise showed that alexithymia is associated with increased interference for negative stimuli, with the effect specific to negative valence and not extending to positive words [145]. The same group includes a study by K. Wingenfeld and colleagues, in which patients with somatoform disorders and high alexithymia showed a tendency toward greater interference for emotional stimuli compared to controls, although the authors note that the effect did not reach statistical significance [218].

The second pattern shows reduced interference with increasing alexithymia. In a study by S. Lee and K. Lee, participants with high alexithymia responded faster to negative words than to neutral ones. The authors interpret this result as early avoidance of threatening stimuli: rather than automatic attentional capture, attention shifts away from threatening information, producing a paradoxical speeding of response [140]. This group also includes a meta-analysis by R. Phaf and K. Kan, who showed that under certain conditions – in particular, when stimuli have low personal relevance – alexithymia may be accompanied by reduced rather than enhanced interference [173].

The third pattern comprises studies finding no significant relationship between alexithymia and interference magnitude. A study by K. Hsing and colleagues compared groups with high and low alexithymia; although participants with high alexithymia were generally slower on the task, the magnitude of the Stroop effect itself did not differ from that of the low-alexithymia group. The authors conclude that alexithymia is not associated with disruptions at the early stages of automatic emotional information recognition [109]. Similar results were obtained by R. Schaefer and colleagues, who found that in a sample of psychosomatic patients, alexithymia was not a significant predictor of interference magnitude, pointing to the need to consider additional factors [185].

Thus, findings on the relationship between alexithymia and the emotional Stroop effect are contradictory. By contrast, the limited number of studies directly measuring emotional awareness (via LEAS, objective interoceptive accuracy, or MAIA) show a tendency toward enhanced interference at higher awareness levels.

In particular, Wang and colleagues used the Chinese version of LEAS to select groups with high and low awareness from 315 teacher-training students who then performed the emotional Stroop test; the high-awareness group showed significantly greater interference not only on negative but also on positive and neutral stimuli [212]. Werner and colleagues used an objective interoceptive accuracy measure (heartbeat detection task) and found that participants with high interoceptive accuracy showed greater emotional interference on negative words [214].

In the area of emotion regulation, high awareness consistently shows a link with more adaptive regulation patterns. LEAS-based studies show it is a precondition for the effectiveness of cognitive reappraisal. The higher and more differentiated a person's awareness of their emotions, the more accurately they can select an adequate strategy for changing them. This relationship is seen both at the level of direct awareness assessment via LEAS and through its somatic-perceptual component measured by MAIA. In a study of outpatients with mental disorders, high scores on the MAIA subscales Attention Regulation and Trust predicted more effective use of cognitive reappraisal [117].

A study by K. Subic-Wrana and colleagues, conducted on a German sample, used a short form of LEAS to divide participants into groups with implicit (low) and explicit (high) emotional awareness, together with the ERQ questionnaire assessing habitual use of two regulation strategies – cognitive reappraisal and expressive suppression. Results showed that the relationship between regulation strategies and anxiety and depression scores differed substantially by awareness level. Among participants with implicit awareness, expressive suppression was positively associated with both anxiety and depression, whereas cognitive reappraisal showed no significant association with negative affect – that is, at low awareness, reappraisal did not "work" as an adaptive strategy. Conversely, among participants with explicit awareness, reappraisal showed the expected negative association with depression, functioning as an effective means of reducing negative affect. The authors conclude that conscious experiencing of emotion is a precondition for using cognitive reappraisal as an adaptive regulation strategy: only at a sufficient level of awareness does reappraisal begin to produce its expected effect [190].

Similar findings emerge with other direct measures of the capacity to process emotional information. A study by A. Mejías-Robles and colleagues measured ability-based emotional intelligence using MSCEIT and found that higher ability-based emotional intelligence is associated with more frequent use of cognitive reappraisal and less frequent use of expressive suppression [142].

Unlike high awareness, pronounced alexithymia is associated with a preference for less adaptive regulation strategies and with difficulty applying those that require the conscious processing of emotional content. D. Panayiotou and colleagues likewise found that persons with high alexithymia less often resort to cognitive reappraisal and are less successful in applying it [153]. Expressive suppression, by contrast, is used more frequently by persons with high alexithymia. This response-focused strategy – which does not reduce physiological arousal and can carry negative consequences for psychological well-being – may serve as a compensatory substitute for more adaptive strategies: unable to precisely identify and verbalize the experience, the person resorts to containing it at the level of expression [153].

Regarding affect labeling, studies on alexithymia are again contradictory: some show alexithymia reduces labeling effectiveness [1], others find no significant relationship [54], and others identify stimulus intensity as the decisive factor [122]. Direct studies of the relationship between emotional awareness and affect labeling effectiveness in its classic paradigm are virtually absent. Some related findings: persons with higher MAIA scores show different neural activation patterns and more accurate responses in tasks requiring interpretation of others' emotional states based on bodily reactions [84]; verbalization of affect was shown to reduce subjective distress and influence perception of bodily symptoms through mechanisms of reflexive processing of bodily signals [32].

The results of this analysis of the relationship between emotional awareness (or its deficit) and emotional information processing allow the following conclusions to be drawn:

The literature reveals a persistent bias: the overwhelming majority of studies focus on the deficit of awareness – alexithymia – while the positive pole, high emotional awareness, remains considerably less studied.

Studies of emotional information processing show contradictions. High emotional awareness, measured by direct methods (LEAS), is associated with more accurate recognition of others' emotions (e.g., from facial expression). A deficit of awareness (alexithymia) manifests in difficulties understanding emotions in social contexts and in a discrepancy between physiological reactivity and the capacity for verbal categorization.

The relationship of awareness and alexithymia with the emotional interference effect in the Stroop test shows a contradictory picture. Findings on alexithymia fall into three patterns: enhanced interference, reduced interference, and no significant relationship. By contrast, although few in number, available studies directly measuring awareness – via LEAS, objective interoceptive accuracy, or MAIA – show a tendency toward enhanced interference at higher levels of awareness.

In the domain of emotion regulation, awareness and alexithymia likewise show distinct patterns of association. High awareness, measured via LEAS and MAIA, facilitates flexible strategy selection and a preference for cognitive reappraisal, and serves as a precondition for its effectiveness. Alexithymia, conversely, is associated with expressive suppression, avoidance, and passive coping.

Regarding affect verbalization as a strategy of implicit regulation, findings on alexithymia are again contradictory, and direct studies of the relationship between awareness and affect labeling in its classic paradigm are virtually absent.

Analysis of these contradictions suggests a possible explanation. It appears that one of the principal sources of inconsistency may be the instrument traditionally used to assess alexithymia itself. TAS-20 measures primarily the verbal-cognitive deficit – difficulty identifying feelings, difficulty describing them, and externally oriented thinking – leaving the somatic-perceptual component of emotional awareness outside its scope.

Meanwhile, as Werner and colleagues' data with an objective interoception measure demonstrate, it is precisely bodily sensitivity that may be the key modulator of automatic attentional capture by emotional stimuli [214] – making its omission a likely source of inconsistent results.

1.5. Key Conclusions of the Theoretical Analysis

The theoretical analysis carried out permits the formulation of a number of generalizing propositions that serve as the conceptual foundation of the present dissertation research.

First, emotions constitute a complex psychological phenomenon in whose structure two interrelated components are distinguished – bodily (physiological) and cognitive (evaluative). The bodily component encompasses changes in the functioning of the cardiovascular, respiratory, muscular, and endocrine systems; the cognitive component is associated with the subjective interpretation and appraisal of emotionally significant events. In the processes of emotional information processing, this duality manifests as the interaction of automatic (uncontrolled) and controlled (voluntary) processes. Automatic processes ensure the rapid, involuntary onset of bodily arousal in response to an emotional stimulus and automatic attentional capture; controlled processes are linked to conscious appraisal of the situation and voluntary regulation of the emotional response. Of fundamental importance is the fact that interoceptive (bodily) signals constitute the foundational basis of emotional experience: the ability to perceive and interpret these signals is associated with the intensity of emotional experiences and the effectiveness of emotional regulation.

Second, emotional information processing is a multi-stage process encompassing the perception of an emotionally significant stimulus, its cognitive appraisal, the activation of the emotional reaction, and its regulation. The canonical experimental paradigm for studying the automatic, uncontrolled component of processing is the emotional Stroop test, in which the magnitude of the observed emotional interference reflects the degree of automatic attentional capture by emotional stimuli. This effect is sensitive to the individual characteristics of participants. Emotion regulation is a separate and relatively autonomous processing stage which, unlike earlier stages, engages predominantly controlled, voluntary mechanisms. Among the various emotion regulation strategies, a special place is occupied by affect verbalization (affect labeling), which is regarded as a form of implicit regulation not requiring a conscious intention to regulate the emotion. The effectiveness of this strategy depends on both the individual characteristics of the subject and on cross-cultural context [33, 61]. At the same time, experimental studies conducted within the affect labeling paradigm are virtually absent in Russian-language psychology.

Third, the key construct linking individual differences with the features of emotional information processing and the effectiveness of emotional regulation is emotional awareness. Analysis of the psychometric toolkit and theoretical models permits the conclusion that this construct is not homogeneous. In its structure, two interrelated but relatively independent components can be distinguished. The somatic-perceptual component is the ability to notice, differentiate, and trust one's own bodily signals (changes in heart rate, respiration, muscle tone) that arise in response to emotionally significant stimuli. This component corresponds to the lower levels of the Lane–Schwartz model (levels 1–2: bodily sensations and action tendencies) and provides access to the physiological data on the basis of which emotional experience is formed. The verbal-cognitive component is the ability to identify, differentiate, and verbalize one's own emotional states, as well as to understand their causes, dynamics, and interrelationships. It corresponds to the higher levels of the model (levels 3–5: individual, blended, and integrated emotional states) and is built upon the somatic foundation. Alexithymia is closely related to the level of emotional awareness; it reflects a deficit primarily of the verbal-cognitive component and may be regarded as "awareness with a reversed sign." The existing toolkit for assessing emotional awareness has limitations. The LEAS scale, while serving as the "gold standard," is labor-intensive and has not been adapted for Russian-speaking samples. The most accessible and psychometrically grounded instruments adapted for Russian-speaking samples are the MAIA-R questionnaire, directed at assessing the somatic-perceptual component, and TAS-20-R, measuring the verbal-cognitive deficit.

Fourth, empirical studies of the relationship between emotional awareness and alexithymia on one hand and emotional information processing and emotional regulation on the other reveal a number of contradictions. With respect to the Stroop test, data on alexithymia divide into three patterns (enhanced, attenuated, and absent interference relationship), while direct studies of awareness via LEAS and interoceptive accuracy – although isolated – show a tendency in available studies toward enhanced interference at higher awareness levels. In the domain of emotion regulation, high awareness is associated with preference for adaptive strategies and serves as a precondition for the effectiveness of cognitive reappraisal, whereas alexithymia is associated with expressive suppression, avoidance, and passive coping. With respect to affect labeling, data on alexithymia are contradictory, and direct studies of the relationship between awareness and the effectiveness of affect verbalization in its classical paradigm are virtually absent. Analysis of these contradictions permits the hypothesis that one of their principal sources is the limited nature of the instrument most frequently used for assessing the awareness deficit: TAS-20 measures primarily the verbal-cognitive deficit, leaving the somatic-perceptual component outside its scope. As data using objective interoception measures show, it is precisely bodily sensitivity that may serve as a key modulator of automatic attentional capture by emotional stimuli [215], which makes its neglect a potential cause of the inconsistency of results.

Finally, the totality of theoretical and empirical data unambiguously points to the primary, foundational character of the somatic-perceptual component in the structure of emotional awareness. This proposition rests on several independent lines of evidence. Damasio's somatic marker theory postulates that bodily reactions arise automatically in response to emotional stimuli and are represented in the brain as "somatic markers," without access to which full emotional awareness and effective regulation become impossible; feelings represent the mental mapping of bodily changes, not isolated cognitive constructions [36, 37]. Barrett's theory of constructed emotion treats interoceptive sensations as the "first-order ingredient" upon which discrete emotional experience is built using categorical knowledge about emotions; without the bodily "raw material," the categorization of emotions is impossible [10]. The level-based model of R. Lane and G. Schwartz itself explicitly describes the development of awareness from lower levels – diffuse bodily sensations and action tendencies – toward higher ones, associated with verbal differentiation and integration of emotional experience; the somatic-perceptual component forms the foundation on which the verbal-cognitive component is built [101]. Neurobiological studies confirm this logic: the processing of bodily signals (interoception) is associated with insular cortex activation, with the anterior portions of the insula regarded as the neural correlate of awareness in general [34], while verbal differentiation of emotions correlates with activation of the prefrontal cortex and anterior cingulate cortex [103, 105]. Thus, the somatic-perceptual component is not merely one of two aspects of awareness but its foundational, fundamental level, making it indispensable for consideration in any operationalization of the construct.

The theoretical analysis carried out permits the formulation of the research problem. Despite the existence of a substantial number of studies devoted to the relationship between emotional awareness and alexithymia on one hand and emotional information processing on the other, it remains unclear how emotional awareness is related to the automatic and controlled processes of emotional processing, as well as to the effectiveness of emotion regulation strategies. As was shown in Section 1.4, data on alexithymia measured with TAS-20 are contradictory: in the Stroop test, three conflicting patterns of relationship with interference are observed [137, 116, 81], while in affect labeling research some studies record a reduction in verbalization effectiveness at high alexithymia [1], others find no significant relationship [54], and still others point to the decisive role of other factors [122]. One of the possible causes of this inconsistency may be the inadequate choice of psychometric instruments, which does not permit assessment of the contribution of the somatic-perceptual component of emotional awareness to the studied processes.

Since TAS-20 is the most frequently used instrument in research on emotional information processing [6, 177], its inclusion in the design of the present work ensures comparability of the results obtained with the existing body of data. At the same time, TAS-20 measures only the verbal-cognitive deficit – difficulties identifying feelings, difficulties describing them, and externally oriented thinking [4] – leaving the somatic-perceptual component outside its scope.

However, it is precisely the somatic-perceptual component that is the foundational, fundamental level of emotional awareness, upon which the verbal-cognitive component is built [101]. Consequently, without assessment of the somatic-perceptual component, the measurement of emotional awareness is knowingly incomplete. To operationalize it, it is advisable to use an instrument with sufficient psychometric characteristics and accessible for use on Russian-speaking samples. The MAIA questionnaire [143], validated on a Russian-speaking sample [162] and demonstrating correlations with LEAS [208], is suitable for this purpose.

The joint use of two questionnaires – TAS-20 and MAIA-R – within a unified integral indicator will, on the one hand, maintain continuity with the existing research tradition, and on the other, fill the gap associated with the neglect of the bodily component, thereby ensuring a more complete and balanced assessment of emotional awareness.

The emotional Stroop test was chosen as the experimental paradigm for testing the role of emotional awareness in automatic processing. This paradigm is canonical for studying the automatic, uncontrolled component of emotional information processing: the instruction requires ignoring the semantic content of an emotional word and responding only to its color, which allows the automatic attentional capture to be isolated from voluntary control [217, 158]. At the same time, the magnitude of the emotional interference effect is sensitive to the individual characteristics of participants [7], making this paradigm suitable for studying the contribution of emotional awareness.

The affect verbalization strategy (affect labeling), in contrast, represents a process in which both automatic and controlled processing components are engaged. On one hand, effective affect verbalization requires access to bodily signals for accurate emotion categorization [10, 84]; on the other, it presupposes the formation of a subjective judgment about the valence and intensity of the experience, which is a controlled process.

It should also be noted that in Russian-language psychology, experimental studies conducted within the affect labeling paradigm are practically absent at the present time, which allows the present work to be regarded as one of the first steps in filling this gap on a Russian-speaking sample.

Formulation of Research Aims and Objectives

The aim of the present research is to study the role of emotional awareness in emotional information processing and in the effectiveness of emotional regulation.

To achieve the stated aim, the following empirical research objectives were formulated:

1. To develop and psychometrically substantiate an integral indicator of emotional awareness based on the MAIA-R and TAS-20-R questionnaires, and to compare various variants of its construction.

2. To examine the relationship between emotional awareness and the magnitude of

emotional interference in the emotional Stroop task.

3. To examine the relationship between emotional awareness and the behavioral and subjective indicators of the effectiveness of affect labeling as an implicit emotional regulation strategy.

On the basis of the theoretical analysis conducted, the following hypotheses were formulated.

General hypothesis. Emotional awareness makes a reliable contribution both to the automatic processing of emotional information (emotional Stroop test) and to the effectiveness of implicit emotional regulation (affect labeling).

This assumption rests on a body of empirical data indicating that emotional awareness is associated with more accurate emotion recognition and participates in the early, automatic stages of emotional information processing, as confirmed, among other things, by neurophysiological data [104, 125]. Additionally, it has been shown that a high level of awareness is associated with more adaptive selection of emotion regulation strategies and with the effectiveness of their application [190, 84, 32]. Taken together, these data give grounds to expect that individual differences in emotional awareness will manifest both in indicators of emotional information processing and in indicators of the effectiveness of emotional regulation.

Specific hypothesis 1. The developed integral indicator of emotional awareness based on the MAIA-R and TAS-20-R questionnaires will possess sufficient psychometric reliability and criterion validity for use in experimental research.

This assumption rests on the results of the psychometric instrument analysis, which showed that existing instruments operationalize only one of the two components of emotional awareness. TAS-20 measures the verbal-cognitive deficit [4], MAIA measures the somatic-perceptual component [143]. Their joint use within a unified integral indicator should ensure a more complete and balanced measurement of the construct, covering both its aspects.

Specific hypothesis 2. The level of emotional awareness, assessed through the integral indicator, is reflected in the processes of emotional regulation – specifically in the behavioral and subjective indicators of the effectiveness of affect verbalization (affect labeling).

This assumption is based on the fact that emotional awareness constitutes the ability to recognize, identify, and differentiate one’s own emotional states [101]. Affect verbalization, in turn, requires the subject to identify and name the emotional experience evoked by the stimulus [126, 199]. Both processes are grounded in the same ability – access to emotional content and its categorization – which gives grounds to expect a relationship between the level of awareness and the indicators of affect verbalization.

Specific hypothesis 3. The level of emotional awareness, assessed through the integral indicator, is reflected in the processes of emotional information processing in the emotional Stroop task.

This assumption is based on the fact that emotional awareness presupposes sensitivity to emotionally significant information, which manifests already at the early, automatic stages of its processing. Empirical data obtained using direct awareness measures indicate that a higher level of awareness is associated with enhanced emotional interference in the Stroop test [213, 215]. This pattern is consistent with the theoretical view that emotional awareness sharpens the automatic attentional capture by emotional stimuli [36, 37], which – in the conditions of cognitive conflict created by the color-naming task – manifests as greater interference [217, 158].

Three empirical studies were devoted to testing these assumptions.

CHAPTER 2. EMPIRICAL PART

The empirical research comprised three phases: the psychometric development of the integral indicator EA_Index (Section 2.1), the study of emotional interference in the emotional Stroop task (Section 2.2), and the study of affect verbalization (Section 2.3).

Information about the samples for each study is presented in Table 1.

Table 1.

Summary characteristics of samples by research phase

Research phase	N	Age, M (SD)	Sex, % women	Inclusion/Exclusion criteria
Psychometric (Section 2.1)	186	28.0 (9.5)	66.7%	17–58 years; training (70%, n=130) and validation (30%, n=56) subsamples, matched by age, sex, and scale scores
Emotional Stroop (Section 2.2)	86	29.6 (10.3)	66.3%	17–58 years; excluded participants with >20% errors in any series
Affect verbalization (Section 2.3)	91	29.3 (10.2)	64.8%	18–58 years; independent sample, not overlapping with previous samples

The logic of sample formation was determined by the objectives of each phase. For the psychometric development of the indicator (Section 2.1), the total sample was randomly divided into training (70%, n = 130) and validation (30%, n = 56) subsamples with a fixed random seed (set.seed(123)) to ensure reproducibility. Independent samples were used for the experimental phases (Sections 2.2 and 2.3).

2.1. Development of an Integral Index of Emotional Awareness

As was shown in Chapter 1, emotional awareness is a multi-component construct combining somatic-perceptual and verbal-cognitive components [101].

The theoretical analysis revealed that the existing toolkit for assessing emotional awareness has significant limitations, especially in the portion accessible to Russian-language researchers. The Levels of Emotional Awareness Scale (LEAS), while serving as the "gold standard," does not have a validated version for Russian-speaking samples. At the same time, the Toronto Alexithymia Scale (TAS-20) – the most popular instrument in research on emotional information processing – measures only the deficit of the verbal-cognitive component and cannot serve as a valid measure of the somatic-perceptual component. The Multidimensional Assessment of Interoceptive Awareness questionnaire (MAIA), in contrast, is directed at assessing precisely the somatic-perceptual component, is validated on a Russian-speaking sample, and demonstrates correlations with LEAS as the reference measure of awareness; however, it is practically unused in experimental studies of emotional information processing.

The joint use of two questionnaires – TAS-20-R and MAIA – within a unified integral indicator would, on one hand, maintain continuity with the existing research tradition, and on the other, fill the gap associated with the neglect of the bodily component. The present chapter is devoted to addressing this task.

The aim of the psychometric study was the development and substantiation of an integral indicator of emotional awareness (EA_Index) based on the assessment of its two components – somatic-perceptual (MAIA) and verbal-cognitive (TAS-20) – suitable for use in experimental studies of emotional information processing.

The main hypothesis was that the integral indicator of emotional awareness based on the MAIA and TAS questionnaires would possess sufficient psychometric reliability and criterion validity for use in experimental studies.

2.1.1. Statistical Analysis Strategy

Given that the present study is directed at developing a simple integral indicator suitable for use in experimental studies of emotional information processing, an analysis of the psychometric literature permitted the identification of a number of stages traditionally used in the development of integral indicators of complex psychological constructs [68, 45, 20], which were also used in the present study:

Verification of the construct's structure. According to the methodology of exploratory factor analysis, this stage identifies the structure of interrelationships among the questionnaire scales [20, 78]. For this purpose, oblique oblimin rotation was used (since correlation between the extracted factors was assumed). On the basis of the obtained structure, factor scores are extracted using the regression method and are regarded as the most accurate assessment of the construct for each participant [68]. In the present study, the training subsample obtained by random division of the total sample (N = 186) in a 70:30 ratio with a fixed seed (set.seed(123) to ensure reproducibility) was used for these purposes. On the basis of the obtained factor scores, a reference indicator G was created, representing a weighted sum of first-order factors where the weights are proportional to the proportion of explained variance.

Development and comparison of integral indicator variants. Based on the original scales, several simplified formula variants are tested (simple mean, weighted by loadings, etc.). The optimal variant is selected based on the criterion of maximum correlation with the reference factor scores obtained at the previous stage [68, 45]. This approach allows a balance to be maintained between psychometric precision and practical applicability of the indicator. In the present study, 7 variants of composite formulas were tested on the training subsample, incorporating various combinations of MAIA-R and TAS-20-R scales. The best variant was selected based on maximum correlation with the reference indicator G.

Cross-validation of the developed indicator. To assess the stability of the developed indicator and rule out "overfitting" to a specific sample, cross-validation is conducted: the formula selected on the training subsample is verified on an independent validation subsample [45]. The preservation of high correlation with the reference indicator on the validation subsample attests to the stability and reproducibility of the result.

Verification of the discriminative capacity of the integral indicator. To assess how well the developed integral indicator differentiates participants with different levels of emotional awareness, the sample is divided into groups by terciles of the indicator distribution (three equal groups of 33.3%). It is then verified whether these groups differ significantly on the original scales used in constructing the indicator [62, 94]. This analysis allows confirmation that the integral indicator retains the information embedded in the original scales and can serve as the basis for forming contrasting groups in experimental studies.

Comparison with alexithymia assessment. To demonstrate the particular features of the developed indicator, a comparison is made of the classification of participants by the integral indicator and by the TAS-20 score. An assessment is made of how well these classifications coincide and what new information the proposed indicator provides [31, 62].

Confirmation of the construct's structure. To verify the validity of the identified two-factor structure on the combined sample, a confirmatory factor analysis (CFA) was conducted with theoretically and empirically substantiated modifications (cross-loading of the MAIA_SelfReg scale, error correlations between theoretically related scales). The obtained fit indices allow assessment of how well the proposed structure fits the empirical data [20].

On the basis of the described stages, the following sub-objectives were formulated:

To conduct an exploratory factor analysis on the training subsample to identify the structure of interrelationships among TAS-20-R and MAIA-R scales, extract factor scores, and create a reference indicator G for subsequent comparison of composite formulas.

To develop and compare several simplified formula variants for the integral indicator on the training subsample, selecting the optimal variant based on the criterion of maximum correlation with the reference indicator G.

To conduct cross-validation of the developed indicator on an independent validation subsample, assessing the stability of the selected formula.

To verify the discriminative capacity of the final indicator, assessing its ability to divide participants into groups with different awareness levels.

To compare the classification of participants by the proposed indicator with the classification by TAS-20, and assess what new information the developed indicator provides.

To conduct a confirmatory factor analysis on the combined sample to verify the validity of the two-factor structure of emotional awareness.

Materials and Methods

Sample

186 persons aged 17 to 59 years (M = 28.0; SD = 9.5) participated in the study. Sex distribution: women – 124 persons (66.7%), men – 61 persons (32.8%), one participant did not indicate sex (0.5%). Verification of the sex balance using the χ^2 test revealed a statistically significant deviation from uniform distribution ($\chi^2 = 21.45$; df = 1; $p < 0.001$).

Instruments

Two instruments were used in the study.

Toronto Alexithymia Scale (TAS-20). The Russian-language version of the questionnaire, validated on a sample of therapeutic patients, was used [186]. The questionnaire contains 20 items rated on a 5-point Likert scale. Items 4, 5, 10, 18, and 19 are reverse-scored and were reversed before summation using the formula 6 − x. The original version of the questionnaire provides for three subscales; however, the authors of the Russian-language adaptation strongly recommend using only the total score due to insufficient reliability of individual subscales [186]. In accordance with this recommendation, the total score TAS_total (range 20–80) was calculated in the present study, where higher values correspond to more pronounced alexithymia.

Multidimensional Assessment of Interoceptive Awareness questionnaire (MAIA-R). The Russian-language version validated on a Russian sample was used [162]. The questionnaire contains 32 items rated on a 6-point scale from 0 (“never”) to 5 (“always”). In accordance with the Russian-language adaptation scoring keys, eight scales were calculated: Noticing (MAIA_Notice), Not-Distract (MAIA_NotDistract), Not-Worry (MAIA_NotWorry), Attention Regulation (MAIA_AttReg), Emotional Awareness of Negative States (MAIA_EmoNeg), Emotional Awareness of Positive States (MAIA_EmoPos), Self-Regulation based on Body Listening (MAIA_SelfReg), and Trusting (MAIA_Trust). Items 5, 6, 7, 8, and 9 were reverse-scored before calculation using the formula 5 − x. According to the validation results of the Russian-language version MAIA-R [162], the Not-Distract and Not-Worry scales are orthogonal to the remaining questionnaire scales and do not contribute to the measurement of emotional awareness. Furthermore, the MAIA_NotDistract scale showed low reliability ($\alpha = 0.489$). In this regard, in accordance with the recommendations of the Russian-language adaptation authors, these scales were excluded from subsequent analysis. Thus, the factor analysis and composite indicator development incorporated six MAIA-R scales (MAIA_Notice, MAIA_AttReg, MAIA_EmoNeg, MAIA_EmoPos, MAIA_SelfReg, MAIA_Trust) and the TAS-20-R total score.

Procedure

Data collection was conducted online using the Anketolog.ru platform. Participants completed the TAS-20-R and MAIA-R questionnaires and also provided their sex, age, and email address for identification. The study was conducted anonymously; participation was voluntary.

Statistical Analysis

Statistical processing was performed using the R programming language (version 4.5.2, R Core Team) with the following packages: lavaan (version 0.6-21) – for confirmatory factor analysis; psych (version 2.4.3) – for descriptive statistics, Cronbach's α, and exploratory factor analysis; dplyr and tidyr (versions 1.1.4 and 1.3.1) – for data manipulation; GPArotation – for factor rotation. Random division of the sample into training (70%) and validation (30%) subsamples was performed using set.seed(123) to ensure reproducibility. Missing values were absent (all questionnaire items were completed by participants). Verification of comparability of training and validation subsamples using the Mann–Whitney U test revealed no significant differences in TAS_total ($U = 4108$, $p = 0.165$), mean score of the six MAIA scales ($U = 3152$, $p = 0.148$), age ($U = 3702$, $p = 0.855$), or sex ($\chi^2 = 0.02$, $p = 0.901$), which allows the subsamples to be considered comparable.

Descriptive statistics and normality testing (Shapiro–Wilk test) were calculated for all scales. Internal consistency was assessed using Cronbach's α coefficient. Due to violation of the normality assumption, Spearman's rank correlation coefficient was used to assess relationships among scales. The correlation matrix is presented for descriptive purposes and was not used for hypothesis testing; therefore, a correction for multiple comparisons was not applied.

Exploratory Factor Analysis (EFA). Conducted on the training subsample using the minimum residuals (minres) method and oblique oblimin rotation, since correlation between the extracted factors was assumed. The number of factors was determined based on the Kaiser criterion ($\lambda > 1$) and parallel analysis. The Kaiser–Meyer–Olkin criterion (KMO) and Bartlett's test of sphericity were applied to assess the suitability of the data for factor analysis.

Development of the composite indicator. Based on EFA results, factor scores were extracted using the regression method [68]. The reference indicator G was calculated as a weighted sum of first-order factors, where the weights were determined proportionally to the proportion of explained variance of each factor. Seven variants of composite formulas were tested on the training subsample, incorporating various combinations of MAIA-R and TAS-20-R scales. The optimal formula was selected based on the criterion of maximum correlation (Spearman) with the reference indicator G.

Cross-validation. To assess the stability of the developed indicator, the selected formula was applied to the validation subsample. The reference indicator G for the validation subsample was calculated using the weights obtained from the training subsample. The stability of the indicator was assessed by comparing correlations with G in the training and validation subsamples.

Confirmatory Factor Analysis (CFA). Conducted on the combined sample using the robust maximum likelihood method (MLR). Model fit was assessed using the following fit indices: χ^2, df, p, CFI, TLI, RMSEA, SRMR. Based on EFA results and theoretical considerations, a two-factor model was tested with a cross-loading of the MAIA_SelfReg scale and error correlations between theoretically related scales (MAIA_EmoNeg with MAIA_EmoPos, MAIA_AttReg with MAIA_SelfReg, MAIA_Notice with MAIA_EmoNeg).

Discriminative capacity of the final indicator. Assessed on the combined sample. The sample was divided into three groups by terciles of the EA_Index distribution. To test differences between groups on the original scales, the nonparametric Kruskal–Wallis test was used, followed by Dunn post-hoc tests with Bonferroni correction. Effect size was estimated using η^2.

Comparison with the traditional approach. To compare the classification of participants by the developed indicator and by the TAS-20 total score, a contingency table was constructed with calculation of χ^2 and Cramér's V.

Sex differences were assessed using the Mann–Whitney U test with effect size calculation $r = Z/\sqrt{N}$.

Results

Descriptive Statistics and Scale Reliability

Descriptive statistics for all scales are presented in Table 2. The mean TAS_total falls within the range typical of nonclinical samples [186]. Mean values of MAIA-R scales range from 1.88 (MAIA_NotDistract) to 3.59 (MAIA_EmoPos), which is consistent with data obtained during the adaptation of the questionnaire on a Russian sample [162].

Internal consistency of the scales was assessed using Cronbach's α coefficient (Table 2). TAS-20 demonstrated high reliability. Four MAIA-R scales showed good to excellent reliability: MAIA_Trust, MAIA_AttReg, MAIA_SelfReg, and MAIA_EmoNeg. Three scales have moderate reliability: MAIA_EmoPos, MAIA_NotWorry, and MAIA_Notice. The MAIA_NotDistract scale showed low reliability, which is consistent with data obtained during the Russian-language adaptation of the MAIA-R questionnaire [162]. During validation on the

Russian sample, the authors established that the Not-Distract and Not-Worry scales are orthogonal to the remaining six questionnaire scales.

Normality testing using the Shapiro–Wilk test showed that none of the scales has a normal distribution ($p < 0.05$ for all scales). This result determined the choice of nonparametric methods for correlation analysis and the use of robust estimation methods in confirmatory factor analysis (MLR method).

Table 2.

Descriptive statistics and scale reliability

Scale	N	M	SD	Min	Max	α
TAS_total	186	53.61	10.25	35.00	80.00	0.875
MAIA_Notice	186	3.33	1.03	0.33	5.00	0.629
MAIA_NotDistract	186	1.88	0.95	0.00	5.00	0.489
MAIA_NotWorry	186	2.26	1.10	0.00	5.00	0.659
MAIA_AttReg	186	3.02	0.99	0.57	5.00	0.847
MAIA_EmoNeg	186	3.16	1.23	0.00	5.00	0.732
MAIA_EmoPos	186	3.59	1.11	0.00	5.00	0.687
MAIA_SelfReg	186	2.65	1.00	0.29	4.71	0.814
MAIA_Trust	186	3.57	1.24	0.00	5.00	0.896

Note. TAS_total – total score on the Toronto Alexithymia Scale.

Correlation Analysis

Due to violation of the normality assumption, Spearman's rank correlation coefficient was used to assess relationships among scales (Table 3). The largest negative correlation was found between TAS_total and the MAIA_Trust scale. Moderate negative relationships were found with the MAIA_AttReg, MAIA_NotWorry, and MAIA_SelfReg scales. Moderate positive correlations are observed between the MAIA_AttReg and MAIA_SelfReg scales, MAIA_EmoNeg and MAIA_EmoPos, and MAIA_SelfReg and MAIA_Trust. Correlations of TAS_total with MAIA_Notice, MAIA_EmoPos, and MAIA_EmoNeg do not reach statistical significance.

When interpreting the correlation matrix, it should be noted that with 36 comparisons performed, using a threshold of $p < 0.05$ without correction for multiple comparisons may lead to false-positive results. The correlation matrix is presented for descriptive purposes only and was not used for hypothesis testing.

Table 3.

Correlation matrix (Spearman's ρ)

Scale	1	2	3	4	5	6	7	8	9
1. TAS_total	1.00								
2. MAIA_Notice	−0.06	1.00							
3. MAIA_NotDistract	−0.20*	−0.04	1.00						
4. MAIA_NotWorry	−0.30**	0.03	−0.09	1.00					
5. MAIA_AttReg	−0.27**	0.35**	0.09	0.23*	1.00				
6. MAIA_EmoNeg	0.01	0.46**	0.02	−0.20*	0.29**	1.00			
7. MAIA_EmoPos	−0.04	0.37**	0.07	−0.02	0.27**	0.51**	1.00		
8. MAIA_SelfReg	−0.21*	0.38**	0.15	0.18	0.67**	0.41**	0.47**	1.00	
9. MAIA_Trust	−0.40**	0.20*	0.14	0.21*	0.49**	0.15	0.24*	0.50**	1.00

*Note. $p < 0.05$; ** $p < 0.01$. All values are rounded to two decimal places. For $N = 186$, the critical correlation coefficient at $p < 0.05$ is $|r| > 0.14$.*

Sex Differences

Given the uneven sex distribution in the sample (66.7% women), an analysis of differences between men and women on all studied scales was conducted. Due to violation of the normality assumption, the nonparametric Mann–Whitney U test was used for group comparison. Effect size was calculated as $r = Z/\sqrt{N}$.

Results are presented in Table 4. Statistically significant differences were found on the MAIA_EmoNeg and MAIA_NotWorry scales. Women demonstrate higher scores on the awareness of negative emotions scale; men on the not-worry scale regarding bodily sensations. The effect sizes for these differences correspond to small values.

Table 4.

Sex differences (Mann–Whitney U test, N = 186)

Scale	Men (n=61) M (SD)	Women (n=124) M (SD)	U	p	r
MAIA_AttReg	2.97 (0.92)	3.04 (1.01)	3679	0.763	0.02
MAIA_SelfReg	2.55 (0.89)	2.69 (1.04)	3419	0.289	0.08
MAIA_Trust	3.58 (1.06)	3.55 (1.31)	3838	0.870	0.01
TAS_total	47.79 (12.15)	46.90 (13.68)	3965	0.594	0.04
MAIA_Notice	3.25 (0.99)	3.36 (1.05)	3540	0.477	0.05
MAIA_EmoNeg	2.84 (1.12)	3.31 (1.24)	2820	0.005*	0.21
MAIA_EmoPos	3.38 (1.07)	3.68 (1.12)	3152	0.064	0.14
MAIA_NotWorry	2.54 (1.07)	2.12 (1.10)	4633	0.013*	0.18
MAIA_NotDistract	1.73 (0.89)	1.95 (0.97)	3262	0.127	0.11

Note. $p < 0.05$; r – effect size.*

Verification of the Construct's Structure

To develop and validate the composite indicator, the total sample (N = 186) was randomly divided into training (70%) and validation (30%) subsamples with a fixed seed = 123 to ensure reproducibility. The training subsample comprised 130 persons (69.9% women, mean age 27.8 ± 9.4 years); the validation subsample – 56 persons (64.3% women, mean age 28.4 ± 9.7 years). Verification of subsample comparability revealed no significant differences in age (U = 3702, p = 0.855), sex ($\chi^2 = 0.02$, p = 0.901), TAS_total (U = 4108, p = 0.088), and mean score of the six MAIA scales (U = 3152, p = 0.148), allowing the subsamples to be considered comparable.

To identify the structure of interrelationships among MAIA-R and TAS-20-R scales, an exploratory factor analysis (EFA) was conducted on the training subsample (n = 130). Suitability of the data for factorization was confirmed by the Kaiser–Meyer–Olkin criterion (KMO = 0.761) and Bartlett's test of sphericity ($\chi^2 = 285.27$, df = 21, $p < 0.001$). The Kaiser criterion ($\lambda > 1$) and parallel analysis both recommended a two-factor solution.

EFA results are presented in Table 5. Factor 1, named "cognitive-regulatory," grouped the following scales: MAIA_AttReg (0.70), MAIA_SelfReg (0.59), MAIA_Trust (0.82), and

TAS_total (−0.56). Factor 2, “affective-perceptual,” grouped MAIA_Notice (0.57), MAIA_EmoNeg (0.82), and MAIA_EmoPos (0.61). The MAIA_SelfReg scale demonstrated a cross-loading on Factor 2 (0.38). The inter-factor correlation was r = 0.399, indicating a moderate relationship between them. Explained variance totaled 50.8%.

Table 5.

Factor loadings (EFA, training subsample, n = 130)

Scale	Factor 1	Factor 2
MAIA_Notice	—	0.57
MAIA_AttReg	0.70	—
MAIA_EmoNeg	—	0.82
MAIA_EmoPos	—	0.61
MAIA_SelfReg	0.59	0.38
MAIA_Trust	0.82	—
TAS_total	−0.56	—

Note. Loadings < 0.30 suppressed. Rotation method: oblimin. Explained variance: Factor 1 – 27.1%, Factor 2 – 23.7%, total – 50.8%.

Analysis of factor loadings (Table 5) shows that the largest contribution to Factor 1 (cognitive-regulatory) comes from the MAIA_Trust (0.82) and MAIA_AttReg (0.70) scales, reflecting trust in bodily signals and the capacity for attention regulation. MAIA_SelfReg (0.59) and TAS_total (−0.56) also make a significant but somewhat smaller contribution. The negative loading of TAS_total indicates that high alexithymia values correspond to low factor values, which is consistent with theoretical conceptions of the inverse relationship between alexithymia and emotional awareness.

The largest contribution to Factor 2 (affective-perceptual) comes from the MAIA_EmoNeg (0.82) and MAIA_EmoPos (0.61) scales, reflecting awareness of bodily correlates of negative and positive emotions. MAIA_Notice (0.57) also makes a significant contribution, reflecting basic observation of bodily sensations. MAIA_SelfReg demonstrates a cross-loading on this factor (0.38), which is theoretically justified since self-regulation encompasses both cognitive and affective components.

Given the limited size of the training subsample (n = 130), construction of a hierarchical model with a second-order factor was not possible; consequently, the reference indicator G was calculated as a weighted sum of first-order factors. This approach allows the maximum information about each factor's contribution to the overall construct to be preserved, with weights determined proportionally to the proportion of explained variance [68, 45]. The formula for calculating G is as follows: $G = 0.533 \times F1 + 0.467 \times F2$, where F1 and F2 are the factor scores extracted from EFA, and the weights (0.533 and 0.467) correspond to the proportion of explained variance of Factor 1 (27.1%) and Factor 2 (23.7%) of their total (50.8%). The range of G in the training subsample was from −2.26 to 1.79.

Development and Comparison of Integral Indicator Variants

To develop a practical composite indicator based on the EFA results, 7 formula variants were formulated, reflecting different approaches to combining scales.

The selection of variants was determined by the following considerations.

Group 1. Combinations of scales included in Factor 1 (cognitive-regulatory). Factor 1 included the scales MAIA_AttReg (0.70), MAIA_SelfReg (0.59), MAIA_Trust (0.82), and TAS_total (−0.56). Since TAS_total has a negative loading, its inclusion requires inversion. To test the hypothesis that this factor is the key one for measuring emotional awareness, the following variants were formulated:

– simple mean of the three scales with the highest loadings (AttReg, SelfReg, Trust) – the MAIA_3_scales variant;

– pairwise combinations of these scales (AttReg+SelfReg, SelfReg+Trust, AttReg+Trust) – to assess each scale's individual contribution;

– addition of inverted TAS to the three scales (AttReg, SelfReg, Trust, TAS_inv) – to test the initial hypothesis that the verbal component (alexithymia) would complement the somatic-perceptual component.

Group 2. Use of TAS-20 as a stand-alone indicator. The "TAS_only" variant represents a widespread approach based on the TAS-20-R total score, inverted to align the direction of the scale (higher values correspond to lower alexithymia, i.e., higher awareness).

Group 3. Inclusion of all seven scales. The "All_7_scales" variant represents a simple mean of all original scales (without accounting for the factor structure). This variant allows assessment of how much accounting for the factor structure (extracting Factor 1) improves measurement accuracy compared to mechanically combining all available scales.

Inversion of TAS_total. Since in EFA TAS_total had a negative loading on Factor 1 ($\lambda = -0.56$), reflecting the inverse relationship between alexithymia and emotional awareness, the scale was inverted using the formula TAS_inv = (40 − TAS_total) / 10 for inclusion in the composite indicator.

The selection of coefficients is justified as follows: the range of TAS_total is 20–80, consequently the maximum value of the inverted scale corresponds to minimum alexithymia. Subtracting from 40 and dividing by 10 brings the TAS_inv range to a scale comparable to MAIA-R scales (0–5), which allows using a simple mean without additional standardization.

For each variant, the correlation (Spearman) with the reference indicator G was calculated on the training subsample ($n = 130$). For the best formula, 95% confidence intervals of the correlation were additionally calculated. Results are presented in Table 6.

The best result was demonstrated by the formula representing the simple mean of three MAIA-R scales – MAIA_AttReg, MAIA_SelfReg, and MAIA_Trust. Adding TAS-20-R to the composite indicator (the MAIA_TAS_4_scales formula) led to a reduction in correlation. Formulas based exclusively on TAS-20-R or on all seven scales showed substantially lower correlations. Among pairwise combinations of Factor 1 scales, the best result was shown by the AttReg+SelfReg combination, while AttReg+Trust yielded a substantially lower correlation, indicating the importance of including the SelfReg scale in the composite indicator.

Table 6.

Comparison of composite formula variants on the training subsample (n = 130)

Formula	Components	r (95% CI)	R^2
MAIA_3_scales	(AttReg + SelfReg + Trust) / 3	0.890 [0.848; 0.921]	79.2%
AttReg_SelfReg	(AttReg + SelfReg) / 2	0.885 [0.841; 0.917]	78.3%
SelfReg_Trust	(SelfReg + Trust) / 2	0.871 [0.822; 0.907]	75.8%
MAIA_TAS_4_scales	(AttReg + SelfReg + Trust + TAS_inv) / 4	0.850 [0.795; 0.892]	72.3%
AttReg_Trust	(AttReg + Trust) / 2	0.800 [0.729; 0.855]	64.1%

Formula	Components	r (95% CI)	R^2
TAS_only	(40 − TAS_total) / 10	0.296 [0.131; 0.446]	8.8%
All_7_scales	Mean of all 7 scales	0.112 [−0.062; 0.279]	1.2%

The key finding is that adding TAS-20-R to the composite indicator (the MAIA_TAS_4_scales formula) did not lead to improved measurement accuracy but, on the contrary, reduced the correlation with the reference indicator G. This refutes the initial hypothesis that an integral indicator combining the verbal (TAS-20-R) and somatic-perceptual (MAIA-R) components would demonstrate higher accuracy in measuring emotional awareness than an indicator based exclusively on MAIA-R. In contrast, the obtained data indicate that the somatic-perceptual component is central for measuring emotional awareness, while the verbal deficit (alexithymia) introduces redundant variance in the algebraic composition of indicators.

Thus, the best formula for calculating the sought indicator EA_Index is as follows:

EA_Index = (MAIA_AttReg + MAIA_SelfReg + MAIA_Trust) / 3

Cross-validation of the EA_Index

To assess the stability of the developed indicator, the selected MAIA_3_scales formula was verified on the independent validation subsample ($n = 56$). The reference indicator G for the validation subsample was calculated using the weights (0.533 and 0.467) obtained from the training subsample.

The correlation of EA_Index with G on the validation subsample was $r = 0.950$ (95% CI [0.916; 0.971], $R^2 = 90.3\%$). This value exceeds the correlation on the training subsample ($r = 0.890$), indicating the absence of overfitting and high stability of the indicator. Thus, cross-validation confirmed that the formula selected on the training subsample maintains high accuracy when applied to new, previously unseen data.

Discriminative Capacity of the EA_Index

To assess the ability of the developed indicator to differentiate participants with different levels of emotional awareness, the combined sample ($N = 186$) was divided into three groups by terciles of the EA_Index distribution. Group boundaries were: low emotional awareness –

EA_Index < 2.69, medium – 2.69 ≤ EA_Index < 3.55, high – EA_Index ≥ 3.55. Each group comprised 62 participants.

Since normality testing of the original scales (Shapiro–Wilk test) revealed statistically significant deviations from normal distribution for all scales ($p < 0.05$ for MAIA_Notice, MAIA_AttReg, MAIA_EmoNeg, MAIA_EmoPos, MAIA_SelfReg, MAIA_Trust, TAS_total), the nonparametric Kruskal–Wallis test was used for group comparison.

Effect size was estimated using η^2, calculated as $H/(N-1)$ [198]. For pairwise group comparisons, the Dunn post-hoc test with Bonferroni correction was applied. Results of the Kruskal–Wallis test are presented in Table 7. Groups differ significantly on all scales included in EA_Index, with very large effect sizes. For scales not included in the indicator (including TAS_total), significant differences are also observed, though effect sizes are smaller (η^2 = 0.096–0.151).

Table 7.

Comparison of groups formed by EA_Index (Kruskal–Wallis test, combined sample, n = 186)

Scale	Low EA (n=62) M (SD)	Medium EA (n=62) M (SD)	High EA (n=62) M (SD)	H	p	η^2
MAIA_AttReg	2.45 (0.71)	3.01 (0.76)	3.60 (0.93)	112.5	< 0.001	0.608
MAIA_SelfReg	2.10 (0.57)	2.64 (0.77)	3.30 (1.01)	110.7	< 0.001	0.599
MAIA_Trust	2.88 (0.94)	3.60 (1.06)	4.23 (1.08)	106.6	< 0.001	0.576
MAIA_Notice	2.98 (0.97)	3.32 (1.00)	3.70 (1.02)	28.0	< 0.001	0.151
MAIA_EmoNeg	2.84 (1.21)	3.14 (1.22)	3.50 (1.25)	21.6	< 0.001	0.117
MAIA_EmoPos	3.19 (1.11)	3.60 (1.09)	3.97 (1.02)	24.9	< 0.001	0.135
TAS_total	55.3 (11.3)	52.5 (10.4)	50.3 (10.2)	17.8	< 0.001	0.096

Note. η^2 – effect size calculated as $H/(N-1)$.

Pairwise comparisons (Dunn test with Bonferroni correction) showed that all three groups differ significantly from each other on the scales included in EA_Index ($p < 0.001$ for all comparisons). For scales not included in EA_Index, differences between groups are less pronounced. For MAIA_Notice, MAIA_EmoNeg, and MAIA_EmoPos, significant differences are observed between the low and high EA groups ($p < 0.001$). For TAS_total, significant differences were found between the low and medium EA groups ($p = 0.048$) and between low and high EA ($p = 0.002$), while the medium and high EA groups did not differ ($p = 0.235$).

Comparison with Alexithymia Assessment

To assess the relationship between the developed indicator and TAS-20 scores, a contingency analysis was conducted on the full sample (N = 186). The sample was divided into three groups by EA_Index terciles (low, medium, high EA) and into three groups by clinical TAS-20 thresholds: ≤51 – low alexithymia; 52–60 – medium; ≥61 – high alexithymia.

Results are presented in Table 8. The highest proportion of individuals with high alexithymia (≥61) is observed in the low EA group (48.4%), whereas in the high EA group it is only 19.4%. Conversely, the proportion of individuals with low alexithymia (≤51) is greatest in the high EA group (64.5%) and smallest in the low EA group (30.6%).

Statistical analysis revealed a significant but weak relationship between the classifications: $\chi^2 = 18.68$, $df = 4$, $p = 0.001$, Cramér's V = 0.224.

Post-hoc analysis showed that the low EA group differs significantly from the medium and high EA groups in the proportion of individuals with high alexithymia ($p = 0.005$ and $p = 0.001$, respectively), while the medium and high EA groups did not differ from each other ($p = 0.825$). Thus, EA_Index and TAS-20 display a significant, though weak, relationship (Cramér's V = 0.224).

Table 8.

Contingency of classifications by EA_Index and TAS-20 (N = 186)

EA_Index	Low alexithymia (≤51)	Medium alexithymia (52–60)	High alexithymia (≥61)	Total
Low EA	19 (30.6%)	13 (21.0%)	30 (48.4%)	62
Medium EA	34 (54.8%)	14 (22.6%)	14 (22.6%)	62
High EA	40 (64.5%)	10 (16.1%)	12 (19.4%)	62
Total	93	37	56	186

Note. $\chi^2 = 18.68$, $df = 4$, $p = 0.001$, *Cramér's V = 0.224.*

Confirmation of the Construct's Structure

To verify the validity of the two-factor structure identified in the EFA on the training subsample, and to confirm that this structure is stable across all the data, a confirmatory factor analysis (CFA) was conducted on the combined sample ($n = 186$). Conducting CFA after completing formula development and cross-validation ensures the independence of the analysis stages and rules out the possibility of using information from the combined sample to adjust the formula.

Based on EFA results and theoretical considerations, a two-factor model was tested with a cross-loading of the MAIA_SelfReg scale (since in EFA it showed a relationship with both factors) and error correlations between theoretically related scales: MAIA_EmoNeg with MAIA_EmoPos (both measuring emotional awareness), MAIA_AttReg with MAIA_SelfReg (both reflecting regulatory processes), and MAIA_Notice with MAIA_EmoNeg (observation of the body is linked to awareness of negative emotions).

The model demonstrated acceptable fit with the data: CFI = 0.964, SRMR = 0.065, TLI = 0.915. The RMSEA value was 0.092 (90% CI [0.046; 0.139]), which falls in the borderline zone and is likely related to the limited sample size for complex models [92]. All factor loadings were statistically significant ($p < 0.001$), confirming each scale's contribution to the corresponding factor.

As in the EFA, TAS_total demonstrated a significant negative loading on Factor 1 ($\lambda = -0.451$, $p < 0.001$), which is consistent with theoretical conceptions of the inverse relationship between alexithymia and emotional awareness. The inter-factor correlation was $r = 0.464$ ($p < 0.001$), indicating a moderate relationship and justifying the use of the weighted factor sum (G) as the reference indicator. Standardized factor loadings are presented in Table 9.

Table 9.

Standardized factor loadings (CFA, combined sample, n = 186)

Factor	Indicator	λ	p
Factor 1 (cognitive-regulatory)	MAIA_AttReg	0.698	< 0.001
	MAIA_Trust	0.740	< 0.001
	TAS_total	−0.451	< 0.001

Factor	Indicator	λ	p
	MAIA_SelfReg	0.472	< 0.001
Factor 2 (affective-perceptual)	MAIA_Notice	0.528	< 0.001
	MAIA_EmoNeg	0.641	< 0.001
	MAIA_EmoPos	0.714	< 0.001
	MAIA_SelfReg	0.429	< 0.001
Inter-factor correlation	r(F1, F2)	0.464	< 0.001

Thus, the results of the confirmatory factor analysis indicate acceptable fit of the two-factor model to the empirical data (CFI = 0.964, SRMR = 0.065). The borderline RMSEA value (0.092) – given the limited sample size ($n = 186$) and model complexity (7 indicators, cross-loading, three error correlations) – does not warrant rejection of the proposed structure [92, 113]. All factor loadings are statistically significant ($p < 0.001$), with values ($\lambda = 0.429$–0.740) corresponding to moderate and high levels. The inter-factor correlation ($r = 0.464$) indicates a substantive relationship, which justifies the use of the weighted factor sum (G) as the reference indicator. The data confirm that the two-factor structure identified on the training subsample is reproduced on the combined sample and is not an artifact of random data partitioning.

EA_Index: Calculation Formula and Normative Values

Based on the analysis conducted, the following formula is proposed as the final indicator of emotional awareness, representing the simple mean of the three MAIA-R scales that loaded on Factor 1 (cognitive-regulatory):

EA_Index = (MAIA_AttReg + MAIA_SelfReg + MAIA_Trust) / 3

This formula was selected as providing maximum correlation with the reference indicator G on the training subsample, and confirmed its stability in cross-validation.

The choice of simple mean (equal weights) over weighted variants is driven by ease of calculation and reproducibility in other studies, as well as comparable performance relative to more complex formulas.

In the combined sample ($N = 186$), EA_Index has the following parameters: range 0.86 to 4.91 ($M = 3.08$, $SD = 0.90$). The correlation of the index with the reference G reached $r = 0.892$ (95% CI [0.856; 0.921]), corresponding to 79.6% of explained variance in the reference construct.

For forming contrasting groups in experimental research, the following threshold values are recommended, based on terciles of the EA_Index distribution in the combined sample:

- Low emotional awareness: EA_Index < 2.69
- Medium emotional awareness: 2.69 ≤ EA_Index < 3.55
- High emotional awareness: EA_Index ≥ 3.55

Distribution of participants by group is presented in Table 10. Group sizes are comparable, ensuring sufficient statistical power when used as an independent variable in experimental designs.

Table 10.

Distribution of participants by emotional awareness group (N = 186)

Group	EA_Index range	n	%
Low EA	< 2.69	62	33.3%
Medium EA	2.69 – 3.55	62	33.3%
High EA	≥ 3.55	62	33.3%

Discussion of Results

The CFA on the combined sample (N = 186) demonstrated acceptable fit of the proposed two-factor model to the empirical data: CFI = 0.964, SRMR = 0.065. The RMSEA value was 0.092 (90% CI [0.046; 0.139]). According to the criteria of M.W. Browne and R. Cudeck [21], an RMSEA in the range 0.08–0.10 corresponds to mediocre fit, which formally exceeds the threshold of 0.08 sometimes treated as the upper limit of acceptable fit. However, this value requires correct interpretation with consideration of sample and model characteristics.

First, according to simulation studies by D. Kenny and colleagues, for small degrees of freedom (df = 9), RMSEA has a systematic tendency toward overestimation [62]. In the present case, the number of degrees of freedom is only 9. Under such conditions, RMSEA overestimation may reach, by the estimates of some authors, 0.02–0.03. Accounting for this correction, the true RMSEA value likely falls within 0.06–0.07, corresponding to acceptable or even good fit.

Second, as noted by L.-T. Hu and P.M. Bentler, with small samples (N < 250), preference should be given to the CFI and SRMR indices, which are less sensitive to sample size than

RMSEA [53]. In the present study, CFI = 0.964 exceeds the recommended threshold of 0.95, and SRMR = 0.065 is below 0.08, indicating good model fit on these indices.

Third, all factor loadings in the model were statistically significant ($p < 0.001$), with values ranging from 0.429 to 0.740, corresponding to moderate and high levels [47]. The low loading of TAS_total ($\lambda = -0.451$) is nonetheless statistically significant and reflects the theoretically grounded inverse relationship between alexithymia and emotional awareness. The presence of significant loadings for all indicators confirms that each contributes to the measurement of the corresponding latent factor.

Thus, despite the borderline RMSEA value, the combined fit indices (CFI, SRMR), together with consideration of the small sample size and few degrees of freedom, support accepting the proposed two-factor model as acceptable and substantively interpretable.

An important methodological advantage of the present study is the division of the total sample into training (70%) and validation (30%) subsamples with a fixed random seed to ensure reproducibility. This procedure corresponds to current cross-validation standards in psychometric instrument development [24] and avoids circularity of analysis (circularity/data leakage), in which the indicator formula is overfitted to a specific sample.

Formula development and selection were conducted exclusively on the training subsample ($n = 130$). The reference indicator G for the validation subsample ($n = 56$) was calculated using the factor weights (0.533 and 0.467) obtained from the training subsample, without any adjustment to the validation data. The final formula EA_Index = (MAIA_AttReg + MAIA_SelfReg + MAIA_Trust) / 3 was fixed before its testing on the validation subsample.

The correlation of EA_Index with the reference indicator G on the validation subsample ($r = 0.950$, 95% CI [0.916; 0.971]) was even higher than on the training subsample ($r = 0.890$). This indicates the absence of overfitting and confirms the stability and reproducibility of the developed indicator. Thus, the research procedure completely rules out the possibility of circular validation and guarantees that the results obtained are not an artifact of random features of the specific sample.

In developing the composite indicator, we compared several formula variants, including those weighted by factor loadings and by reliability. The best result was demonstrated by the equal-weights formula – the simple mean of three scales. More complex weighted formulas accounting for each scale's contribution did not outperform the simple additive model. This phenomenon is explained by the fact that with small samples (n = 130), estimates of factor loadings and reliability coefficients may be unstable [57], and using them as weights introduces additional variability and may lead to overfitting [59]. Additionally, the simple mean has the advantage of reproducibility: other researchers can use EA_Index without recalculating weights on their own samples, consistent with the principles of open and reproducible science.

An important result of our work was that the EFA conducted on the training subsample permitted the identification of two latent factors underlying the interrelationships among MAIA-R and TAS-20 questionnaire scales. The identified two-factor structure demonstrated good fit. Explained variance totaled 50.8%, which is an acceptable result for a psychometric study.

The first factor, named "cognitive-regulatory," grouped the following scales:

Attention Regulation (MAIA_AttReg) – the ability to sustain and direct attention to bodily sensations [123]. This scale reflects the voluntary, controlled component of working with bodily information.

Self-Regulation (MAIA_SelfReg) – the ability to use awareness of bodily sensations to regulate psychological distress [123].

Trusting (MAIA_Trust) – experiencing one's own body as a safe and trustworthy source of information about emotional states [123]. This scale reflects an evaluative relationship with bodily signals.

TAS-20 total score (with negative loading) – measures deficits in cognitive emotion processing, including difficulty identifying feelings, difficulty describing them, and externally oriented thinking [206]. The negative loading indicates that low values on this factor correspond to high alexithymia, which is consistent with the meta-analysis by D. Maroti and colleagues, which records a significant negative correlation between TAS-20 and LEAS ($r = -0.122$; 95% CI [−0.180; −0.064]) [112].

It should be noted that the Trusting scale (MAIA_Trust) somewhat diverges from a purely "cognitive-regulatory" logic, as it more strongly reflects affective evaluation (safety, trust) rather than cognitive or regulatory processes. However, its placement in this factor may be explained by the fact that the ability to trust bodily signals is a result of successful regulation and cognitive processing of bodily information. Furthermore, in research on interoceptive awareness, the

Trusting scale demonstrates stable relationships with regulatory processes and psychological well-being indicators [63, 45].

The second factor, named "affective-perceptual," grouped the following scales:

Noticing (MAIA_Notice) – the ability to notice various bodily sensations (comfortable, uncomfortable, and neutral) [123].

Emotional Awareness of Negative States (MAIA_EmoNeg) and *Emotional Awareness of Positive States* (MAIA_EmoPos) – the ability to recognize the link between bodily sensations and emotional states of different valence [123].

These scales reflect basic perceptual processes and their relationship to emotional experiences, corresponding to the lower levels of the Lane–Schwartz emotional awareness model (levels 1–2: bodily sensations and their connection to affect) [74].

The CFA confirmed the reproducibility of the two-factor structure: all factor loadings were statistically significant, and the model fit indices indicate good correspondence with the empirical data.

The inter-factor correlation proved to be moderate and significant, indicating a substantive relationship between them while maintaining relative independence.

The identified two-factor structure empirically confirms the theoretical proposition substantiated in Chapter 1 regarding the non-homogeneous nature of emotional awareness, within which two interrelated but relatively independent components can be distinguished – somatic-perceptual (Factor 2) and verbal-cognitive with regulatory capacities (Factor 1).

The central finding of the present chapter was that the original hypothesis was not confirmed. The initial intent envisaged creating an integral indicator of emotional awareness that would combine information from two complementary sources: TAS-20 and MAIA-R. It was expected that the joint use of these instruments would yield a more complete and reliable measure of the construct than either one alone. However, the obtained empirical data did not support this expectation. Adding TAS-20 to the composite indicator in any form reduced the correlation with the reference factor scores compared to the indicator based exclusively on MAIA-R scales. The somatic-perceptual component measured by MAIA-R proved sufficient for reliable assessment of emotional awareness, while the verbal-deficit component (TAS-20) introduces redundant variance in the algebraic composition of indicators.

At the same time, it would be incorrect to claim that TAS-20 showed no relationship with the measured construct. It entered the factor structure – in the cognitive-regulatory Factor 1 – with a statistically significant, though modest, negative loading ($\lambda = -0.451$, $p < 0.001$). This means that TAS-20 and the scales included in EA_Index share a common latent factor, indicating their substantive relationship. However, direct algebraic addition of TAS-20 to the composite proved ineffective and led to reduced measurement accuracy.

The resulting EA_Index does not equally reflect both components of emotional awareness – it operationalizes awareness primarily through the somatic-perceptual component measured by three MAIA-R scales. From this perspective, EA_Index, although based exclusively on somatic-perceptual scales, allows indirect inference about the overall level of emotional awareness: low EA_Index scores indicate impaired somatic access, making full verbal emotional awareness impossible, whereas high scores indicate an intact bodily foundation on which verbal representation may be built even in the presence of some deficit measured by TAS-20. From a practical standpoint, this means that for experimental studies of emotional information processing, EA_Index may be preferable to TAS-20, as it reflects the bodily channel through which emotional information is primarily processed.

This conclusion is also supported by the results of the contingency analysis of classifications by EA_Index and TAS-20, which revealed a statistically significant, moderate relationship between the two indicators (Cramér's $V = 0.224$). As can be seen from the obtained data, among participants with high emotional awareness by EA_Index, 64.5% have low alexithymia, while among participants with low awareness, high alexithymia occurs in 48.4% of cases. Thus, persons with low alexithymia have a high probability of falling into the high emotional awareness group by EA_Index. In other words, EA_Index and TAS-20 display partial overlap, confirming that both instruments belong to the same conceptual field of emotional awareness. The detected relationship is in the same range as the correlation between TAS-20 and LEAS in the meta-analysis by Maroti and colleagues ($r = -0.122$; 95% CI [-0.180; -0.064]), indicating a significant but not strong relationship between alexithymia and emotional awareness [112].

On the basis of the results obtained, a question may arise regarding the utility of the EA_Index if the key data proved to come from the MAIA-R questionnaire. The developed indicator has a number of advantages over using “pure” MAIA-R. In psychometric terms, EA_Index is based only on the three scales included in the cognitive-regulatory factor (MAIA_AttReg, MAIA_SelfReg, MAIA_Trust), which demonstrated the highest factor loadings in the CFA (λ = 0.698–0.740). Excluding the affective-perceptual factor scales (MAIA_Notice, MAIA_EmoNeg, MAIA_EmoPos), as well as the orthogonal scales MAIA_NotDistract and MAIA_NotWorry, improves the psychometric quality of the integral indicator compared to using all questionnaire scales. The correlation of EA_Index with the reference factor scores ($r = 0.890$ on the training subsample, $r = 0.950$ on the validation subsample) is substantially higher than the correlation of any individual MAIA-R scale with the reference indicator, confirming its advantage. Additionally, EA_Index is a unidimensional indicator, which simplifies sample stratification by awareness level, whereas the use of three separate scales would require multivariate approaches and would create a multiple comparisons problem. Thus, EA_Index does not duplicate MAIA-R but represents its psychometrically grounded and practical operationalization, preserving the theoretical structure of the construct and possessing the advantages of ease of use and reproducibility of results. Furthermore, the conducted analysis shows which specific MAIA-R scales are most important in the somatic-perceptual component of emotional awareness.

One limitation was the uneven sex distribution in the sample (66.7% women). However, no significant differences were found between men and women on the scales included in EA_Index ($p > 0.05$ for MAIA_AttReg, MAIA_SelfReg, MAIA_Trust), which allows the indicator to be applied to mixed-sex samples. The results obtained are consistent with data from the Russian-language MAIA-R adaptation study, which also found no significant sex differences on the main questionnaire scales. For full validation, studies are needed in which EA_Index is compared with independent behavioral indicators. Such verification is carried out in the experimental chapters of the present dissertation (Chapter 3), where the developed indicator is used for sample stratification in the emotional Stroop test and affect verbalization paradigms.

Thus, the developed indicator EA_Index = (MAIA_AttReg + MAIA_SelfReg + MAIA_Trust) / 3 represents a simple, psychometrically grounded, and stable instrument for assessing emotional awareness through its somatic-perceptual component.

EA_Index demonstrates sufficient psychometric properties for use as a rapid-assessment measure of emotional awareness (Cronbach's α = 0.84–0.86; correlation with the reference indicator G: r = 0.890–0.950).

The obtained superiority of the indicator based on three MAIA-R scales over the combination with TAS-20 indicates that the somatic-perceptual component is not merely one aspect of emotional awareness but its central, fundamental core. The verbal-cognitive deficit (alexithymia), although linked to the somatic-perceptual component (as confirmed by the significant loading of TAS-20 on Factor 1), when directly algebraically combined, introduces redundant variance and reduces measurement accuracy. This means that for practical diagnostic assessment of emotional awareness (e.g., in applied studies of emotional information processing), reliance on the somatic-perceptual MAIA-R scales is sufficient.

2.2. Study 1. Emotional Awareness in the Emotional Stroop Task

As was shown in Chapter 1, the emotional Stroop test is the canonical experimental paradigm for studying the automatic, uncontrolled processes of emotional information processing. The instruction requires ignoring the semantic content of the word and responding only to its color, which allows the automatic attentional capture to be isolated from voluntary control [217, 158]. The magnitude of the emotional interference effect is sensitive to the individual characteristics of participants [7], making this paradigm suitable for studying the contribution of emotional awareness.

The aim of this study was to test the assumption that the level of emotional awareness, assessed through the EA_Index indicator, would be reflected in the processes of emotional information processing in the emotional Stroop task.

Materials and Methods

Participants

91 participants took part in the study. Inclusion criteria were: Russian as the native language, normal or corrected-to-normal vision, and the absence of neurological or psychiatric disorders by self-report. Participants were recruited through social media announcements and the snowball sampling method; participation was voluntary and compensated.

Five participants were excluded from analysis because their error rate (incorrect responses when naming the color) exceeded 20% in any of the experimental series, to avoid distortions due to non-compliance with the instructions. The final sample comprised 86 persons (57 women, 29 men). The mean age of participants was 29.58 years (SD = 10.29; range 17–58 years). All participants signed an informed consent form before the experiment. An a priori power analysis showed that to detect a medium effect size ($d = 0.5$) at $\alpha = 0.05$ with power 0.80, a sample size of $N = 34$ is required; the actual $N = 86$ provides power > 0.80.

Stimulus Material

The stimulus material included 70 Russian-language nouns divided into three categories: 30 neutral, 20 negative, and 20 positive words.

Words were selected from the ENRuN emotional norms database, which contains normative emotional valence ratings for 378 Russian-language nouns (Lyusin, Sysoeva, 2025). Each word in the database was rated on five emotional categories (joy, sadness, anger, fear, disgust) on a scale from 0 to 5, which allowed dividing the words into neutral, negative, and positive categories on the basis of objective criteria.

An integrated valence was calculated for each word using the formula of the balance of positive and negative emotional categories: Valence = Joy − (Sadness + Anger + Fear + Disgust) / 4. Analysis showed that the word groups are contrastive: valence ranges do not overlap.

For negative words, valence ranged from −3.09 to −1.31; for neutral words from −0.01 to 2.21; for positive words from 2.38 to 4.70. Analysis of variance (ANOVA) revealed statistically significant differences between all three groups ($F(2, 57) = 94.27$, $p < 0.001$, $\eta^2 = 0.77$). The percentage of agreement between the original categorization and the calculated valence was 90.3%.

To control for linguistic covariates, data were collected on word frequency in the language (ipm – instances per million words) based on a frequency dictionary [130], as well as information on word length in letters.

Procedure

The experiment was conducted individually in a separate room with controlled lighting. The participant sat approximately 60 cm from the computer monitor. The mouse was held in the left hand; the right hand rested on the keyboard.

Each trial began with a fixation cross presented at the center of the screen for 500 ms. After this, a word was presented in the same location, printed in one of four colors: yellow, red, green, or blue. Colors were presented in random order. The participant's task was to press the key corresponding to the color as rapidly and accurately as possible: 1 – yellow, 2 – red, 3 – green, 4 – blue. The key-color assignment was identical for all participants; random color-order presentation minimizes the potential influence of key imbalance.

Instructions did not indicate that participants should read the words; participants were asked to focus exclusively on the ink color.

Words were presented until the participant responded, but no longer than 2000 ms. The inter-trial interval was 1000 ms.

The experiment comprised four series: the first series contained 10 practice trials; the second, third, and fourth series – 20 trials each. Each of the three main series used only one type of stimuli: neutral, negative, or positive words. The blocked design was chosen to minimize carryover effects between stimuli of different valence.

The order of series was randomized across participants; verification showed no significant influence of order on response time. Each participant completed 70 trials in total.

The order of word presentation within each series was randomized for each participant.

Upon completion of the experimental phase, each participant performed a subjective Age of Acquisition (AoA) rating procedure. Participants were read the words from the experimental set aloud and asked to indicate the approximate age in years at which they first learned each word – began to understand and/or use it.

Participants were instructed to draw on their own language-learning experience; examples of typical acquisition ages were provided ("мама" [mom] – approximately 1.5 years, "школа" [school] – approximately 5–6 years), and they were asked to provide approximate estimates when uncertain. For unfamiliar words, participants were asked to indicate the age at which a typical child might learn it. The validity of the subjective age-of-acquisition rating method for Russian-language vocabulary has been confirmed in psycholinguistic research (e.g., [191]).

To assess the somatic-perceptual component of emotional awareness, the Russian-language version of the Multidimensional Assessment of Interoceptive Awareness questionnaire – MAIA-R, adapted by R. Popova and O. Lopukhova [162] – was used.

The level of emotional awareness was assessed using the composite indicator EA_Index.

Internal consistency of EA_Index in the present sample ($N = 86$) was $\alpha = 0.84$. Based on the EA_Index distribution, participants were divided into three groups by terciles: low awareness (EA_Index $\leq$ 2.587), medium awareness (2.587 < EA_Index $\leq$ 3.613), and high awareness (EA_Index > 3.613).

Statistical Analysis

Data analysis was performed in the R environment (version 4.5.2) using the following packages: lme4 (for linear mixed models), stats (for t-tests, ANOVA, and regressions), car (for regression residual diagnostics), lmtest and sandwich (for HC3 robust standard errors). Data from the practice (first) series, which contained 10 trials with neutral words, were not included in the main analysis, since the purpose of the practice series was to familiarize participants with the procedure and response keys.

A priori power analysis. To determine the required sample size, an a priori calculation was performed for a t-test at medium effect size $d = 0.5$, significance level $\alpha = 0.05$, and statistical power $1 - \beta = 0.80$. The calculation showed a required sample size of $N = 34$. The actual sample size ($N = 86$) exceeds this requirement.

Response time data cleaning. The following procedure was applied to response time data. Trials in which the participant gave an incorrect response (pressed the wrong key for the word's color) were excluded, which is standard practice in Stroop data analysis [133, 217]. Trials with response time less than 200 ms (anticipations) were also excluded, since such responses do not reflect cognitive processing [167, 216]. To identify outliers among slow responses, the Median Absolute Deviation (MAD) method was used with a threshold of 2.5 [123]. This method is robust to distributional skewness and is recommended for processing RT data instead of standard deviation [167, 201].

Log transformation. Since the response time distribution in cognitive tasks has positive skewness, natural log transformation (log-RT) was applied for normalization and to bring the data to a form suitable for parametric statistics (t-tests, ANOVA, regressions) [167, 216]. All subsequent statistical analyses were conducted using log-RT. Raw RT values in milliseconds (M, SD) are presented in tables and text for clarity.

Data averaging. After data cleaning, the mean log-RT was computed per participant, separately for each word type (neutral, negative, positive). These averaged indicators were used for subsequent statistical analysis (paired t-tests, ANOVA, regressions).

Control for linguistic covariates. Linear mixed models (LMM) using the lme4 package were applied to control the influence of linguistic word parameters (frequency, number of letters, age of acquisition) on response time, with log-transformed RT as the dependent variable, linguistic parameters as fixed effects, and random intercept for words. Standard diagnostic checks of regression residuals (homoscedasticity, normality, independence) were performed using the car, lmtest, and sandwich packages.

Main statistical analysis. Paired t-tests (for comparing RT between valence conditions) and linear regression (for assessing the relationship between EA_Index and interference magnitude) were used for hypothesis testing. Additionally, to verify linearity of the relationship and as a confirmatory analysis, a comparison of three participant groups (low, medium, and high emotional awareness) was performed using one-way analysis of variance (ANOVA) with subsequent post-hoc comparison (Tukey's test). To verify the robustness of results, regression coefficients were re-estimated using robust standard errors (HC3), which allowed correction of possible heteroscedasticity and confirmation of the significance of the obtained coefficients. The significance level was set at $p < 0.05$. Effect sizes were assessed using r (for t-tests), η^2 (for ANOVA), and R^2 (for regressions).

Post-hoc power analysis. For the regression model in which EA_Index predicted the magnitude of interference on negative words, a post-hoc power analysis was conducted. At the obtained $R^2 = 0.0975$ ($f^2 = 0.1081$), the achieved statistical power was 0.854.

Results

The a priori calculation (described in the "Statistical Analysis" section) showed that to detect a medium effect size ($d = 0.5$) with power 0.80, a sample size of $N = 34$ is required. The actual sample size was $N = 86$. The post-hoc power analysis for the regression model in which EA_Index predicted the magnitude of interference on negative words showed that at $R^2 = 0.0975$ ($f^2 = 0.1081$), the achieved power is 0.854. The statistical power of the study is sufficient for detecting medium and large effect sizes.

Demographic Characteristics of the Sample

The arithmetic mean (M) and standard deviation (SD) were used to describe demographic characteristics of the sample. Comparison of men and women by age and EA_Index level was performed using the independent samples t-test.

The final sample, after exclusion of participants with an error rate exceeding 20%, comprised 86 persons. Of these, 57 (66.3%) were women and 29 (33.7%) men. Mean participant age was 29.58 years (SD = 10.29). The mean value of the composite emotional awareness indicator EA_Index was 3.118 (SD = 0.879). No statistically significant differences between men and women were found either in age ($t = 1.192$, $p = 0.240$) or in EA_Index level ($t = -1.144$, $p = 0.258$).

Based on the EA_Index distribution, all participants were divided into three groups by terciles: low awareness (EA_Index ≤ 2.587, n = 29), medium awareness (2.587 < EA_Index ≤ 3.613, n = 27), and high awareness (EA_Index > 3.613, n = 30). Group characteristics are presented in Table 11.

Table 11.

Demographic characteristics of groups with different emotional awareness levels

Group	N	Age (M, SD)	EA_Index (M, SD)	Women (n)	Men (n)
Low awareness	29	30.2 (10.9)	2.14 (0.414)	17	12
Medium awareness	27	30.3 (10.4)	3.09 (0.308)	19	8
High awareness	30	28.3 (9.82)	4.09 (0.297)	21	9

Error Analysis

The nonparametric Friedman test was used to compare the error percentage between the three types of words (neutral, negative, positive).

Total number of trials and error percentage by stimulus type are presented in Table 12. The Friedman test revealed no statistically significant differences between word types ($\chi^2 = 3.848$, $p = 0.146$). It should be noted that the number of trials differs by word type as a result of the exclusion of incorrect responses, anticipations, and outliers during data cleaning.

Table 12.

Error percentage by stimulus type

Word type	Total trials	Number of errors	Error percentage (%)
Neutral	1508	71	4.71
Negative	1679	75	4.47
Positive	1705	58	3.40

The error percentage does not differ significantly between neutral, negative, and positive words.

Linguistic Characteristics of Stimuli and Their Relationship with Response Time

The main analysis used 20 neutral words, since 10 neutral words were presented only in the practice series and were excluded from analysis. The number of negative and positive words remained unchanged (20 words of each type).

The arithmetic mean (M) and standard deviation (SD) were used to describe the linguistic parameters of stimuli (word frequency in the language – ipm, number of letters, age of acquisition).

Spearman's rank correlation coefficient (ρ) was used to assess the relationship between linguistic parameters and response time (RT) for each word type. Linear mixed models (LMM) with log-transformed RT as the dependent variable, linguistic parameters as fixed effects, and random intercept for words were used to control the influence of linguistic parameters on response time.

Spearman's correlation between LMM residuals and each covariate was calculated to assess the success of covariate control.

Linguistic characteristics of stimuli by word type are presented in Table 13.

Table 13.

Linguistic characteristics of stimuli by word type (M ± SD)

Word type	N words	Frequency (ipm)	Letter count	Age of acquisition (years)
Neutral	20	29.3 ± 14.3	5.40 ± 0.49	6.20 ± 1.10
Negative	20	29.0 ± 11.5	5.06 ± 0.74	6.60 ± 1.30
Positive	20	41.7 ± 14.8	5.35 ± 0.58	5.84 ± 0.90

Note. ipm – instances per million words.

Correlation analysis (Spearman's coefficient) revealed significant relationships between linguistic parameters and response time (RT) for each word type. Results are presented in Table 14.

Table 14.

Correlations of linguistic parameters with response time (RT) by word type (ρ, p)

Parameter	Neutral words	Negative words	Positive words
Frequency (ipm)	$\rho = -0.458$, $p = 0.042$	$\rho = -0.266$, $p = 0.256$	$\rho = -0.552$, $p = 0.013$
Letter count	$\rho = -0.85$, $p < 0.001$	$\rho = -0.932$, $p < 0.001$	$\rho = -0.878$, $p < 0.001$
Age of acquisition	$\rho = 0.258$, $p = 0.272$	$\rho = -0.424$, $p = 0.062$	$\rho = -0.154$, $p = 0.517$

Note. ρ – Spearman's rank correlation coefficient; significant correlations ($p < 0.05$) highlighted.

As can be seen from Table 14, frequency correlates significantly negatively with RT for neutral ($\rho = -0.458$, $p = 0.042$) and positive ($\rho = -0.552$, $p = 0.013$) words: more frequent words are processed more rapidly.

Letter count correlates significantly negatively with RT for all three word types (ρ from −0.85 to −0.93, $p < 0.001$): shorter words are processed more rapidly. Age of acquisition showed no significant correlations ($p > 0.05$ for all word types, though a trend is observed for negative words: $\rho = -0.424$, $p = 0.062$).

Linear mixed models (LMM) with log-transformed RT as the dependent variable, linguistic parameters as fixed effects, and random intercept for words were applied to control the influence of linguistic parameters on response time. After covariate control, the model residuals do not correlate with frequency ($\rho = 0.006$, $p = 0.683$), letter count ($\rho = -0.003$, $p = 0.814$), or age of acquisition ($\rho = 0.004$, $p = 0.773$).

Linguistic parameters (frequency and letter count) correlate significantly with response time, which justifies the need for their control. The application of LMM successfully neutralized their influence, since the model residuals do not correlate with the covariates. Consequently, the observed valence effects are not artifacts of linguistic differences among the stimuli.

Emotional Interference Effect

Descriptive statistics of response time by word type are presented in Table 15.

Table 15.

Descriptive statistics of response time (RT, ms) by word type

Comparison type	Word type	M	SD	Min	Max
Stroop effect	Negative	734.5	98.3	521.2	987.4
	Neutral	695.2	87.6	509.8	934.1
	Difference (negative − neutral)	39.3	3.38	29.0	46.9
Positive word effect	Positive	669.6	79.4	498.3	892.7
	Neutral	695.2	87.6	509.8	934.1
	Difference (positive − neutral)	−25.6	1.89	−29.1	−21.2

Response time for negative words is longer than for neutral words; response time for positive words is shorter than for neutral words.

To verify the presence of the classical emotional interference effect, a paired t-test was conducted to compare response time (RT) for negative and neutral words. Effect size was assessed using r (Cohen's r for dependent samples).

The paired t-test revealed a statistically significant slowing of response to negative words compared to neutral. The mean difference was 39.3 ms (95% confidence interval [38.6; 40.0]), $t(85) = 113.55$, $p < 0.001$. Effect size $r = 0.997$ (very large). Response time for negative words is significantly longer than for neutral words (classical emotional interference effect).

To assess the relationship between the level of emotional awareness (EA_Index) and the magnitude of interference on negative words (difference between negative and neutral words), a linear regression was conducted.

To verify the robustness of results, the regression coefficients were re-estimated using robust standard errors (HC3). A regression analysis was also conducted for the positive word effect.

Additionally, to verify linearity of the relationship and as a confirmatory analysis, a comparison of three participant groups (low, medium, and high emotional awareness) was performed using one-way ANOVA with subsequent post-hoc comparison (Tukey's test). Given the small number of hypotheses being tested, correction for multiple comparisons was not applied.

Regression analysis showed that EA_Index is a significant positive predictor of the magnitude of interference on negative words: $\beta = 1.14$ ms per unit of EA_Index (95% confidence interval [0.3876; 1.8928]), $p = 0.0034$, $R^2 = 0.0975$ (corresponding to a small but statistically significant effect size). Using robust standard errors (HC3), the result remained significant: $\beta = 1.14$ ms per unit of EA_Index, $SE = 0.3517$, $p = 0.0017$. For the positive word effect, regression analysis found no significant relationship: $\beta = -0.2668$ ms per unit of EA_Index, $p = 0.300$, $R^2 = 0.0146$.

An additional ANOVA also revealed statistically significant differences between groups in the magnitude of interference ($F(2,83) = 3.96$, $p = 0.022$, $\eta^2 = 0.087$). Post-hoc comparison (Tukey's test) showed that the high-awareness group demonstrates greater interference compared to the low-awareness group (mean difference = 2.19 ms, $p = 0.022$, Cohen's $d = 0.68$). The medium-awareness group did not differ significantly from either the low or high group. ANOVA for the positive word effect showed no significant differences between groups ($F(2,83) = 0.212$, $p = 0.809$, $\eta^2 = 0.005$).

A higher level of emotional awareness (EA_Index) is associated with greater magnitude of interference on negative words. This result is confirmed by both regression analysis (continuous predictor) and comparison of extreme groups (high vs. low awareness). No significant relationship with EA_Index was found for positive words.

Before interpreting the obtained results, it is necessary to discuss the influence of extraneous factors that might have distorted the observed effects. In the present study, such factors were the linguistic characteristics of the stimulus material: word frequency, age of acquisition, and word length. Correlation analysis revealed significant relationships between these parameters and response time, which justifies the need for their control. Linear mixed models (LMM) were applied to neutralize the influence of linguistic covariates. After covariate control, model residuals did not correlate with frequency, letter count, or age of acquisition (residual correlations with linguistic parameters: $\rho < 0.01$, $p > 0.05$), confirming the successful neutralization of their influence. Thus, the observed valence effects are not artifacts of linguistic differences among the stimuli.

Another potentially significant factor was the speed-accuracy trade-off. To rule out this alternative interpretation, an error analysis was conducted. The Friedman test revealed no statistically significant differences in error percentage between neutral, negative, and positive words ($\chi^2 = 3.848$, df = 2, p = 0.146), which allows the assertion that differences in response time between stimulus types are not related to a change in participants' strategy.

The a priori power analysis showed that the actual sample size (N = 86) exceeds the required size (N = 34) for detecting a medium effect size, and the post-hoc power analysis for the regression model confirmed sufficient sensitivity of the study.

The reproduction of the classical emotional interference effect – a significant slowing of response to negative words compared to neutral – attests to the correctness of the implemented experimental procedure and the validity of the selected stimulus material.

The key finding of the study was the detection of a positive relationship between the level of emotional awareness, operationalized through its somatic-perceptual component (EA_Index), and the magnitude of emotional interference on negative words. Both regression analysis and comparison of extreme groups showed that a higher level of awareness is accompanied by greater interference. This result directly confirms the proposed hypothesis.

The data obtained are consistent with the results of N. Werner and colleagues. In Werner's study, the group with high interoceptive accuracy demonstrated greater interference on negative words. Although an objective interoception measure was not used in the present study, the EA_Index employed is based on MAIA-R scales directed at assessing the ability to notice bodily signals, regulate attention toward them, and trust them. It may be assumed that persons with high awareness by EA_Index, like participants with high interoceptive accuracy in the Werner study [215], are characterized by enhanced automatic attentional capture by negative information, which – in conditions of limited cognitive resources – creates additional interference.

The detected pattern allows the explanation of contradictions documented in the literature. Studies relying on TAS-20 measure the verbal-cognitive deficit and may yield any of the three interference patterns depending on sample composition. Studies in which awareness is measured through the somatic-perceptual component – whether objective interoceptive accuracy [215] or EA_Index – consistently demonstrate enhanced interference.

Thus, the direction of the relationship depends on which component of awareness is brought into focus by the measurement. TAS-20, which does not address bodily sensitivity, does not allow prediction of interference magnitude with the same certainty as measures directed at the somatic-perceptual component, which, according to the somatic marker theory [36, 37], is the key element for the automatic attentional capture by emotional stimuli.

When interpreting the results, a number of limitations must be considered. First, the correlational design does not allow causal conclusions to be drawn about the direction of the relationship between emotional awareness and interference magnitude. Neither reverse causality nor the influence of third variables – for example, the level of trait anxiety, which is capable of modulating both interoceptive sensitivity and the response to emotional stimuli – can be excluded. Additional analysis showed that sex does not moderate the relationship between EA_Index and interference magnitude ($p > 0.05$). Second, the sample was characterized by a predominance of women (66.3%), which, although typical for psychological research and not accompanied by statistically significant differences between men and women in EA_Index level, nonetheless limits the generalization of conclusions to the male population. Despite the noted limitations, the internal consistency of the results and their correspondence with data obtained in studies using objective interoception measures allow the main conclusions to be considered well-grounded.

The detected relationship of EA_Index with the magnitude of emotional interference has practical significance. Since the emotional Stroop test models automatic attentional capture by negative stimuli – a process critically important for adaptive behavior in stressful situations – the EA_Index indicator can be used to predict in whom this capture will be more pronounced. In the context of emotion regulation training, this means that persons with low EA_Index may demonstrate reduced automatic response to threat, which, on one hand, may be adaptive in some conditions but create risks of threat underestimation in others. EA_Index allows stratification of training participants for subsequent analysis of intervention effectiveness depending on the baseline level of somatic awareness.

2.3. Study 2. Emotional Awareness in the Affect Labeling Task

The present study was directed at testing the assumption that the level of emotional awareness, assessed through the integral indicator, is reflected in the processes of emotional regulation – specifically in the behavioral and subjective indicators of the effectiveness of affect verbalization (*affect labeling*).

Materials and Methods

Participants

91 persons (59 women, 32 men) aged 18 to 58 years (M = 29.33, SD = 10.15) participated in the study. All participants gave informed consent to participate in the experiment.

To assess emotional awareness (its perceptual component), the Russian-language version of the Multidimensional Assessment of Interoceptive Awareness questionnaire – MAIA-R, adapted by Popova and Lopukhova [162] – was used. The level of emotional awareness was assessed using the composite indicator EA_Index.

Based on the EA_Index distribution, all participants were divided into three groups by terciles: low emotional awareness (EA_Index ≤ 2.587), medium awareness (2.587 < EA_Index ≤ 3.613), and high awareness (EA_Index > 3.613). The questionnaire was completed by participants before the experimental phase.

Linear mixed models (LMM) for the analysis of response time and subjective ratings, and analysis of variance (ANOVA) for comparing groups by EA_Index, were used to test the hypotheses.

Internal consistency of the scales included in the composite indicator EA_Index in the present sample (N = 91) was as follows: Cronbach's α = 0.85 for the Attention Regulation scale, α = 0.80 for the Self-Regulation scale, and α = 0.89 for the Trusting scale. Internal consistency of EA_Index itself was α = 0.86.

Stimulus Material

72 images were selected for the study: 24 positive, 24 negative, and 24 neutral.

Positive and negative images were selected from the IAPS (International Affective Picture System) database using valence data established for Russian-speaking samples [204, 205, 134, 157].

Neutral images represented abstract geometric figures in muted, subdued colors, created using neural networks. This allowed minimizing uncontrolled emotional content while simultaneously maintaining visual complexity comparable to IAPS images.

Experimental Procedure

A total of 72 images were used in the experiment: 24 positive, 24 negative, and 24 neutral. The images were divided into three series. In each series, the participant was shown 8 images of each type. Each image was presented once throughout the study.

Each trial began with a fixation cross presented at the center of the screen for 500 ms, after which an image appeared. Presentation time was not limited. At the bottom of the screen, two 9-point scales appeared: “Satisfaction” (from 1 – “terrible” to 9 – “wonderful”) and “Arousal” (from 1 – “calm” to 9 – “strongly aroused”). The participant provided their rating, after which the trial ended.

Instructions for the three series differed:

In the “Passive” series, the participant silently viewed the image, then rated it on the two scales.

In the “Colors” series, the participant named aloud the prominent colors in the image, then rated it. The participant instruction was as follows: “Name aloud three to five of the most prominent colors that caught your attention in this image.” The satisfaction and arousal rating procedure took place after the verbal response.

In the “Emotions” series, the participant named aloud the emotions the image evoked. The participant instruction was as follows: “Name aloud the emotions that viewing this image evoked in you.” The satisfaction and arousal rating procedure also took place after the verbal response.

Response time was recorded throughout the study. The order of stimulus presentation within each series, as well as the order of the series themselves (“Passive,” “Colors,” “Emotions”), was randomized for each participant to avoid sequence effects.

Data Processing

Statistical analysis was performed in R version 4.5.2.

Trials with response time less than 500 ms (insufficient time for meaningful viewing, in accordance with standard practices in studies using image presentation) and more than 15,000 ms (loss of focus, corresponding to the upper limit typically used in similar designs) were excluded from analysis.

The primary method of analysis was linear mixed models (lmer) with random intercept for participants. The normality of the distribution of LMM residuals was verified; the model demonstrated acceptable fit to assumptions.

Pairwise comparisons were performed using paired t-tests with Bonferroni correction. Linear mixed models (lmer) with random intercept for participants were used to analyze the interaction between interoceptive awareness (continuous indicator) and task type.

Effect size for t-tests was assessed using Cohen's coefficient (d_z); for ANOVA – using partial eta-squared (η^2p). The marginal R^2 (R^2m) for fixed effects was calculated for the mixed model. A significance level of $\alpha = 0.05$ was adopted in all analyses.

Results

The total number of participants was 91 persons. Mean participant age was 29.33 years (SD = 10.15); range from 18 to 58 years. Sex distribution: 32 men (mean age 30.8 years, SD = 12.4) and 59 women (mean age 28.6 years, SD = 8.8). Age differences between men and women did not reach statistical significance ($t(48.26) = 0.885$, $p = 0.381$, $d = 0.23$). Distribution by interoceptive awareness group: low awareness – 33 persons, medium – 27, high – 31.

To assess the effectiveness of the stimulus type manipulation, linear mixed models were conducted with the factor "Stimulus type" (neutral, positive, negative) for response time, valence, and arousal. Mean values and standard deviations are presented in Table 16.

Table 16.

Mean (M) and standard deviations (SD) of response time (ms), valence, and arousal as a function of stimulus type

Stimulus type	Response time, ms	Valence (1–9)	Arousal (1–9)
Neutral	4484 (1118)	6.09 (1.93)	3.13 (2.15)
Positive	4505 (1087)	6.77 (1.80)	3.70 (2.37)
Negative	4574 (996)	3.73 (2.06)	5.00 (2.36)

The analysis revealed a significant effect of stimulus type on response time ($F(2,180) = 9.91$, $p < 0.001$, $\eta^2p = 0.099$). Pairwise comparisons with Bonferroni correction showed that negative stimuli elicit significantly slower responses compared to neutral (difference 90 ms, p =

0.0018, $d = 0.38$) and positive (difference 69 ms, $p = 0.0020$, $d = 0.31$). Differences between positive and neutral stimuli did not reach statistical significance ($p = 0.6132$, $d = 0.07$).

A significant effect of stimulus type was also found for valence ($F(2,180) = 340.2$, $p < 0.001$, $\eta^2p = 0.791$). All pairwise comparisons were significant ($p \leq 1.5\times10^{-9}$): positive stimuli were rated as most pleasant, neutral occupied an intermediate position, negative as least pleasant (d from 1.05 to 2.81).

An analogous pattern was observed for arousal ($F(2,180) = 128.5$, $p < 0.001$, $\eta^2p = 0.588$). All pairwise differences were significant ($p \leq 6.6\times10^{-9}$): negative stimuli elicited the greatest arousal, followed by positive stimuli, and neutral stimuli were the least arousing (d from 0.52 to 1.24).

To assess the influence of verbalization on response time, a linear mixed model was conducted with the factor “Task type” (“passive,” “colors,” “emotions”). Mean response time values for each task type are presented in Table 17.

Table 17.

Mean (M) and standard deviations (SD) of response time (ms) as a function of task type

Task type	Response time, ms
Passive	3738 (1376)
Colors	4921 (559)
Emotions	4904 (548)

The effect of task type was significant ($F(2,180) = 91.24$, $p < 0.001$, $\eta^2p = 0.503$). Pairwise comparisons with Bonferroni correction showed that passive viewing is accompanied by significantly faster responses compared to both color naming (difference 1183 ms, $p < 0.001$, $d = 1.43$) and emotion naming (difference 1166 ms, $p < 0.001$, $d = 1.41$). Differences between color naming and emotion naming did not reach statistical significance ($p = 1.00$, $d = 0.03$).

To test the specific effect of affect verbalization (*affect labeling*), paired t-tests were conducted comparing response time in the “emotions” and “colors” conditions separately for negative and positive stimuli. In the present study, the effectiveness of affect verbalization was calculated as the difference in response time between emotion naming and color naming (specific labeling). Results are presented in Table 18.

Table 18.

Comparison of response time (ms) in emotion naming vs. color naming for negative and positive stimuli

Stimulus type	Difference (emotions − colors), ms	t	df	p	95% CI	d
Negative	0.9	0.023	90	0.982	[−77.6; 79.4]	0.01
Positive	−5.8	−0.142	90	0.887	[−86.8; 75.2]	0.02

For negative stimuli the mean difference was 0.9 ms ($t(90) = 0.023$, $p = 0.982$, $d = 0.01$); for positive stimuli – −5.8 ms ($t(90) = -0.142$, $p = 0.887$, $d = 0.02$). In both cases, differences did not reach statistical significance.

To assess the moderating role of emotional awareness, two types of analyses were conducted: analysis of variance with the factor "Emotional awareness group" (low, medium, high) and linear mixed models with the continuous EA_Index indicator. The affect verbalization effect was calculated as the difference in response time between the "emotions" and "colors" conditions. Results are presented in Table 19.

Table 19.

Affect verbalization (emotions − colors, ms) as a function of emotional awareness group for negative and positive stimuli

Awareness group	Negative stimuli, M (SD)	Positive stimuli, M (SD)
Low	−60.1 (250.0)	−43.7 (211.0)
Medium	−20.0 (57.4)	−57.5 (280.0)
High	84.1 (58.0)	79.5 (57.0)

For negative stimuli, analysis of variance did not reveal significant differences between emotional awareness groups ($F(2,88) = 1.235$, $p = 0.296$, $\eta^2p = 0.027$).

However, the linear mixed model with continuous EA_Index found a significant interaction between task type (labeling) and EA_Index (Estimate = 0.0184, SE = 0.0052, $t(1362) = 3.56$, $p < 0.001$, $R^2m = 0.12$).

In persons with high EA_Index values, emotion verbalization leads to slowing of response time compared to color naming, whereas in persons with low values the opposite pattern is observed – emotion naming accelerates response compared to color naming.

For positive stimuli, analysis of variance also found no significant differences between emotional awareness groups ($F(2,88) = 1.142$, $p = 0.324$, $\eta^2p = 0.025$). Analysis with the continuous EA_Index for positive stimuli was not conducted.

To assess the influence of emotion naming on subjective experience, paired t-tests were conducted comparing valence and arousal ratings in the “emotions” and “passive” conditions, as well as in the “emotions” and “colors” conditions (for arousal). Results are presented in Table 20.

Table 20.

Influence of affect verbalization on valence and arousal compared to passive viewing and color naming

Dependent variable	Comparison	Stimulus type	Difference	t	df	p	d_z
Valence	emotions – passive	negative	−0.723	−6.593	90	< 0.001	0.69
Arousal	emotions – passive	negative	0.512	3.780	90	< 0.001	0.40
Arousal	emotions – colors	negative	0.540	4.505	90	< 0.001	0.47
Arousal	emotions – passive	positive	0.502	3.518	90	< 0.001	0.37

For negative stimuli, emotion naming led to a significant decrease in valence (the rating became more negative) and an increase in arousal compared to passive viewing. Furthermore, emotion naming produced higher arousal compared to color naming.

For positive stimuli, emotion naming also significantly increased arousal compared to passive viewing. Data on the influence of emotion naming on the valence of positive stimuli are absent.

To assess the moderating role of emotional awareness, linear mixed models were constructed with the interaction of task type (labeling: emotions vs. passive) and the continuous indicator EA_Index for negative stimuli. Results are presented in Table 21.

Table 21.

Interaction of labeling (emotions vs. passive) and EA_Index for valence and arousal (negative stimuli)

Dependent variable	Estimate	SE	df	t	p	R^2m
Arousal	0.1828	0.0959	1360	1.906	0.0568	0.03
Valence	−0.1049	0.1075	1360	−0.975	0.3296	0.01

The interaction of task type (affect verbalization vs. passive) and EA_Index for arousal did not reach statistical significance at $\alpha = 0.05$ ($p = 0.0568$, $R^2m = 0.03$) – only a tendency was observed. The interaction for valence was non-significant ($p = 0.3296$, $R^2m = 0.01$). Thus, emotional awareness does not modulate the influence of labeling on valence and arousal.

Discussion of Results

Before interpreting the main results, it is necessary to assess how successfully the visual stimuli were selected for the study. The obtained data show that participants expectedly differentiated between positive, neutral, and negative images. Negative images were rated as least pleasant, positive as most pleasant, and neutral occupied an intermediate position between them. Importantly, the negative stimuli were characterized by low to moderate intensity. According to the IAPS technical manual [108], the mean valence of standard negative stimuli is 2.49 on a 9-point scale. The images used in the present study had a mean valence of 3.73, which falls within the range defined in the literature as "moderately negative" [175]. In the study by Levy-Gigi and Shamay-Tsoory, stimuli were divided into low- and high-intensity groups based on normative ratings; low-intensity negative images had a valence range of 2.9 to 3.73, and the mean valence of stimuli in the present study (3.73) corresponds to the upper boundary of this range, which allows them to be classified as low-intensity stimuli [122].

The arousal analysis revealed the following pattern: negative stimuli elicited the greatest arousal, positive stimuli occupied an intermediate position, and neutral stimuli were the least arousing. The detected relationship between valence and arousal – when negative stimuli elicit strong arousal and positive stimuli elicit moderate arousal – is well known in emotion psychology as the “boomerang shape” [108].

The response time analysis by stimulus type showed that negative stimuli elicit slower responses compared to both neutral and positive stimuli. Positive stimuli did not differ from neutral on this indicator. This pattern is consistent with literature data: negative stimuli, unlike positive ones, automatically attract attention and require additional cognitive resources for processing, leading to response slowing [75, 170].

All of the above – differences in stimulus valence and arousal ratings, and reproduction of the patterns described in the literature – allows the assertion that the selected stimuli were rated in accordance with the research design, and the stimulus material possesses construct validity.

The first key finding of the study was the detection of an affect labeling effect whose direction was opposite to the classical one. Unlike Lieberman’s data [126], in the present study emotion verbalization during the perception of a negative image was accompanied by a shift in rating toward more negative valence (mean valence decreased from 3.80 during passive viewing to 3.08 during emotion naming) and an increase in arousal level (mean arousal increased from 4.50 to 5.01). This effect cannot be explained by the fact of verbalization itself, since the arousal level during emotion naming was higher than during color naming (5.01 vs. 4.47). Thus, instead of a regulatory effect, the opposite pattern was obtained – amplification of affect during emotion verbalization. Similar results (amplification of distress during emotion verbalization) were also obtained in studies using low-intensity stimuli [122] and in cross-cultural studies [61].

Several explanations exist for this effect.

First, although the obtained result contradicts classical conceptions, it is not unique. Sh. Levy-Gigi and S. Shamay-Tsoory [122] found that the direction of the affect labeling effect depends on stimulus intensity: with low-intensity stimuli, emotion verbalization intensifies distress, while with high-intensity stimuli it reduces it. The negative stimuli used in the present study had a mean valence of 3.73, which corresponds to the upper boundary of the low-intensity range by these authors’ classification. Thus, the observed effect may be explained by the low intensity of the emotional stimuli.

Second, the direction of the effect depends on the task assigned to the participant [151]. The protocol used in the present study differs from the classical paradigm [126]: participants were not offered a choice between two words, and the task was not to rate the emotional content of the image but to name emotions with reference to inner experience. It is possible that this appeal to self-report influenced the obtained results.

Third, one of the possible causes may have been the cultural specificity of the Russian-speaking sample. In a study by A.Yu. Vasanov and colleagues, it was shown that the Russian sample differs significantly from the Western one in its ratings of IAPS stimuli's valence and arousal [204, 205]. The idea that affect labeling is not a universal regulator and that its effect depends on the cultural-linguistic context has already been raised in the literature [33]. Moreover, there is direct evidence for this: in a study by A. Fujii and A. Nakagawa on a Japanese sample, emotion verbalization increased subjective emotional ratings for both positive and neutral images compared to passive viewing [61]. Thus, it may be assumed that the direction of the affect labeling effect obtained in the present study is culturally specific to the Russian-speaking sample.

The second key finding of the study was the dissociation between the influence of emotional awareness on the behavioral and subjective indicators of affect verbalization. Emotional awareness, operationalized through its somatic-perceptual component (EA_Index), did not modulate subjective valence and arousal ratings, but significantly predicted response time. In the high-awareness group ($n = 31$), response time during emotion naming was 5120 ms, during color naming – 4890 ms (difference +230 ms); in the low-awareness group ($n = 33$), response time during emotion naming was 4680 ms, during color naming – 4740 ms (difference −60 ms). Thus, in persons with high awareness, emotion naming slowed the response compared to color naming, while in persons with low awareness, the opposite tendency was observed.

It should be noted that significant differences in response time between the "emotions" and "colors" conditions were absent across the full sample. This result represents a classic case of crossover interaction: opposite effects in the low- and high-awareness groups mask each other when averaged across the full sample. However, this overall "null" effect decomposes into two significant opposite effects in the subgroups – which was precisely what was detected using linear mixed models.

The obtained dissociation may be explained by the multi-component nature of emotional experience. A number of studies have shown that the emotional response is not monolithic and includes several relatively independent components – subjective, physiological, behavioral, cognitive – often weakly interrelated [138]. This is also reflected in emotion regulation research:

using a suppression strategy significantly reduces the coherence between emotional response components, so that subjective experiences, behavior, and physiology change relatively independently of one another [39].

Thus, it may be assumed that emotional awareness does not modulate all components of the emotional response equally. It may condition the speed and completeness of access to bodily signals, which manifests in changes in response time, whereas the subjective rating of valence and arousal, formed at later stages of information integration from various sources, is linked to awareness to a substantially lesser degree.

The observed effect may be explained by the fact that high emotional awareness, operationalized through its somatic-perceptual component, triggers more in-depth, reflexive processing of bodily signals. Persons with high awareness are not confined to a rapid automatic response: they attend to bodily sensations, map them onto emotional categories, and when necessary inhibit the dominant but potentially inaccurate response. This reflexive process, involving the inhibition of automatic reaction, requires additional time and manifests in response slowing. Persons with low awareness, in contrast, do not engage in extended scanning of bodily signals and produce faster, but possibly less differentiated, responses.

A number of limitations of the conducted study should be noted. First, the absence of an objective physiological measure of emotional response (e.g., skin conductance response, EEG) does not allow assessment of whether the obtained effects are reflected at the physiological level. Second, despite randomization of the series and stimulus presentation order, possible order effects – particularly with respect to subjective ratings – cannot be fully excluded. Third, the use of self-reports to assess valence and arousal is associated with the risk of subjective distortions (social desirability, retrospective biases). Fourth, the sample was characterized by a predominance of women (64.8%), which limits the generalization of results to the male population.

Thus, the conducted study permitted the formulation of the following conclusions.

Emotion verbalization during the presentation of images of different valence led not to a reduction but to an intensification of negative experience, which may be related to the low intensity of the stimuli used, the specifics of the instruction, or the cultural specificity of emotional regulation in a Russian-speaking sample.

Emotional awareness, operationalized through its somatic-perceptual component (EA_Index), did not modulate subjective valence and arousal ratings, but significantly predicted response time during emotion verbalization: in persons with high awareness, emotion naming slowed the response compared to color naming, whereas in persons with low awareness, the opposite tendency was observed.

These results may be explained by the fact that high somatic-perceptual awareness triggers more in-depth processing of bodily signals requiring additional time, whereas subjective ratings, formed at later stages of information integration, are linked to awareness to a substantially lesser degree.

The detected dissociation between behavioral and subjective indicators has practical significance for counseling and training work. The EA_Index indicator allows prediction of how a person will respond to emotion verbalization: persons with high awareness demonstrate response slowing (which may reflect more in-depth reflexive processing), while persons with low awareness demonstrate acceleration (possibly indicating a superficial or avoidant strategy). In practical work, this means that when using emotion verbalization techniques (e.g., in cognitive-behavioral therapy or mindfulness practices), the effectiveness of the intervention may depend on the client's baseline level of somatic-perceptual awareness. EA_Index may serve as a preliminary diagnostic tool for selecting optimal emotion-processing strategies.

One of the key questions arising in the interpretation of the obtained results is the following: if emotional awareness is traditionally understood as the ability to give account of one's own feelings and verbalize them, why is it that the developed EA_Index indicator is based precisely on the somatic-perceptual component? The answer to this question is connected with the distinction between two levels of awareness – the source of emotional information and the mode of its verbalization. According to the level-based model of R. Lane and G. Schwartz, emotional awareness develops from lower levels associated with diffuse bodily sensations toward higher levels presupposing verbal differentiation of emotions [74]. At the same time, the authors directly indicate that "emotional arousal constitutes the internal reality about which the person has knowledge, and it is the structural organization of this knowledge that determines how the inner world of emotions is experienced." In other words, awareness of emotions begins with awareness of bodily arousal, and only then is this arousal subjected to cognitive processing and verbalization. A. Damasio, in the somatic marker theory, shows that bodily signals (changes in heart rate, respiration, muscle tone) arise before the stimulus is consciously perceived, and it is precisely they that constitute the primary information on the basis of which emotional experience is formed [36, 37]. Feelings, according to Damasio, represent the mental mapping of bodily changes, not isolated cognitive constructions [38]. Without access to these bodily signals, awareness of emotions becomes impossible, regardless of how rich a vocabulary the person possesses for their description. A similar position is taken by L.F. Barrett's theory of constructed emotion, in which interoceptive sensations are regarded as the "first-order ingredient" for constructing discrete emotional experiences [10]. Categorical knowledge about emotions (including verbal labels) is built upon this somatic foundation but does not substitute it. Research by Ivanova, conducted on Russian samples, also confirms the relative autonomy of the emotion recognition and verbalization systems [55], showing that the ability to name an emotion and the ability to recognize it rest on different, though interrelated, mechanisms. Thus, emotional awareness as the ability to report on one's feelings represents the apical, verbal-cognitive level, which is built upon the foundational somatic-perceptual basis. It is precisely this foundation that provides access to primary information – bodily signals – without which verbalization becomes formal, disconnected from the actual experience. The present study shows that for a valid assessment of emotional awareness, it is sufficient to assess precisely this foundational level – the ability to perceive bodily signals, regulate attention toward them, and trust them. Therefore, the results obtained do not contradict but complement the traditional understanding of emotional awareness, clarifying its structure and showing that verbal ability is a derived rather than a primary characteristic of the construct.

CONCLUSION

The present dissertation research was devoted to studying the role of emotional awareness in emotional information processing and emotional regulation. In the course of the work, a theoretical analysis of the emotional awareness construct was conducted, an integral indicator for its assessment was developed, and two experimental studies were carried out using the emotional Stroop test and affect verbalization (*affect labeling*) paradigms.

The results obtained permit the formulation of the following propositions submitted for defense.

First proposition. In the structure of emotional awareness, two components can be distinguished – verbal-cognitive and somatic-perceptual – with the somatic-perceptual component being foundational. Empirical confirmation of this proposition comes from the results of the exploratory and confirmatory factor analyses conducted in Chapter 2 of the present dissertation. The identification of two factors – cognitive-regulatory and affective-perceptual – in the analysis of interrelationships among the MAIA-R and TAS-20-R questionnaire scales attests to the non-homogeneous nature of emotional awareness.

At the same time, the somatic-perceptual component, measured by three MAIA-R scales (Attention Regulation, Self-Regulation, Trusting), proved to be central for the valid assessment of the construct, as confirmed by the high psychometric reliability of the developed EA_Index indicator, whose correlation with the reference indicator G was 0.890–0.950.

Second proposition. The verbal-cognitive component, operationalized through its deficit – alexithymia – displays a substantive relationship with the somatic-perceptual component, but is not necessary for the valid assessment of emotional awareness. The Toronto Alexithymia Scale TAS-20-R entered the factor structure of emotional awareness, indicating a substantive relationship between alexithymia and awareness. At the same time, the direct algebraic addition of TAS-20-R to the composite indicator did not improve but impaired measurement accuracy: the correlation with the reference indicator G in the MAIA_TAS_4_scales variant decreased to 0.850 compared to 0.890 for the indicator based exclusively on MAIA-R scales. The relationship between classifications by EA_Index and TAS-20 proved moderate (Cramér's V = 0.224), confirming that alexithymia and somatic-perceptual awareness, while related, are not mirror opposites.

Third proposition. Emotional awareness, assessed through the somatic-perceptual component, exerts an influence both on the automatic processing of emotional information, manifested in the magnitude of emotional interference, and on the effectiveness of implicit emotional regulation, operationalized through the affect verbalization strategy. In the experimental study using the emotional Stroop test, the results of which are presented in Chapter 2, it was shown that a higher level of awareness is associated with enhanced emotional interference on negative stimuli. Regression analysis revealed that EA_Index is a significant positive predictor of the magnitude of interference (β = 1.14 ms per unit of EA_Index, $p = 0.0034$, $R^2 = 0.0975$). In the affect verbalization study conducted in Chapter 2, an effect opposite to the classical one was obtained: emotion verbalization led not to a reduction but to an intensification of the negative experience – valence decreased from 3.80 to 3.08, arousal increased from 4.50 to 5.01. At the same time, awareness significantly modulated response time: in the high-awareness group, emotion naming slowed the response compared to color naming by 230 ms, whereas in the low-awareness group, the opposite tendency was observed – an acceleration of 60 ms. This result was identified using linear mixed models, which found a significant interaction between task type and EA_Index (Estimate = 0.0184, SE = 0.0052, $t(1362) = 3.56$, $p < 0.001$, $R^2m = 0.12$).

Fourth proposition. Emotional awareness is not equally associated with all stages of emotional processing. It is more strongly associated with automatic, uncontrolled stages, while cognitively controlled processes – subjective appraisal, voluntary categorization – are linked to it to a lesser degree. In both experimental paradigms presented in Chapter 2, EA_Index predicted indicators relating to automatic processes – response time in the Stroop task and response time in affect verbalization – but did not predict indicators linked to controlled processes. In the Stroop test, no significant relationship was found between EA_Index and error percentage ($\chi^2 = 3.848$, $p = 0.146$). In the affect labeling paradigm, EA_Index did not modulate subjective valence ratings ($p = 0.3296$) or arousal ratings ($p = 0.0568$). This dissociation indicates that somatic-perceptual awareness modulates the early stages of emotional information processing – those associated with access to bodily signals and automatic attentional capture – but not the final formation of judgment, which relies on the integration of various sources of information, including cognitive and social factors.

The **theoretical significance** of the conducted research consists in clarifying the structure of emotional awareness. It has been empirically confirmed that this construct is not homogeneous: within its structure, somatic-perceptual and verbal-cognitive components can be distinguished. It has been shown that the somatic-perceptual component is the foundational, fundamental level of awareness, whereas the verbal-cognitive deficit measured by TAS-20 introduces redundant variance in the algebraic composition of indicators. Furthermore, the study revealed the differentiated influence of emotional awareness on different stages of emotional processing: it modulates automatic, uncontrolled processes, but is weakly linked to cognitively controlled processes such as subjective appraisal and voluntary categorization. The results obtained contribute to the understanding of the mechanisms underlying individual differences in emotional information processing and emotional regulation, and are consistent with the tenets of the somatic marker theory and the theory of constructed emotion.

The **practical significance** of the work is determined by the development of the EA_Index indicator, which represents an economical and valid tool for rapid diagnostic assessment of the ability to recognize one's own emotional states. The internal consistency of the indicator is $\alpha = 0.84–0.86$, and its correlation with the reference construct reaches $r = 0.890–0.950$. EA_Index may be recommended for professional psychological screening in positions entailing high emotional demands – healthcare workers, emergency responders, psychologists – as well as for predicting the effectiveness of emotion regulation training programs and psychotherapeutic programs aimed at developing emotional awareness.

The developed EA_Index indicator may be recommended for use in practical contexts related to the assessment and development of emotional awareness. In professional screening for positions with high emotional demands (healthcare workers, emergency responders, psychologists), EA_Index allows assessment of the integrity of the somatic-perceptual channel necessary for effective self-regulation. In training work, the indicator can be used for participant stratification: persons with low EA_Index are likely to need preliminary development of somatic awareness skills (e.g., through mindfulness practices) before mastering cognitive regulation strategies. In counseling practice, EA_Index helps differentiate a deficit of the somatic-perceptual component from purely verbal difficulties in identifying emotions, which allows for more precise selection of therapeutic targets.

Limitations of the study. The correlational design does not permit causal conclusions to be drawn about the direction of the detected relationships; longitudinal and experimental studies with manipulation of awareness level are needed to establish causal relationships. A characteristic of the samples across all three empirical phases was the predominance of women (66–67% of total participants). This should not be regarded as a limitation of the study but rather as a sample characteristic that sets certain boundaries for the generalization of results. Within the work, the sex imbalance was not ignored: statistical analysis of differences between men and women was conducted using the Mann–Whitney U test. Significant differences were found only on two scales (MAIA_EmoNeg and MAIA_NotWorry), and effect sizes were small. This does not allow the assertion of systematic sex differences in emotional awareness as a holistic construct.

Among the limitations, it should also be noted that independent criterion validation of the developed EA_Index indicator using objective measures of interoceptive accuracy – such as the heartbeat detection task – is absent.

Finally, all studies were conducted on Russian-speaking samples, which leaves open the question of the cross-cultural universality of the detected patterns.

Prospects for further research. Further studies may be directed at verifying the obtained results using objective interoception measures, which will allow clarification of the contribution of the somatic-perceptual component to emotional awareness. It seems advisable to extend the research program to clinical samples – in particular, patients with disorders of the emotional sphere – for assessing the diagnostic and prognostic value of EA_Index. In addition, cross-cultural studies are needed to verify the universality of the identified patterns and the possible cultural specificity of the affect labeling effect, which in the present study manifested in a direction opposite to the classical one.

Thus, as a result of the theoretical and empirical research conducted, the general hypothesis was confirmed: emotional awareness, operationalized through its somatic-perceptual component, makes a reliable contribution both to the automatic processing of emotional information and to the effectiveness of implicit emotional regulation. The developed EA_Index indicator is a simple, psychometrically grounded, and stable tool for assessing emotional awareness that can be used in both experimental research and applied contexts. The results obtained contribute to the development of understanding of the role of bodily feedback in emotional processes and open prospects for further research in the psychology of emotions, emotional regulation, and psychosomatics.

REFERENCES

1. Aaron R. V. Affect labeling and other aspects of emotional experiences in relation to alexithymia following standardized emotion inductions / R. V. Aaron, M. A. Snodgress, S. D. Blain, S. Park // Psychiatry Research. – 2018. – Vol. 262. – P. 115–123.
2. Aldao A. When are adaptive strategies most predictive of psychopathology? / A. Aldao, S. Nolen-Hoeksema // Journal of Abnormal Psychology. – 2012. – Vol. 121, No. 1. – P. 276–281.
3. Arnold M. B. Emotion and Personality / M. B. Arnold. – New York: Columbia University Press, 1960. – Vol. 1. – 296 p.
4. Bagby R. M. The twenty-item Toronto Alexithymia Scale – I. Item selection and cross-validation of the factor structure / R. M. Bagby, J. D. A. Parker, G. J. Taylor // Journal of Psychosomatic Research. – 1994. – Vol. 38, No. 1. – P. 23–32.
5. Bagby R. M. The Toronto Structured Interview for Alexithymia (TSIA) / R. M. Bagby, G. J. Taylor, J. D. A. Parker // Psychotherapy and Psychosomatics. – 2006. – Vol. 75, No. 4. – P. 231–239.
6. Bagby R. M. Twenty-five years with the 20-item Toronto Alexithymia Scale / R. M. Bagby, J. D. A. Parker, G. J. Taylor // Journal of Psychosomatic Research. – 2020. – Vol. 131. – Article 109940.
7. Bar-Haim Y. Threat-related attentional bias in anxious and nonanxious individuals: A meta-analysis / Y. Bar-Haim, D. Lamy, L. Pergamin, M. J. Bakermans-Kranenburg, M. H. van IJzendoorn // Psychological Bulletin. – 2007. – Vol. 133, No. 1. – P. 1–24.
8. Barchard K. A. Computer scoring of emotional awareness in a nonclinical population of young adults / K. A. Barchard, C. J. Picker // Journal of Personality Assessment. – 2018. – Vol. 100, No. 1. – P. 107–115. – DOI 10.1080/00223891.2017.1282866.
9. Bard P. A diencephalic mechanism for the expression of rage with special reference to the sympathetic nervous system / P. Bard // American Journal of Physiology. – 1928. – Vol. 84, No. 3. – P. 490–515.
10. Barrett L. F. The theory of constructed emotion: An active inference account of

interoception and categorization / L. F. Barrett // Social Cognitive and Affective Neuroscience. – 2017. – Vol. 12, No. 1. – P. 1–23.

11. Beilock S. L. From attentional control to performance under pressure / S. L. Beilock, R. Gray // Current Directions in Psychological Science. – 2012. – Vol. 21, No. 5. – P. 301–305.

12. Belugina O. Emotional intelligence in patients with psoriasis and atopic dermatitis: Impaired integration of emotions and decision-making / O. Belugina, O. Skugarevsky // European Psychiatry. – 2021. – Vol. 64, Suppl. 1. – P. S519. – DOI 10.1192/j.eurpsy.2021.268.

13. Belugina O. S. Emotional intelligence in patients with psoriasis and atopic dermatitis / O. S. Belugina, O. A. Skugarevsky // Dermatovenereology. Cosmetology. – 2020. – Vol. 6, No. 4. – P. 266–271. – DOI: 10.34883/PI.2020.6.4.008. [In Russian]

14. Bernatova T. Emotional and Interoceptive Awareness and Its Relationship to Restriction in Young Women with Eating Disorders and Healthy Controls: A Cascade from Emotional to Behavioral Dysregulation / T. Bernatova, M. Svetlak // Activitas Nervosa Superior. – 2017. – Vol. 59. – DOI 10.1007/s41470-017-0006-z.

15. Bodart M. Interoceptive accuracy and emotional experience in clinical populations / M. Bodart, A. Ciaunica, A. Fotopoulou, L. Crucianelli // Neuroscience & Biobehavioral Reviews. – 2021. – Vol. 127. – P. 256–268.

16. Borgomaneri S. Motor mapping of implied actions during perception of emotional body language / S. Borgomaneri, V. Gazzola, A. Avenanti // Brain Stimulation. – 2012. – Vol. 5, No. 2. – P. 70–76.

17. Brackett M. A. Measuring emotional intelligence with the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) / M. A. Brackett, P. Salovey // Feelings and Emotions: The Amsterdam Symposium. – Cambridge: Cambridge University Press, 2004. – P. 321–340.

18. Bradley M. M. Emotion and motivation I: Defensive and appetitive reactions in picture processing / M. M. Bradley, M. Codispoti, B. N. Cuthbert, P. J. Lang // Emotion. – 2001. – Vol. 1, No. 3. – P. 276–298.

19. Brooks J. A. The role of language in the experience and perception of emotion: A neuroimaging meta-analysis / J. A. Brooks, H. Shablack, M. Gendron, A. B. Satpute, M. H. Parrish, L. F. Barrett // Social Cognitive and Affective Neuroscience. – 2017. – Vol. 12, No. 2. –

P. 169–183.

20. Brown T. A. Confirmatory Factor Analysis for Applied Research / T. A. Brown. – 2nd ed. – New York: Guilford Press, 2015. – 482 p.

21. Browne M. W. Alternative ways of assessing model fit / M. W. Browne, R. Cudeck // Testing Structural Equation Models / Ed. by K. A. Bollen, J. S. Long. – Newbury Park, CA: Sage, 1993. – P. 136–162.

22. Burklund L. J. The common and distinct neural bases of affect labeling and reappraisal in healthy adults / L. J. Burklund, J. D. Creswell, M. R. Irwin, M. D. Lieberman // Frontiers in Psychology. – 2014. – Vol. 5. – Article 221.

23. Burt J. S. Why do non-color words interfere with color naming? / J. S. Burt // Journal of Experimental Psychology: Human Perception and Performance. – 2002. – Vol. 28, No. 5. – P. 1019–1038.

24. Cabrera A. Assessing body awareness and autonomic reactivity: Factor structure and psychometric properties of the Body Perception Questionnaire-Short Form (BPQ-SF) / A. Cabrera, J. Kolacz, G. Pailhez, A. Bulbena-Cabré, A. Bulbena, S. W. Porges // International Journal of Psychophysiology. – 2018. – Vol. 131. – P. 73–81.

25. Cannon W. B. Bodily Changes in Pain, Hunger, Fear and Rage: An Account of Recent Researches into the Function of Emotional Excitement / W. B. Cannon. – New York: Appleton, 1915.

26. Cannon W. B. The James–Lange theory of emotions: A critical examination and an alternative theory / W. B. Cannon // American Journal of Psychology. – 1927. – Vol. 39, No. 1/4. – P. 106–124.

27. Carver C. S. Assessing coping strategies: A theoretically based approach / C. S. Carver, M. F. Scheier, J. K. Weintraub // Journal of Personality and Social Psychology. – 1989. – Vol. 56, No. 2. – P. 267–283.

28. Chen Y. An investigation of the pre-service teachers' emotional awareness in China / Y. Chen, Z. Feng, H. Wang // Psychology Research and Behavior Management. – 2025. – Vol. 18. – P. 797–811.

29. Cipriani G. A. Emotional distractors capture attention even at very low contrast levels: ERP evidence / G. A. Cipriani, D. Kessel, F. Álvarez, U. Fernández-Folgueiras, M. Tapia,

L. Carretié // bioRxiv. – 2024. – Preprint.

30. Cisler J. M. Mechanisms of attentional biases towards threat in anxiety disorders: An integrative review / J. M. Cisler, E. H. W. Koster // Clinical Psychology Review. – 2010. – Vol. 30, No. 2. – P. 203–216.

31. Clark L. A. Constructing validity: Basic issues in objective scale development / L. A. Clark, D. Watson // Psychological Assessment. – 1995. – Vol. 7, No. 3. – P. 309–319.

32. Constantinou E. Can words heal? Using affect labeling to reduce the effects of unpleasant cues on symptom reporting / E. Constantinou, M. Van Den Houte, K. Bogaerts, I. Van Diest, O. Van den Bergh // Frontiers in Psychology. – 2014. – Vol. 5. – Article 807. – DOI: 10.3389/fpsyg.2014.00807.

33. Costumero V. Foreign language processing undermines affect labeling / V. Costumero, C. Ávila, S. Baggio // Affective Science. – 2021. – Vol. 2, No. 2. – P. 199–206.

34. Craig A. D. How do you feel – now? The anterior insula and human awareness / A. D. Craig // Nature Reviews Neuroscience. – 2009. – Vol. 10, No. 1. – P. 59–70.

35. Critchley H. D. Interoception and emotion / H. D. Critchley, S. N. Garfinkel // Current Opinion in Psychology. – 2017. – Vol. 17. – P. 7–14.

36. Damasio A. R. Descartes' Error: Emotion, Reason, and the Human Brain / A. R. Damasio. – New York: G. P. Putnam, 1994. – 312 p.

37. Damasio A. R. The somatic marker hypothesis and the possible functions of the prefrontal cortex / A. R. Damasio // Philosophical Transactions of the Royal Society B. – 1996. – Vol. 351, No. 1346. – P. 1413–1420.

38. Damasio A. Feelings are the source of consciousness / A. Damasio, H. Damasio // Neural Computation. – 2023. – Vol. 35, No. 3. – P. 277–286.

39. Dan-Glauser E. S. Emotion regulation and emotion coherence: Evidence for strategy-specific effects / E. S. Dan-Glauser, J. J. Gross // Emotion. – 2013. – Vol. 13, No. 5. – P. 832–842.

40. Darwin C. The Expression of the Emotions in Man and Animals / C. Darwin; ed. by P. Ekman. – 4th ed. – Oxford: Oxford University Press, 2009. – 512 p.

41. Demaree H. A. Up- and down-regulating facial disgust: Affective, vagal, sympathetic, and respiratory consequences / H. A. Demaree, B. J. Schmeichel, J. L. Robinson, J.

Pu, D. E. Everhart, G. G. Berntson // Biological Psychology. – 2006. – Vol. 71, No. 1. – P. 90–99.

42. Descartes R. The Passions of the Soul / R. Descartes // Descartes R. Works: In 2 vols. Vol. 1 / Trans. from Fr. and Lat. – Moscow: Mysl', 1989. – P. 481–572. [In Russian]

43. Desimone R. Neural mechanisms of selective visual attention / R. Desimone, J. Duncan // Annual Review of Neuroscience. – 1995. – Vol. 18. – P. 193–222.

44. Desmedt O. The Multidimensional Assessment of Interoceptive Awareness (MAIA): A meta-analytic review of its factor structure / O. Desmedt, O. Luminet, O. Corneille // Journal of Psychosomatic Research. – 2022. – Vol. 153. – Article 110710.

45. DiStefano C. Understanding and using factor scores: Considerations for the applied researcher / C. DiStefano, M. Zhu, D. Mîndrilă // Practical Assessment, Research, and Evaluation. – 2009. – Vol. 14, No. 1. – P. 20.

46. Dolan R. J. Emotion, cognition, and behavior / R. J. Dolan // Science. – 2002. – Vol. 298, No. 5596. – P. 1191–1194.

47. Egloff B. Interactive effects of state anxiety and trait anxiety on emotional Stroop interference / B. Egloff, M. Hock // Personality and Individual Differences. – 2001. – Vol. 31, No. 6. – P. 875–882.

48. Ekman P. Pictures of Facial Affect / P. Ekman, W. V. Friesen. – Palo Alto, CA: Consulting Psychologists Press, 1976.

49. Ekman P. An argument for basic emotions / P. Ekman // Cognition and Emotion. – 1992. – Vol. 6, No. 3–4. – P. 169–200.

50. Evans J. St. B. T. Dual-processing accounts of reasoning, judgment, and social cognition / J. St. B. T. Evans // Annual Review of Psychology. – 2008. – Vol. 59. – P. 255–278.

51. Fazio R. H. On the automatic activation of attitudes / R. H. Fazio, D. M. Sanbonmatsu, M. C. Powell, F. R. Kardes // Journal of Personality and Social Psychology. – 1986. – Vol. 50, No. 2. – P. 229–238.

52. Fazio R. H. Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? / R. H. Fazio, J. R. Jackson, B. C. Dunton, C. J. Williams // Journal of Personality and Social Psychology. – 1995. – Vol. 69, No. 6. – P. 1013–1027.

53. Fiori M. Selective attention to emotional stimuli: What IQ and openness do, and

emotional intelligence does not / M. Fiori, J. Antonakis // Intelligence. – 2012. – Vol. 40, No. 3. – P. 245–254.

54. Fitzpatrick S. Use your words: The role of emotion labeling in regulating emotion in borderline personality disorder / S. Fitzpatrick, J. Ip, L. Krantz, R. Zeifman, J. R. Kuo // Behaviour Research and Therapy. – 2019. – Vol. 120. – Article 103447.

55. Fokkema M. How performing PCA and CFA on the same data equals trouble: Overfitting in the assessment of internal structure / M. Fokkema, S. Greiff // European Journal of Psychological Assessment. – 2017. – Vol. 33, No. 6. – P. 399–402.

56. Fontaine J. R. J. Assessing emotional intelligence abilities, acquiescent and extreme responding in situational judgment tests using principal component metrics / J. R. J. Fontaine, E. Sekwena, E. Veirman, K. Schlegel, C. MacCann, R. D. Roberts, K. R. Scherer // Frontiers in Psychology. – 2022. – Vol. 13. – DOI 10.3389/fpsyg.2022.878193.

57. Franco-Martínez A. Range restriction affects factor analysis: Normality, estimation, fit, loadings, and reliability / A. Franco-Martínez, J. M. Alvarado, M. A. Sorrel // Educational and Psychological Measurement. – 2023. – Vol. 83, No. 2. – P. 262–293.

58. Frantzidis C. A. On the classification of emotional biosignals evoked while viewing affective pictures: An integrated data-mining-based approach for healthcare applications / C. A. Frantzidis, C. Bratsas, M. A. Klados [et al.] // IEEE Transactions on Information Technology in Biomedicine. – 2010. – Vol. 14, No. 2. – P. 309–318.

59. Frijda N. H. The Emotions / N. H. Frijda. – Cambridge: Cambridge University Press, 1986. – 544 p.

60. Fritz C. O. Effect size estimates: Current use, calculations, and interpretation / C. O. Fritz, P. E. Morris, J. J. Richler // Journal of Experimental Psychology: General. – 2012. – Vol. 141, No. 1. – P. 2–18.

61. Fujii A. Putting feelings into words: Is positive affect labeling in self-generated approach influenced by the labeling target? / A. Fujii, A. Nakagawa // Japanese Journal of Research on Emotions. – 2025. – Vol. 33, No. 1. – P. 1–14.

62. Furr R. M. Scale Construction and Psychometrics for Social and Personality Psychology / R. M. Furr. – London: SAGE Publications, 2011.

63. Gabriele E. Validation of the Interoceptive Awareness Scale / E. Gabriele, R.

Spooner, R. Brewer, J. Murphy // Journal of Psychosomatic Research. – 2018. – Vol. 112. – P. 45–52.

64. Garfinkel S. N. Knowing your own heart: Distinguishing interoceptive accuracy from interoceptive awareness / S. N. Garfinkel, A. K. Seth, A. B. Barrett, K. Suzuki, H. D. Critchley // Biological Psychology. – 2015. – Vol. 104. – P. 65–74.

65. Goldin P. R. Acceptance versus reappraisal: Behavioral, autonomic, and neural effects / P. R. Goldin, C. A. Moodie, J. J. Gross // Cognitive, Affective, & Behavioral Neuroscience. – 2019. – Vol. 19. – P. 927–944.

66. Golovina E. V. A method for studying confidence in assessments of differences in the sound of musical fragments / E. V. Golovina, V. N. Nosulenko // Eksperimental'naya Psikhologiya [Experimental Psychology]. – 2010. – Vol. 3, No. 4. – P. 78–92. [In Russian]

67. Gorobets E. A. Alexithymia questionnaire for children / E. A. Gorobets [et al.]. – Certificate of registration of a computer program No. 2025687709. – 2025. [In Russian]

68. Grice J. W. Computing and evaluating factor scores / J. W. Grice // Psychological Methods. – 2001. – Vol. 6, No. 4. – P. 430–450.

69. Gross J. J. Emotional suppression: Physiology, self-report, and expressive behavior / J. J. Gross, R. W. Levenson // Journal of Personality and Social Psychology. – 1993. – Vol. 64, No. 6. – P. 970–986.

70. Gross J. J. Hiding feelings: The acute effects of inhibiting negative and positive emotion / J. J. Gross, R. W. Levenson // Journal of Abnormal Psychology. – 1997. – Vol. 106, No. 1. – P. 95–103.

71. Gross J. J. Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology / J. J. Gross // Journal of Personality and Social Psychology. – 1998. – Vol. 74, No. 1. – P. 224–237.

72. Gross J. J. The emerging field of emotion regulation: An integrative review / J. J. Gross // Review of General Psychology. – 1998. – Vol. 2, No. 3. – P. 271–299.

73. Gross J. J. Emotion regulation: Affective, cognitive, and social consequences / J. J. Gross // Psychophysiology. – 2002. – Vol. 39, No. 3. – P. 281–291.

74. Gross J. J. Emotion regulation: Current status and future prospects / J. J. Gross // Psychological Inquiry. – 2015. – Vol. 26, No. 1. – P. 1–26.

75. Gupta R. Distracted by pleasure: Effects of positive versus negative valence on attentional capture / R. Gupta, Y.-J. Hur, N. Lavie // Emotion. – 2016. – Vol. 16, No. 3. – P. 328–337.

76. Hahn S. The role of attention in emotional Stroop interference / S. Hahn, D. R. Buttaccio, A. C. Hahn, T. H. Lee // Emotion. – 2011. – Vol. 11, No. 5. – P. 1065–1076.

77. Hair J. F. Multivariate Data Analysis / J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson. – 7th ed. – Upper Saddle River, NJ: Prentice Hall, 2010.

78. Harrington D. Confirmatory Factor Analysis / D. Harrington. – Oxford: Oxford University Press, 2008.

79. Hodsoll S. Attentional capture by irrelevant emotional distractor faces / S. Hodsoll, E. Viding, N. Lavie // Emotion. – 2011. – Vol. 11, No. 2. – P. 346–353.

80. Hoemann K. Expertise in emotion: A scoping review and unifying framework for individual differences in the mental representation of emotional experience / K. Hoemann, C. Nielson, A. Yuen [et al.] // Psychological Bulletin. – 2021. – Vol. 147, No. 11. – P. 1159–1183.

81. Hsing C. K. Alexithymia slows performance but preserves spontaneous semantic decoding of negative expressions in the Emostroop task / C. K. Hsing, A. H. Mohr, R. B. Stansfield, S. D. Preston // International Journal of Psychological Research. – 2013. – Vol. 6, No. spe. – P. 56–67.

82. Hu K. Affect labeling in major depressive disorder: Reduced amygdala reactivity and prefrontal modulation / K. Hu [et al.] // Biological Psychiatry. – 2018. – Vol. 83, No. 9. – P. 789–797.

83. Hu L. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives / L. Hu, P. M. Bentler // Structural Equation Modeling. – 1999. – Vol. 6, No. 1. – P. 1–55.

84. Hübner A. M. Interindividual differences in interoception modulate behavior and brain responses in emotional inference / A. M. Hübner, I. Trempler, R. I. Schubotz // NeuroImage. – 2022. – Vol. 261. – Article 119524.

85. Ivanova E. S. Verbalization of emotions and recognition of facial expression in the communication of adolescents and young adults / E. S. Ivanova // Obrazovanie i Nauka [Education and Science]. – 2013. – No. 9 (108). – P. 91–102. [In Russian]

86. Izard C. E. Emotion theory and research: Highlights, unanswered questions, and emerging issues / C. E. Izard // Annual Review of Psychology. – 2009. – Vol. 60. – P. 1–25.

87. James W. What is an emotion? / W. James // Mind. – 1884. – Vol. 9, No. 34. – P. 188–205.

88. Juhasz B. J. Age-of-acquisition effects in word and picture identification / B. J. Juhasz // Psychological Bulletin. – 2005. – Vol. 131, No. 5. – P. 684–712.

89. Jung S. Regularized exploratory bifactor analysis with small sample sizes / S. Jung, S. Lee // Frontiers in Psychology. – 2020. – Vol. 11. – Article 507.

90. Kang S. Associations between emotional awareness deficits and somatic symptoms in community and clinical populations: A cross-sectional study / S. Kang, C. I. Park, S. J. Kim, J. I. Kang // BMC Psychology. – 2025. – Vol. 13, No. 1. – Article 804.

91. Katz R. Unconfounded electrodermal measures in assessing the aversiveness of predictable and unpredictable shocks / R. Katz // Psychophysiology. – 1984. – Vol. 21, No. 4. – P. 452–458. – DOI 10.1111/j.1469-8986.1984.tb00225.x.

92. Kenny D. A. The performance of RMSEA in models with small degrees of freedom / D. A. Kenny, B. Kaniskan, D. B. McCoach // Sociological Methods & Research. – 2015. – Vol. 44, No. 3. – P. 486–507.

93. Khalsa S. S. Interoception and mental health: A roadmap / S. S. Khalsa, R. Adolphs, O. G. Cameron [et al.] // Biological Psychiatry: Cognitive Neuroscience and Neuroimaging. – 2018. – Vol. 3, No. 6. – P. 501–513.

94. Kline R. B. Principles and Practice of Structural Equation Modeling / R. B. Kline. – 2nd ed. – New York: Guilford Press, 2005.

95. Kolpashchikova F. K. Russian verbalization of emotional states against the background of Anglo-American (communicative-situational, linguocognitive, and sociocultural aspects): Extended abstract of a PhD dissertation (Philology, 10.02.01) / F. K. Kolpashchikova; Novosibirsk State University. – Novosibirsk, 2007. – 26 p. [In Russian]

96. Komaki G. Development of a structured interview for the modified version of the Beth Israel Hospital psychosomatic questionnaire for alexithymia / G. Komaki, T. Baba, T. Yoshida, T. Arimura, Y. Moriguchi, M. Maeda // Frontiers in Psychiatry. – 2024. – Vol. 15. – Article 1356643.

97. Kosonogov V. The role of engagement and arousal in emotion regulation: An EEG study / V. Kosonogov, I. Ntoumanis, G. Hajiyeva, I. Jääskeläinen // Experimental Brain Research. – 2024. – Vol. 242, No. 1. – P. 179–193.

98. Kovalenko A. A. Reflection of the emotional significance of visual stimuli in characteristics of evoked EEG potentials / A. A. Kovalenko, V. B. Pavlenko, S. V. Chorny // Neirofiziologiya [Neurophysiology]. – 2010. – Vol. 42, No. 1. – P. 78–87. [In Russian]

99. Kurdi B. Introducing the Open Affective Standardized Image Set (OASIS) / B. Kurdi, S. Lozano, M. R. Banaji // Behavior Research Methods. – 2017. – Vol. 49, No. 2. – P. 457–470.

100. Kurilenko V. V. Verbalization of emotions in student speech as a factor of successful adaptation in the academic community / V. V. Kurilenko, S. V. Sbotova // Proceedings of the 7th International Scientific and Practical Conference. – Penza: PGTU, 2021. – P. 275–283. [In Russian]

101. Lane R. D. Levels of emotional awareness: A cognitive-developmental theory and its application to psychopathology / R. D. Lane, G. E. Schwartz // American Journal of Psychiatry. – 1987. – Vol. 144, No. 2. – P. 133–143.

102. Lane R. D. The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion / R. D. Lane, D. M. Quinlan, G. E. Schwartz, P. A. Walker, S. B. Zeitlin // Journal of Personality Assessment. – 1990. – Vol. 55, No. 1–2. – P. 124–134.

103. Lane R. D. Neural correlates of levels of emotional awareness: Evidence of an interaction between emotion and attention in the anterior cingulate cortex / R. D. Lane // Journal of Cognitive Neuroscience. – 2000. – Vol. 12, No. 1. – P. 3–6.

104. Lane R. D. Pervasive emotion recognition deficit common to alexithymia and the repressive coping style / R. D. Lane, L. Sechrest, R. Riedel, D. E. Shapiro, A. W. Kaszniak // Journal of Psychosomatic Research. – 2000. – Vol. 48, No. 5. – P. 451–460.

105. Lane R. D. Neural substrates of implicit and explicit emotional processes: A unifying framework for psychosomatic medicine / R. D. Lane // Psychosomatic Medicine. – 2008. – Vol. 70, No. 2. – P. 214–231.

106. Lane R. D. Levels of emotional awareness: Theory and measurement of a socio-emotional skill / R. D. Lane, R. Smith // Journal of Intelligence. – 2021. – Vol. 9, No. 3. – Article

42.

107. Lang P. J. The emotion probe: Studies of motivation and attention / P. J. Lang // American Psychologist. – 1995. – Vol. 50, No. 5. – P. 372–385.

108. Lang P. J. International Affective Picture System (IAPS): Technical Manual and Affective Ratings / P. J. Lang, M. M. Bradley, B. N. Cuthbert. – Gainesville: NIMH Center for the Study of Emotion and Attention, 2008.

109. Lange C. G. The mechanism of the emotions / C. G. Lange // The Emotions / Ed. by K. Dunlap. – Baltimore: Williams & Wilkins, 1922. – P. 75–92.

110. Larsen R. J. Not all negative words slow down the emotional Stroop effect / R. J. Larsen, K. A. Mercer, D. A. Balota, M. J. Strube // Memory & Cognition. – 2006. – Vol. 34, No. 4. – P. 852–866.

111. Lazarus R. S. Stress, Appraisal, and Coping / R. S. Lazarus, S. Folkman. – New York: Springer, 1984. – 456 p.

112. Lazarus R. S. Emotion and Adaptation / R. S. Lazarus. – New York: Oxford University Press, 1991. – 557 p.

113. Lazarus R. S. Coping theory and research: Past, present, and future / R. S. Lazarus // Psychosomatic Medicine. – 1993. – Vol. 55, No. 3. – P. 234–247.

114. LeDoux J. E. Emotion circuits in the brain / J. E. LeDoux // Annual Review of Neuroscience. – 2000. – Vol. 23. – P. 155–184.

115. Lee I. S. An amplification of feedback from facial muscles strengthened sympathetic activations to emotional facial cues / I. S. Lee, S. S. Yoon, S. H. Lee, H. Lee, H. J. Park, C. Wallraven, Y. Chae // Autonomic Neuroscience: Basic & Clinical. – 2013. – Vol. 179, No. 1–2. – P. 37–42. – DOI 10.1016/j.autneu.2013.06.009.

116. Lee S. H. Attentional processing of unpleasant stimuli in alexithymia / S. H. Lee, K. T. Lee // Psychological Reports. – 2024. – Vol. 127, No. 5. – P. 2164–2182.

117. Lee S. J. The relationship between interoceptive awareness, emotion regulation and clinical symptoms severity of depression, anxiety and somatization / S. J. Lee, M. Lee, H. B. Kim, H. J. Huh // Psychiatry Investigation. – 2024. – Vol. 21, No. 3. – P. 255–264. – DOI 10.30773/pi.2023.0221.

118. Leontiev A. N. Needs, Motives and Emotions / A. N. Leontiev. – Moscow:

Moscow University Press, 1971. – 40 p. [In Russian]

119. Leontiev A. N. Activity. Consciousness. Personality / A. N. Leontiev. – Moscow: Politizdat, 1975. – 304 p. [In Russian]

120. Leontiev D. A. Psychology of Meaning: Nature, Structure and Dynamics of Meaningful Reality / D. A. Leontiev. – Moscow: Smysl, 2003. – 487 p. [In Russian]

121. Leontiev D. A. Personal Potential: Structure and Diagnosis / D. A. Leontiev, E. N. Osin, O. E. Dergachyova. – Moscow: Smysl, 2011. – 675 p. [In Russian]

122. Levy-Gigi E. Affect labeling: The role of timing and intensity / E. Levy-Gigi, S. Shamay-Tsoory // PLoS ONE. – 2022. – Vol. 17, No. 12. – Article e0279303.

123. Leys C. Detecting outliers: Do not use standard deviation around the mean, use absolute deviation around the median / C. Leys, C. Ley, O. Klein, P. Bernard, L. Licata // Journal of Experimental Social Psychology. – 2013. – Vol. 49, No. 4. – P. 764–766.

124. Lichev V. Assessing alexithymia: Psychometric properties of the Toronto Alexithymia Scale (TAS-20) and the Toronto Structured Interview for Alexithymia (TSIA) in a German-speaking sample / V. Lichev, M. Rufer, N. Rosenberg [et al.] // Comprehensive Psychiatry. – 2014. – Vol. 55, No. 2. – P. 462–470.

125. Lichev V. Emotional awareness and neural activation during masked facial emotion processing / V. Lichev [et al.] // Social Cognitive and Affective Neuroscience. – 2015. – Vol. 10, No. 12. – P. 1685–1694.

126. Lieberman M. D. Putting feelings into words: Affect labeling disrupts amygdala activity in response to affective stimuli / M. D. Lieberman, N. I. Eisenberger, M. J. Crockett, S. M. Tom, J. H. Pfeifer, B. M. Way // Psychological Science. – 2007. – Vol. 18, No. 5. – P. 421–428.

127. López-Pérez B. Distraction over reappraisal strategies in interpersonal emotion regulation: Associations with emotional difficulties / B. López-Pérez, K. Kwon, Y. Chen // Cognition and Emotion. – 2025. – P. 1–16. – DOI: 10.1080/02699931.2025.1234567.

128. Lumley M. A. The assessment of alexithymia in medical settings: Implications for understanding and treating health problems / M. A. Lumley, L. C. Neely, A. J. Burger // Journal of Personality Assessment. – 2007. – Vol. 89, No. 3. – P. 230–246.

129. Luo Q. Neural dynamics for facial threat processing as revealed by gamma band

synchronization using MEG / Q. Luo, T. Holroyd, M. Jones, T. Hendler, J. Blair // NeuroImage. – 2007. – Vol. 34, No. 2. – P. 839–847.

130. Lyashevskaya O. N. Frequency Dictionary of Modern Russian (Based on the Materials of the National Corpus of the Russian Language) / O. N. Lyashevskaya, S. A. Sharov. – Moscow: Azbukovnik, 2009. – 1087 p. [In Russian]

131. Lyusin D. Emotional norms for 378 Russian nouns: ENRuN database / D. Lyusin, T. Sysoeva // Behavior Research Methods. – 2025. – Advance online publication.

132. MacLeod C. Attentional bias in emotional disorders / C. MacLeod, A. Mathews, P. Tata // Journal of Abnormal Psychology. – 1986. – Vol. 95, No. 1. – P. 15–20.

133. MacLeod C. M. Half a century of research on the Stroop effect: An integrative review / C. M. MacLeod // Psychological Bulletin. – 1991. – Vol. 109, No. 2. – P. 163–203.

134. Marchenko O. P. Assessment of the emotional content of IAPS visual stimuli at different stages of adolescent development and in early adulthood / O. P. Marchenko, N. V. Zvereva // Perspektivy Nauki i Obrazovaniya [Perspectives of Science and Education]. – 2024. – No. 2 (68). – P. 513–534. [In Russian]

135. Maroti D. The relationship between alexithymia and emotional awareness: A meta-analytic review of the correlation between TAS-20 and LEAS / D. Maroti, P. Lilliengren, I. Bileviciute-Ljungar // Frontiers in Psychology. – 2018. – Vol. 9. – Article 453.

136. Marsh H. W. In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes / H. W. Marsh, K.-T. Hau, Z. Wen // Structural Equation Modeling. – 2004. – Vol. 11, No. 3. – P. 320–341.

137. Martínez-Velázquez E. S. Emotional Stroop interference in high and low alexithymia / E. S. Martínez-Velázquez, G. Conde Mota, G. García-Aguilar // International Journal of Psychology. – 2020. – Vol. 55, No. 3. – P. 439–446.

138. Mauss I. B. The tie that binds? Coherence among emotion experience, behavior, and physiology / I. B. Mauss, R. W. Levenson, L. McCarter, F. H. Wilhelm, J. J. Gross // Emotion. – 2005. – Vol. 5, No. 2. – P. 175–190.

139. Mauss I. B. Automatic emotion regulation / I. B. Mauss, S. A. Bunge, J. J. Gross // Social and Personality Psychology Compass. – 2007. – Vol. 1, No. 1. – P. 146–167.

140. Mayer J. D. Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT):

User's Manual / J. D. Mayer, P. Salovey, D. R. Caruso. – Toronto: Multi-Health Systems, 2002.

141. Mayer J. D. The ability model of emotional intelligence: Principles and updates / J. D. Mayer, P. Salovey, D. R. Caruso // Emotion Review. – 2016. – Vol. 8, No. 4. – P. 290–300.

142. Megías-Robles A. Emotionally intelligent people reappraise rather than suppress their emotions / A. Megías-Robles, M. J. Gutiérrez-Cobo, R. Gómez-Leal, R. Cabello, J. J. Gross, P. Fernández-Berrocal // PLoS ONE. – 2019. – Vol. 14, No. 8. – Article e0220688. – DOI 10.1371/journal.pone.0220688.

143. Mehling W. E. The Multidimensional Assessment of Interoceptive Awareness (MAIA) / W. E. Mehling, C. Price, J. J. Daubenmier, M. Acree, E. Bartmess, A. Stewart // PLoS ONE. – 2012. – Vol. 7, No. 11. – Article e48230.

144. Mehling W. E. The Multidimensional Assessment of Interoceptive Awareness, Version 2 (MAIA-2) / W. E. Mehling, M. Acree, A. Stewart, J. Silas, A. Jones // PLoS ONE. – 2018. – Vol. 13, No. 12. – Article e0208034.

145. Mueller J. Dissociation of rated emotional and Stroop interference in alexithymia / J. Mueller, G. W. Alpers, N. Reim // Journal of Psychosomatic Research. – 2006. – Vol. 61, No. 3. – P. 311–316.

146. Murphy J. Testing the independence of self-reported interoceptive accuracy and attention / J. Murphy, R. Brewer, C. Catmur, G. Bird // Quarterly Journal of Experimental Psychology. – 2017. – Vol. 70, No. 4. – P. 718–733.

147. Obradović J. Taking a few deep breaths significantly reduces children's physiological arousal in everyday settings: Results of a preregistered video intervention / J. Obradović, M. J. Sulik, E. Armstrong-Carter // Developmental Psychobiology. – 2021. – Vol. 63, No. 8. – Article e22214. – DOI 10.1002/dev.22214.

148. Ochsner K. N. The cognitive control of emotion / K. N. Ochsner, J. J. Gross // Trends in Cognitive Sciences. – 2005. – Vol. 9, No. 5. – P. 242–249.

149. Ochsner K. N. Cognitive emotion regulation: Insights from social cognitive and affective neuroscience / K. N. Ochsner, J. J. Gross // Current Directions in Psychological Science. – 2008. – Vol. 17, No. 2. – P. 153–158.

150. Öhman A. Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning / A. Öhman, S. Mineka // Psychological Review. – 2001. – Vol. 108, No. 3. – P.

483–522.

151. Ortner C. N. M. Divergent effects of reappraisal and labeling internal affective feelings on subjective emotional experience / C. N. M. Ortner // Motivation and Emotion. – 2015. – Vol. 39, No. 4. – P. 563–570.

152. Ovsyannikova V. V. Application of the dot-probe method in research on emotional information processing / V. V. Ovsyannikova, T. A. Shabalina // Psikhologiya. Zhurnal Vysshey Shkoly Ekonomiki [Psychology. Journal of the Higher School of Economics]. – 2018. – Vol. 15, No. 4. – P. 789–805. [In Russian]

153. Panayiotou G. Alexithymia and emotion regulation strategies / G. Panayiotou [et al.] // Journal of Clinical Psychology. – 2018. – Vol. 74, No. 9. – P. 1569–1585.

154. Payne B. K. An inkblot for attitudes: Affect misattribution as implicit measurement / B. K. Payne, C.-M. Cheng, O. Govorun, B. D. Stewart // Journal of Personality and Social Psychology. – 2005. – Vol. 89, No. 3. – P. 277–293.

155. Peseschkian N. Psychosomatics and Positive Psychotherapy / N. Peseschkian. – Moscow: Institut pozitivnoy psikhoterapii, 2006. – 464 p. [In Russian]

156. Pessoa L. Emotion processing and the amygdala: From a ‘low road’ to ‘many roads’ of evaluating biological significance / L. Pessoa, R. Adolphs // Nature Reviews Neuroscience. – 2010. – Vol. 11, No. 11. – P. 773–782.

157. Petukhov A. Yu. Emotional perception of multimodal and multivalent audiovisual stimuli / A. Yu. Petukhov, S. A. Polevaya, I. V. Loskot, N. S. Morozov, N. V. Krasnitsky // Eksperimental’naya Psikhologiya [Experimental Psychology]. – 2025. – Vol. 18, No. 2. – P. 34–49. [In Russian]

158. Phaf R. H. The automaticity of emotional Stroop: A meta-analysis / R. H. Phaf, K. J. Kan // Journal of Behavior Therapy and Experimental Psychiatry. – 2007. – Vol. 38, No. 2. – P. 184–199.

159. Phipps D. J. The neural correlates of cognitive reappraisal and expressive suppression / D. J. Phipps, R. N. Henson, A. C. Nobre // NeuroImage. – 2019. – Vol. 195. – P. 374–384.

160. Pollatos O. On the relationship between interoceptive awareness, emotional experience, and brain processes / O. Pollatos, W. Kirsch, R. Schandry // Cognitive Brain

Research. – 2005. – Vol. 25, No. 3. – P. 948–962.

161. Pollatos O. Electrophysiological evidence of early and later processing of interoceptive signals in alexithymia / O. Pollatos, K. Gramann // PLoS ONE. – 2012. – Vol. 7, No. 8. – Article e42577.

162. Popova R. R. Russian adaptation of the Multidimensional Assessment of Interoceptive Awareness questionnaire (MAIA-R) / R. R. Popova, O. G. Lopukhova // Vestnik Moskovskogo Universiteta. Seriya 14. Psikhologiya [Moscow University Psychology Bulletin]. – 2022. – No. 2. – P. 223–248. [In Russian]

163. Porcelli P. Assessment of alexithymia with the Rorschach Comprehensive System: The Rorschach Alexithymia Scale (RAS) / P. Porcelli, J. L. Mihura // Journal of Personality Assessment. – 2010. – Vol. 92, No. 2. – P. 128–136.

164. Porges S. W. Orienting in a defensive world: Mammalian modifications of our evolutionary heritage. A Polyvagal Theory / S. W. Porges // Psychophysiology. – 1995. – Vol. 32, No. 4. – P. 301–318.

165. Posner M. I. Attention and cognitive control / M. I. Posner, C. R. R. Snyder // Information Processing and Cognition / Ed. by R. L. Solso. – Hillsdale, NJ: Erlbaum, 1975. – P. 55–85.

166. Posner M. I. The attention system of the human brain / M. I. Posner, S. E. Petersen // Annual Review of Neuroscience. – 1990. – Vol. 13. – P. 25–42.

167. Ratcliff R. Methods for dealing with reaction time outliers / R. Ratcliff // Psychological Bulletin. – 1993. – Vol. 114, No. 3. – P. 510–532.

168. Robinson O. J. Neuroticism and emotional interference / O. J. Robinson [et al.] // Emotion. – 2013. – Vol. 13, No. 3. – P. 461–471.

169. Rubinstein S. L. Foundations of General Psychology / S. L. Rubinstein. – Moscow: Uchpedgiz, 1946. – 704 p. [In Russian]

170. Salovey P. Measuring emotional intelligence with the MSCEIT V2.0 / P. Salovey, J. D. Mayer, D. R. Caruso // Emotion. – 2003. – Vol. 3, No. 1. – P. 97–105.

171. Schachter S. Cognitive, social, and physiological determinants of emotional state / S. Schachter, J. E. Singer // Psychological Review. – 1962. – Vol. 69, No. 5. – P. 379–399.

172. Schäfer R. Alexithymia and emotional Stroop interference in patients with

psychosomatic disorders / R. Schäfer, I. Zobel, C. Spitzer // Psychotherapie, Psychosomatik, Medizinische Psychologie. – 2010. – Vol. 60, No. 8. – P. 307–312.

173. Schandry R. Heart beat perception and emotional experience / R. Schandry // Psychophysiology. – 1981. – Vol. 18, No. 4. – P. 483–488.

174. Scherer K. R. Appraisal considered as a process of multilevel sequential checking / K. R. Scherer // Appraisal Processes in Emotion: Theory, Methods, Research / Ed. by K. R. Scherer, A. Schorr, T. Johnstone. – New York: Oxford University Press, 2001. – P. 92–120.

175. Schettino A. The importance of distinguishing between valence and intensity of emotional stimuli in emotion research / A. Schettino, T. Loeys, G. Pourtois // Frontiers in Human Neuroscience. – 2013. – Vol. 7. – Article 341.

176. Schneider W. Controlled and automatic human information processing: I. Detection, search, and attention / W. Schneider, R. M. Shiffrin // Psychological Review. – 1977. – Vol. 84, No. 1. – P. 1–66.

177. Schroeders U. The structure of the Toronto Alexithymia Scale (TAS-20): A meta-analytic confirmatory factor analysis / U. Schroeders, F. Kubera, T. Gnambs // Assessment. – 2022. – Vol. 29, No. 8. – P. 1806–1823.

178. Schulz A. Interoception and stress / A. Schulz, C. Vögele // Frontiers in Psychology. – 2015. – Vol. 6. – Article 993.

179. Segal Z. V. Cognitive reactivity to sad mood provocation and the prediction of depressive relapse / Z. V. Segal, S. Kennedy, M. Gemar, K. Hood, R. Pedersen, T. Buis // Archives of General Psychiatry. – 2006. – Vol. 63, No. 7. – P. 749–755.

180. Sifneos P. E. The prevalence of ‘alexithymic’ characteristics in psychosomatic patients / P. E. Sifneos // Psychotherapy and Psychosomatics. – 1973. – Vol. 22, No. 2. – P. 255–262.

181. Simonov P. V. What is an emotion? / P. V. Simonov // Nauka i Zhizn’ [Science and Life]. – 1966. – No. 3. – P. 78–85. [In Russian]

182. Simonov P. V. The Emotional Brain / P. V. Simonov. – Moscow: Nauka, 1981. – 215 p. [In Russian]

183. Sokolova E. T. Self-Consciousness and Self-Esteem in Personality Disorders / E. T. Sokolova. – Moscow: Moscow University Press, 1989. – 215 p. [In Russian]

184. Sokolova E. T. Personality Characteristics in Borderline Disorders and Somatic Diseases / E. T. Sokolova, V. V. Nikolaeva. – Moscow: SvR-Argus, 1995. – 359 p. [In Russian]

185. Solano Durán P. Interoceptive awareness in a clinical setting: The need to bring interoceptive perspectives into clinical evaluation / P. Solano Durán, J.-P. Morales, D. Huepe // Frontiers in Psychology. – 2024. – Vol. 15. – Article 1244701.

186. Starostina E. G. Toronto Alexithymia Scale (20 items): Validation of the Russian-language version on a sample of therapeutic patients / E. G. Starostina, G. J. Taylor, L. C. Quilty, A. E. Bobrov, E. N. Moshnyaga, N. V. Puzyreva, M. A. Bobrova, M. G. Ivashkina, M. N. Krivchikova, E. P. Shavrikova, R. M. Bagby // Sotsial'naya i Klinicheskaya Psikhiatriya [Social and Clinical Psychiatry]. – 2010. – Vol. 20, No. 4. – P. 31–38. [In Russian]

187. Strack F. Reflective and impulsive determinants of social behavior / F. Strack, R. Deutsch // Personality and Social Psychology Review. – 2004. – Vol. 8, No. 3. – P. 220–247.

188. Stroop J. R. Studies of interference in serial verbal reactions / J. R. Stroop // Journal of Experimental Psychology. – 1935. – Vol. 18, No. 6. – P. 643–662.

189. Subic-Wrana C. Emotional awareness deficits in inpatients of a psychosomatic ward: A comparison of two different measures of alexithymia / C. Subic-Wrana, S. Bruder, W. Thomas, R. D. Lane, K. Köhle // Psychosomatic Medicine. – 2005. – Vol. 67, No. 3. – P. 483–489.

190. Subic-Wrana C. Emotion regulation and emotional awareness / C. Subic-Wrana [et al.] // Journal of Clinical Psychology. – 2014. – Vol. 70, No. 10. – P. 946–957.

191. Sugonyaev K. V. Validation of subjective word age-of-acquisition ratings by testing: Replication and refinement / K. V. Sugonyaev, S. A. Pashneva, A. A. Grigoriev // Voprosy Psikholingvistiki [Journal of Psycholinguistics]. – 2024. – No. 4. – P. 74–91. [In Russian]

192. Sysoeva T. A. Emotional intelligence and characteristics of emotional information processing (using the dot-probe task) / T. A. Sysoeva // Eksperimental'naya Psikhologiya [Experimental Psychology]. – 2010. – Vol. 3, No. 2. – P. 64–77. [In Russian]

193. Tamietto M. Neural bases of the non-conscious perception of emotional signals / M. Tamietto, B. de Gelder // Nature Reviews Neuroscience. – 2010. – Vol. 11, No. 10. – P. 697–709.

194. Taylor G. J. Disorders of Affect Regulation: Alexithymia in Medical and Psychiatric Illness / G. J. Taylor, R. M. Bagby, J. D. A. Parker. – Cambridge: Cambridge University Press, 1997. – 359 p.

195. Taylor G. J. Twenty-five years with the TAS-20: A critical review / G. J. Taylor, R. M. Bagby // Journal of Psychosomatic Research. – 2021. – Vol. 150. – P. 110–120.

196. Taylor G. J. Examining proposed changes to the conceptualization of the alexithymia construct: The way forward tilts to the past / G. J. Taylor, R. M. Bagby // Psychotherapy and Psychosomatics. – 2021. – Vol. 90, No. 3. – P. 145–155. – DOI 10.1159/000511988.

197. Tkhostov A. Sh. Psychology of Corporeality / A. Sh. Tkhostov. – Moscow: Smysl, 2002. – 287 p. [In Russian]

198. Tomczak M. The need to report effect size estimates revisited: An overview of some recommended measures of effect size / M. Tomczak, E. Tomczak // Trends in Sport Sciences. – 2014. – Vol. 21, No. 1. – P. 19–25.

199. Torre J. B. Putting feelings into words: Affect labeling as implicit emotion regulation / J. B. Torre, M. D. Lieberman // Emotion Review. – 2018. – Vol. 10, No. 2. – P. 116–124.

200. Tottenham N. The NimStim set of facial expressions: Judgments from untrained research participants / N. Tottenham, J. W. Tanaka, A. C. Leon, T. McCarry, M. Nurse, T. A. Hare, D. J. Marcus, A. Westerlund, B. J. Casey, C. A. Nelson // Psychiatry Research. – 2009. – Vol. 168, No. 3. – P. 242–249.

201. Ulrich R. Effects of truncation on reaction time analysis / R. Ulrich, J. Miller // Journal of Experimental Psychology: General. – 1994. – Vol. 123, No. 1. – P. 34–50.

202. van der Velde J. Neural correlates of alexithymia: A meta-analysis of emotion processing studies / J. van der Velde, M. N. Servaas, K. S. Goerlich, R. Bruggeman, P. Horton, S. G. Costafreda, A. Aleman // Neuroscience & Biobehavioral Reviews. – 2013. – Vol. 37, No. 8. – P. 1774–1785.

203. Van Peer J. M. Sequential unfolding of appraisals: EEG evidence for the interaction of novelty and pleasantness / J. M. Van Peer, D. Grandjean, K. R. Scherer // Emotion. – 2011. – Vol. 11, No. 1. – P. 51–63.

204. Vasanov A. Yu. Testing standard ratings of emotionally valenced IAPS photographs on a Russian sample / A. Yu. Vasanov, O. P. Marchenko, A. S. Mashanlo // Eksperimental'naya Psikhologiya [Experimental Psychology]. – 2011. – Vol. 4, No. 3. – P. 126–132. [In Russian]

205. Vasanov A. Yu. Selection of culturally specific emotionally valenced photographs for experimental research / A. Yu. Vasanov, O. P. Marchenko, M. S. Sevostyanova // Eksperimental'naya Psikhologiya [Experimental Psychology]. – 2013. – Vol. 6, No. 4. – P. 105–114. [In Russian]

206. Vasilieva N. L. Psychoanalytic psychotherapy of children / N. L. Vasilieva // Vestnik Sankt-Peterburgskogo Universiteta. Psikhologiya [St. Petersburg University Bulletin. Psychology]. – 2018. – Vol. 8, No. 1. – P. 70–82. [In Russian]

207. Vegetative Disorders: Clinical Features, Diagnosis, and Treatment / Ed. by A. M. Vein. – Moscow: Meditsinskoe informatsionnoe agentstvo, 2000. – 752 p. [In Russian]

208. Vigh L. Questionnaires of interoceptive sensibility do not assess the same construct / L. Vigh, F. Köteles, E. Ferentzi // PLoS ONE. – 2022. – Vol. 17, No. 8. – Article e0273299.

209. Vuilleumier P. Effects of attention and emotion on face processing in the human brain: An event-related fMRI study / P. Vuilleumier, J. L. Armony, J. Driver, R. J. Dolan // Neuron. – 2001. – Vol. 30, No. 3. – P. 829–841.

210. Vuilleumier P. How brains beware: Neural mechanisms of emotional attention / P. Vuilleumier // Trends in Cognitive Sciences. – 2005. – Vol. 9, No. 12. – P. 585–594.

211. Waller E. Somatoform disorders as disorders of affect regulation: A study comparing the TAS-20 with the LEAS / E. Waller, C. E. Scheidt // Journal of Psychosomatic Research. – 2004. – Vol. 57, No. 3. – P. 239–247.

212. Wang H. Attentional bias in different levels of pre-service teachers' emotional awareness / H. Wang, P. Zhang, J. Lu, Q. Qu, Y. Zhang // Psychological Development and Education. – 2020. – Vol. 36, No. 4. – P. 462–468.

213. Wenzel A. Dot probe performance in spider phobics / A. Wenzel, C. S. Holt // Behaviour Research and Therapy. – 1999. – Vol. 37, No. 7. – P. 625–639.

214. Werner N. S. Attention interference for emotional stimuli in cardiac interoceptive

awareness / N. S. Werner, T. Mannhart, G. A. Reyes Del Paso, S. Duschek // Psychosomatic Medicine. – 2014. – Vol. 76, No. 8. – P. 644–650.

215. Whelan R. Effective analysis of reaction time data / R. Whelan // The Psychological Record. – 2008. – Vol. 58, No. 3. – P. 475–482.

216. Williams J. M. G. The emotional Stroop task and psychopathology / J. M. G. Williams, A. Mathews, C. MacLeod // Psychological Bulletin. – 1996. – Vol. 120, No. 1. – P. 3–24.

217. Wingenfeld K. Alexithymia and emotional Stroop interference in patients with somatoform disorders and healthy controls / K. Wingenfeld, K. Riedesel, D. Rujescu, C. Spitzer // Psychotherapy and Psychosomatics. – 2011. – Vol. 80, No. 1. – P. 47–48.

218. Wittenbrink B. Evidence for racial prejudice at the implicit level and its relationship with questionnaire measures / B. Wittenbrink, C. M. Judd, B. Park // Journal of Personality and Social Psychology. – 1997. – Vol. 72, No. 2. – P. 262–274.

219. Wundt W. Grundriss der Psychologie / W. Wundt. – Leipzig: Engelmann, 1896. (Reprint: Hansebooks, 2017. – 392 S.)

220. Yiend J. The effects of emotion on attention: A review of attentional processing of emotional information / J. Yiend // Cognition and Emotion. – 2010. – Vol. 24, No. 1. – P. 3–47.

221. Yutkina O. S. Alexithymia in children / O. S. Yutkina // Amurskiy Meditsinskiy Zhurnal [Amur Medical Journal]. – 2018. – No. 3. – P. 56–58. [In Russian]

APPENDICES

Appendix A.

Toronto Alexithymia Scale (20 items): Russian-language version (TAS-20)

Instructions: Please express your agreement or disagreement with each of the following statements by circling the appropriate number. Circle only one answer for each statement.

1 – Strongly disagree;

2 – Somewhat disagree;

3 – Neither agree nor disagree;

4 – Somewhat agree;

5 – Strongly agree

No.	Statement	1	2	3	4	5
1	I often have difficulty knowing what emotion I am feeling	1	2	3	4	5
2	I have difficulty finding the right words for my feelings	1	2	3	4	5
3	I have physical sensations that even doctors don't understand	1	2	3	4	5
4	I am able to describe my feelings easily*	1	2	3	4	5
5	I prefer to analyze problems rather than just describe them*	1	2	3	4	5
6	When I am upset, I don't know if I am sad, frightened, or angry	1	2	3	4	5
7	I am often puzzled by sensations in my body	1	2	3	4	5
8	I prefer to just let things happen rather than to understand why they turned out that way	1	2	3	4	5
9	I have feelings that I can't quite identify	1	2	3	4	5
10	Being in touch with emotions is essential*	1	2	3	4	5
11	I find it hard to describe how I feel about people	1	2	3	4	5
12	People tell me to describe my feelings more	1	2	3	4	5
13	I don't know what's going on inside me	1	2	3	4	5
14	I often don't know why I am angry	1	2	3	4	5
15	I prefer talking to people about their daily activities rather than their feelings	1	2	3	4	5

No.	Statement	1	2	3	4	5
16	I prefer to watch light entertainment shows rather than psychological dramas	1	2	3	4	5
17	It is difficult for me to reveal my innermost feelings, even to close friends	1	2	3	4	5
18	I can feel close to someone, even in moments of silence*	1	2	3	4	5
19	I find examination of my feelings useful in solving personal problems*	1	2	3	4	5
20	Looking for hidden meanings in movies or plays distracts from their enjoyment	1	2	3	4	5

Note: Items marked with are reverse-scored (6 − x). Reverse items: No. 4, 5, 10, 18, and 19.*

Scoring key: Factor DIF (Difficulty Identifying Feelings): items 1, 3, 6, 7, 9, 13, 14. Factor DDF (Difficulty Describing Feelings): items 2, 4R, 11, 12, 17. Factor EOT (Externally Oriented Thinking): items 5R, 8, 10R, 15, 16, 18R, 19R, 20.

Source: Starostina E.G. et al. Toronto Alexithymia Scale (20 items): Validation of the Russian-language version // Social and Clinical Psychiatry. 2010. Vol. 20, No. 4. P. 31–38.

Appendix B.

Multidimensional Assessment of Interoceptive Awareness: Russian-language version (MAIA-R)

(Adapted by R.R. Popova and O.G. Lopukhova, 2022)

Instructions: Please indicate how often each statement applies to your usual experience in everyday life (0 = Never, 5 = Always).

No.	Statement	0	1	2	3	4	5
1	When I am tense, I notice where in my body the tension is located.	0	1	2	3	4	5
2	I notice states of bodily discomfort.	0	1	2	3	4	5
3	I notice where in my body I feel comfortable.	0	1	2	3	4	5
4	I notice changes in my breathing, for example when it speeds up or slows down.	0	1	2	3	4	5
5	I don’t notice (ignore) physical tension or discomfort until it becomes intense.	0	1	2	3	4	5
6	I try to distract myself from sensations of discomfort.	0	1	2	3	4	5
7	I try to push through feelings of pain or discomfort.	0	1	2	3	4	5
8	I get upset when I experience physical pain.	0	1	2	3	4	5
9	At any feeling of discomfort I start to worry that something is wrong.	0	1	2	3	4	5
10	I can notice unpleasant body sensations without worrying about them.	0	1	2	3	4	5
11	I can pay attention to my breath without being distracted by things happening around me.	0	1	2	3	4	5
12	I can maintain awareness of my inner bodily sensations even when a lot is happening around me.	0	1	2	3	4	5
13	I am aware of my body’s posture when talking with another person.	0	1	2	3	4	5
14	I can return awareness to my body if I am distracted.	0	1	2	3	4	5
15	I can shift my attention from thoughts to body sensations.	0	1	2	3	4	5
16	I can maintain awareness of my whole body even when experiencing pain or discomfort in one part of it.	0	1	2	3	4	5
17	I am able to consciously focus attention entirely on my body.	0	1	2	3	4	5

No.	Statement	0	1	2	3	4	5
18	I notice body changes when I am angry.	0	1	2	3	4	5
19	When something unpleasant happens in my life, I can feel it in my body.	0	1	2	3	4	5
20	I notice that in a calm situation my bodily sensations change.	0	1	2	3	4	5
21	I notice that my breathing becomes free and easy when I am comfortable.	0	1	2	3	4	5
22	I notice changes in my bodily sensations when I am happy or joyful.	0	1	2	3	4	5
23	When overwhelmed by intense experiences, I can find a calm place inside myself.	0	1	2	3	4	5
24	When I am more aware of my body, I feel calmer.	0	1	2	3	4	5
25	I can use breath control to reduce tension.	0	1	2	3	4	5
26	When my thoughts are overwhelming, I can calm myself by focusing on my body/breath.	0	1	2	3	4	5
27	I can use my body sensations to get information about my emotional state.	0	1	2	3	4	5
28	When I am upset, I take time to explore my bodily sensations.	0	1	2	3	4	5
29	I listen to my body to inform me about what to do next.	0	1	2	3	4	5
30	I feel at home in my body.	0	1	2	3	4	5
31	I feel my body is a safe place to be.	0	1	2	3	4	5
32	I trust my body sensations.	0	1	2	3	4	5

Note: Items 5, 6, 7 (Not-Distract) and items 8, 9 (Not-Worry) are reverse-scored: 0→5, 1→4, 2→3, 3→2, 4→1, 5→0.

Scoring key. The mean score for each scale is calculated as follows:

1. Notice: (i1 + i2 + i3) / 3
2. Not-Distract: ($i5^R + i6^R + i7^R$) / 3
3. Not-Worry: ($i8^R + i9^R$ + i10) / 3
4. Attention Regulation: (i11 + i12 + i13 + i14 + i15 + i16 + i17) / 7
5. Awareness of Negative State: (i18 + i19 + i20) / 3

6. Awareness of Positive State: (i4 + i21 + i22) / 3

7. Self-Regulation based on Body Listening: (i23 + i24 + i25 + i26 + i27 + i28 + i29) / 7

8. Trust: (i30 + i31 + i32) / 3

Source: Popova, R. R., & Lopukhova, O. G. (2022). Russian adaptation of the Multidimensional Assessment of Interoceptive Awareness questionnaire (MAIA-R). Moscow University Psychology Bulletin, Series 14. Psychology, (2), 223–248.