T.C.

YEDİTEPE UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF PHYSIOTHERAPY AND REHABILITATION

TURKISH ADAPTATION AND VALIDITY-RELIABILITY STUDY OF AWARENESS BODY CHART

MASTER THESIS

FATMA ŞAHİN, PT

İSTANBUL-2022

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İSTANBUL-2022

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated ..... and numbered .....

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DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by anotherperson nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

01.03.2021

Fatma Şahin

DEDICATION

I would like to dedicate my thesis to my father, Mehmet Şahin and my mother, Ayşe Şahin, who trusts me and supports me endlessly to reach this days and my beloved Cem Özkahraman for his endless support and encouragement.

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LIST OF SYMBOLS AND ABBREVIATIONS

%	Symbol of percentage
A	Cronbach's alpha value
M	Unit of length in meters
Kg	Unit of mass in kilograms
ABC	Awareness Body Chart
AS	Ankylosing Spondylitis
ASD	Autism Spectrum Disorders
BAQ	Body Awareness Questionnaire
BAS	Body Awareness Scale
BAS-H	Body Awareness Scale-Health
BBAT	Basic Body Awareness Therapy
BDI	Beck Depression Inventory
BDI- II	Beck Depression Inventory- II
BPQ	Body Perception Questionnaire
CBT	Cognitive-Behavioural Therapy
CFS	Chronic Fatigue Syndrome
CNS	Central Nervous System
DCML	Dorsal Column- Medial Lemniscus Tract
e.g.	Abbreviation for 'for example'
GTOs	Golgi Tendon Organs
ICC	Intraclass Correlation Coefficient
ISQ	Interoception Sensory Questionnaire
KMO	Kaiser-Meyer-Olkin Test

MAIA	Multidimentional Assessment of Interoceptive Awareness
MBT	Mind-Body Treatment Methods
MDT	Mediodorsal Thalamic Nucleus
NTS	Nucleus of The Solitary Tract
NPV	Negative Predictive Value
OCD	Obsessive-Compulsive Disorders
OFC	Orbitofrontal Cortex
PPV	Positive Predictive Value
RA	Rheumatic Arthritis
ROC Analyse	Receiver Operating Characteristic Analyse
S.D.	Standart Deviation
SPSS	Statistical Package Analyze for Social Sciences
VNS	Vagus Nerve Stimulation

ABSTRACT

Şahin, F. (2022). Turkısh Adaptation and Validity-Reliability Study of Awareness Body Chart. Yeditepe University, Institute of Health Science, Department of Physiotherapy and Rehabilitation, MSc thesis, İstanbul. This study was carried out to state the cross-cultural adaptation and validity and reliability of the Awareness Body Chart (ABC) by translating it into Turkish. ABC is a visual scale that evaluates body awareness with the colouring method over the male and female diagrams divided into 51 regions, taking into account the anatomical structures. Body awareness, which consists of efferent and afferent nerve pathways between body structures and CNS, is the perception of sensory information coming from one's own body and the outside world and processing this information in the brain. Body awareness is a concept that can be changed by the person's physiological body perception, which includes visual, tactile, olfactory, gustatory, auditory, proprioceptive, vestibular and interoceptive sensory inputs. It interacts with cultural pressures, beliefs, attitudes, memories, prejudices. The study consisted of 229 healthy and 40 depressive participants. Translation and cross-cultural adaptation were made accordingly to Beaton's 6-step procedure. The Turkish version of the ABC was created according to the procedure steps. The mean age of the participants was 20.99±2.18 years. Internal consistency was evaluated in validity and reliability analyses, and ABC was found to be highly reliable. ($\alpha = 0.942$) A test-retest comparison was performed after the second measurement was made two weeks later to examine ABC's reproducibility and temporal invariance. (n=53) As a result, the Intraclass Correlation Coefficient (ICC) was found to be 0.993, and a significant increase was observed in the retest result. ($p < 0.05$) In the Factor Analysis, it was found that the scale items could be grouped under a single factor considering the original structure of the scale, and 57.68% of the variance of ABC could be explained. It was found that ABC is a scale that discriminates sensitively between healthy individuals and depressive individuals. ($p<0.001$) Consequently, it was determined that the Awareness Body Chart is a valid and reliable assessment scale in Turkish that can evaluate body awareness in adults.

Keywords: Awareness Body Chart, body awareness, depression, validity, reliabity

ÖZET

Şahin, F. (2022). Vücut Farkındalık Şeması'nın Türkçe Adaptasyonu ve Geçerlilik-Güvenilirlik Çalışması. Yeditepe Üniversitesi. Sağlık Bilimleri Enstitüsü. Fizyoterapi ve Rehabilitasyon ABD., Yüksek Lisans Tezi. İstanbul. Bu çalışma, Vücut Farkındalık Şeması'nın (VFŞ) Türkçe'ye çevirisi ve kültürler arası adaptasyonunun yapılarak geçerlilik ve güvenilirliğinin belirlenmesi amacıyla gerçekleştirildi. VFŞ, anatomik yapılar göz önünde bulundurularak 51 bölgeye ayrılmış kadın ve erkek şemalarının renklendirilmesiyle beden farkındalığını değerlendiren görsel bir ölçektir. Merkezi sinir sistemi ile vücut yapıları arasındaki afferentve efferent sinir yolaklarından oluşan beden farkındalığı, kişinin kendi bedeninden ve dış dünyadan gelen duyusal bilgileri algılaması ve bu bilgileri beyinde işlemesidir. Beden farkındalığı kişinin görsel, dokunsal, koku alma, tat alma, işitsel, proprioseptif, vestibüler ve interoseptif duyusal girdiler içeren fizyolojik beden algısı tarafından değiştirilebilen ve kültürel baskılar, inançlar, tutumlar, anılar, önyargılar ile etkileşim içinde olan bir kavramdır. Çalışma 229 sağlıklı ve 40 depresyonlu katılımcıdan oluşmaktadır. Çeviri ve kültürlerarası adaptasyon için Beaton'un 6 aşamalı prosedürü kullanıldı. Prosedürün aşamalarına göre VFŞ'nin Türkçe versiyonu oluşturuldu. Katılımcıların yaş ortalaması 20,99±2,18 yıldır. Geçerlilik ve güvenilirlik analizlerinde iç tutarlılık değerlendirildi ve VFŞ'nin güvenilir olduğu görüldü. (α = 0,942) VFŞ'nin yinelenebilirliği ve zamansal değişmezliğini incelemek için iki hafta sonra gerçekleştirilen ikinci bir ölçümün ardından test-retest karşılaştırması yapıldı. (n=53) Bunun sonucunda, Sınıf içi korelasyon katsayısı (ICC) 0,993 bulundu ve retest sonucunda anlamlı artış olduğu görüldü. ($p < 0,05$) Açımlayıcı faktör analizinde ölçek maddelerinin, ölçeğin orijinal yapısı göz önünde bulundurularak tek faktör altında toplanabildiği ve VFŞ'nın varyansının % 57,68'ini açıklanabildiği bulundu. VFŞ'nin sağlıklı bireyler ile depresyonlu bireyleri hassas bir şekilde ayırt eden bir ölçek olduğu bulundu. ($p <0,001$) Sonuç olarak, Vücut Farkındalık Şeması'nın, yetişkinlerde beden farkındalığını değerlendirmek için kullanılabilecek, Türkçe geçerli ve güvenilir bir değerlendirme ölçeği olduğu belirlendi.

Anahtar Kelimeler: Vücut Farkındalık Şeması, geçerlilik, güvenilirlik, beden farkındalığı,depresyon.

1.INTRODUCTION AND PURPOSE

Philosophers have proclaimed the human senses as windows to the soul and powerful determinants of who we are and what we will become. Democritus thought that all the senses were a variant of the sense of touch, and he explained the sensation by the friction of atoms. Aristotle thought of connecting the four elements and the four senses: water and sight, air and sound, fire and smell, and earth and touch. Socrates' view that "In addition to the familiar senses such as sight, hearing, and smell, there are others, they have names, they are infinitely numerous" was also supported by scientists. (1) Far Eastern philosophy which is the source of many spiritual and physical treatment methods, has a very old history. The most important element for approaches based on Far Eastern philosophy is the interaction between mind, body, and spirit and their integrity. (2) Later, the philosophy of body and mind integrity caught the attention of European health professionals such as doctors, physiotherapists, psychologists, movement scientists, and they developed the concept of body awareness in the 1800s. They have developed body awareness-oriented treatment approaches and principles by combining traditional medical treatment and movement methods. (3)

There is developing evidence in the literature on the importance of body awareness, but there is a confusion of definitions in the various concepts and sub-concepts. (4) Sherrington (1900) conceptualized a sense of 'material self', thinking that all these feelings are interrelated and provide a basis for one's physical sense of self. (5) Mehling (2009) mentioned that body awareness contains an attentional focus on and being aware of internal body sensations. (6) Body awareness has a twofold definition; The first is the experience dimension (experiences of the body), and the other is the movement dimension (movement, and behaviors in movements). Another definition of body awareness is awareness of how the body is used regarding its function and interaction with itself and with others. Under normal conditions, we perceive the world with our bodies, and we experience in the world with our bodies. From this point of view, the body cannot merely be degraded to an object and constitutes our way of understanding the world. (7) From a neuroscientific point of view, body awareness is described as the process of becoming aware and processing the sensory information that the brain receives from the body and the outside world. This information is processed and transformed into experiences of the body, and the person can perceive and interpret his/her own body and environment. (8) Body awareness is the subjective experience of knowledge incoming from the body and consists of complex afferent and efferent

feedback loops between the Central Nervous System (CNS) and body structures. (9) Body awareness means knowing one's own body and the properties of other objects around it. Information arising from the body involves intra-bodily awareness, that is, one's own body and movements, and extra-body awareness, that is, information such as the properties and positions of other objects in the environment. This information is processed and transformed into the body's experiences. This knowledge and experiences effectively understand one's body and environment and establish social communication. (10) Depending on all the explanations here, body awareness is defined as the perceiving sensory signals from one's own body and is constituted by sensory information coming from the outside and inside of the body. (11) However, the process of perceiving this sensory information from the body often occurs unconsciously. It can also occur at the conscious level when necessary. (6) Body image is the physical appearance of the person, which we can describe as size, shape, and form in his mind. This multidimensional psychological incarnation experience is created due to one's emotional experiences with body image and appearance characteristics. A person's physiological body perception, with the inclusion of kinesthetic, visceral, tactile, auditory, olfactory, visual, and gustatory sensory inputs, influences body awareness. This effect results are seen in the processing of sensory information in the CNS and the individual's manners and emotions, interpretation, valuation, beliefs, cultural influences, memories, and conditioning. (3)

So, how does body awareness develop from infancy to adulthood? The first six years of life are very important in growth and development stages such as the perception of body dimensions and parts, the ability to move functionally, the nervous system, the development of senses, and cognitive functions. (12) The functional motor capacity of the child, the sense of joint movement, the conscious performance of muscle movements, the sense of position in space, the development of balance, and muscle coordination contribute to the formation of body awareness in children over time. (12,13,14). Body perception in children develops by communicating with the outside world. After children begin to perceive objects around them, they compare them with body parts whose proportions are constantly changing. Owing to the games we played as children, concepts such as position, speed, and distance are formed and developed. Over time, the child begins to realize his body better, interprets the stimuli he receives from the environment, creates a reaction, and begins to associate it with his own body. For these complex brain interactions to occur seamlessly, a good body awareness must be formed in the child. (15,16) When a baby starts to crawl, he explores the

environment more. Thanks to this sensory information obtained from the outside world during crawling, he can understand the physical differences between his body and the external environment. This sensory information enables the baby's body image to develop and adapt to the environment. According to the normal motor development stages, as the body diagram develops in a motor development stage, the necessary motor control and conformity will be provided for the transition to the next motor development stage. (17) Increasing body awareness with the development of the body diagram in crawling, which is expected from a normally developing baby, will lead to half-kneeling or kneeling skills, which are the upper stage. Normal motor development stages will continue as walking and running, respectively, and the baby will explore the environment more. As the baby adds new stimuli, knowledge, and experiences from the environment to his repertoire, he will create many different body diagrams and adopt these body diagram to create his body image. (18,19) If body awareness decay or cannot be constituted for any reason, some senses will be more active than others, and this will cause energy loss in the organism. Even if the child has poor body awareness, the expected quality responses will not be seen in some motor skills and functional movements. (14)

The literature shows the relationship between body awareness and diseases such as fibromyalgia, rheumatic diseases, anxiety, autism, eating disorders, scoliosis, phantom pain, post-traumatic stress, depression, irritable bowel syndrome, obsessive-compulsive disorders (OCD), and dysmenorrhea. (20,21,22,23,24,25,26,27,28,29,30, 31,32)

Several questionnaires and scales measure body perception, body awareness, and innerperception. Some of these are translated the Turkish language, for example, Body Awareness Questionnaire (BAQ), Body Perception Questionnaire (BPQ), and some of them have not translated the Turkish language like Multidimensional Assessment of Interoceptive Awareness (MAIA), Body Awareness Scale-Health (BAS-H), Interoception Sensory Questionnaire (ISQ) and Awareness Body Chart (ABC). (4,33,34,35,36,37)

Developed by Ursula Danner (2017), ABC is divided into 51 regions by dividing it into two parts, anterior and posterior, taking into account the anatomical structures of male and female bodies. The person is asked for trying to feel his body and colour each region on the map with one of the following colours according to his perception: Orange = “I can perceive very detailed” Yellow = “I can perceive in detail” Green = “I can detect” Blue = “I can perceive vaguely” Black = “Cannot detect”. In physical pain,

he can mark the localization and spread of pain (e.g. point, strip, patch) with a red felt-tip pen. A pain scale shows how much pain is felt in the areas where the pain is felt at the end of the form. In case of pain in more than one area, the name of the painful area can be written next to the sign. (4)

Although, there are some Turkish translations and cultural adaptations of a few scales and questionnaires related body awareness. They are all verbal scales, which causes limitations such as incomplete definition or incomprehension. Using a visual scale to measure body awareness is a new idea. Many healthcare professionals use anatomical schemas, charts, or drawings to communicate with patients. (e.g., localizing emotions within the body or localizing pain) In general, the unusual colouring approach of the affected area in body maps is acceptable in children and adults. (4) ABC is an easily understood and applicable scale. We believe that ABC's Turkish translation and cultural adaptation will contribute to clinical applications and scientific studies. This study aimed to asses the cross-cultural adaptation, reliability, and validity of the Turkish version of the Awareness Body Chart.

2.TEORICAL FRAMEWORK

The sense concept is the feeling that external or internal stimuli create in the cortex through special receptors in humans and animals. The senses of the receptors according to their location; we can divide them into three main headings: exteroceptors, interoceptors and proprioceptors. Exteroceptors are receptors located on or just below the body's surface and stimulated by external stimuli. Interoceptors are found in organs and their peripheral structures as free nerve endings. It detects sensations such as tickling, coolness, warmth, hunger, thirst, pain, itching, sexual arousal, air hunger, pulse, muscle activity, bladder swelling, and vasomotor activity. On the other hand, proprioceptors are located in the muscle,tendon, ligament, joint capsule and inner ear, and they carry sensory information such as stretching, contraction, and movement perception of these structures to the brain. (38) The two main pathways that bring sensory information to the brain are the Dorsal column-medial lemniscus tract (DCML) and the Spinothalamic tract. These two nerve pathways start from the dorsal root ganglion cells, as they do in transporting most sensory information. The dorsal column is primarily responsible for proprioceptive and tactile sensations, while the primer responsibility of the Spinothalamic tract is transporting pain and temperature sensations. The axon which enters the dorsal root participates in the white matter of the dorsal column in the spinal cord. Axons that transported via the dorsal column end and synapses with chondneurons in the medulla. The second neuron in the system emerges from one of these nuclei and continues upward by crossing the midline of the medulla. The medial lemniscus is a bunch of axons that raise to the brainstem. The axons of the second neuron transport via the medial lemniscus and terminate in the thalamus, where each synapses with the third neuron in its path. The third neuron of the system transmits axons of it into the postcentral gyrus in the cerebrum. Somatosensory information are committed in the postcentral gyrus, and conscious perceiving of the stimulus occurs. The Spinothalamic pathway also begins with neurons in the dorsal root ganglion. These neurons extend their axons up to the dorsal horn, where they synapse with the se condneuron in their path. Axons from these second neurons then intersect in the spinal cordand ascend to the brain and enter the thalamus, where each in its way synapses with the third neuron. Neurons in the thalamus then project their axons into the Spinothalamic pathway, synapses in the cerebral cortex's postcentral gyrus. (39) (Figure1)

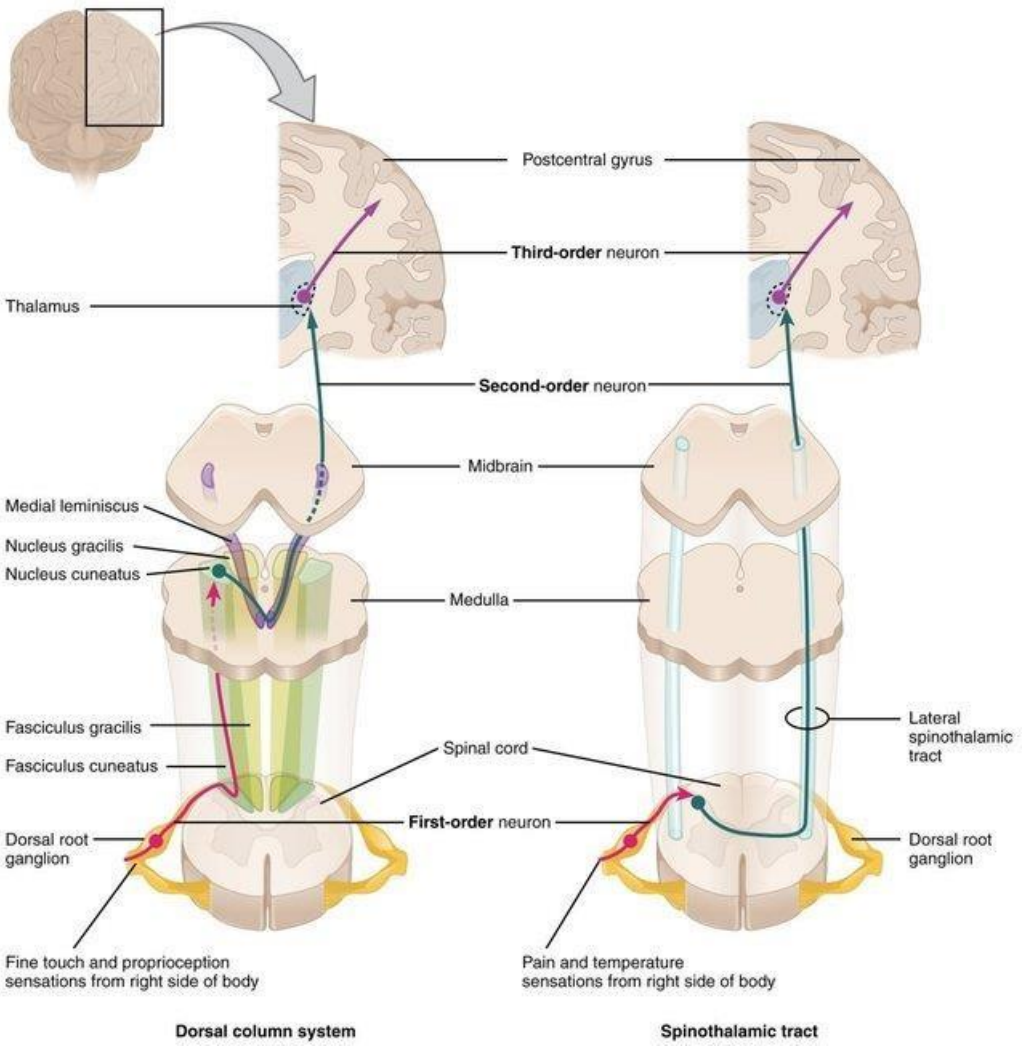

Figure 1. The appearance of the dorsal column system and spinothalamic tract (40)

Sensory information from DCML is received and processed in the cortex by the primary and secondary somatic sensory cortex and Broadman's areas 5 and 7, the somatosensory association cortex of the posterior parietal lobe. With the information it carries, DCML creates a somatotopic body map according to the density and location of somatosensory receptors in the primary somatosensory cortex and contributes to body awareness. The body map in the cortex, known as the homonculus, is represented as a slightly distorted body image. (Figure 2) Interestingly, this body representation at the cortex level has been shown to be flexible rather than stable. It has been shown that regions representing certain body parts can be enlarged in size with intensive use, and representation will decreasewith non-use and consequent decrease in skill. (41)

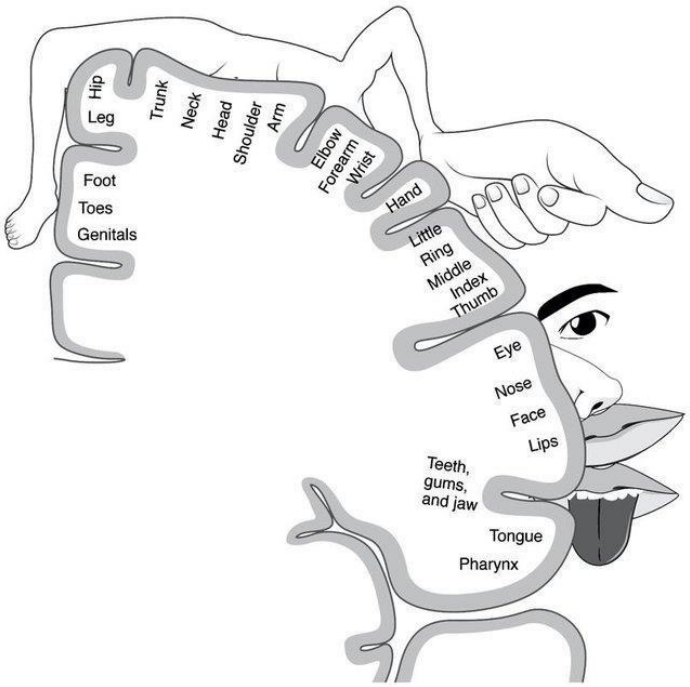

Figure 2. Illustration of Sensory Homunculus (42)

One study stated that there is also a complex interaction with the visual, tactile and auditory mechanisms. (43) The cortical representation of the body is formed due to the perception of the boundaries of the human body and the integration of its relationship with the surrounding area. Three important dimensional variables must be defined for this body/space interaction: personal space, peripersonal space, and extrapersonal space. Personal space is the cortical representation of the body surface, and it is responsible for regulating the relationship with the peripersonal and extrapersonal space. When performing any actions (e.g., grasping and manipulating objects) or protecting our body if there is a threat in the outside environment, Peripersonal space is essential to do these and for body self-knowledge. (45) (Figure 3) Peripersonal space is better processed than extrapersonal space. It is due to the activation of Visio-tactile bimodal neurons. (46) It is stated in a study with monkeys that the bimodal neurons may be found in several areas, including premotor area 6, parietal areas, and the putamen. (47)

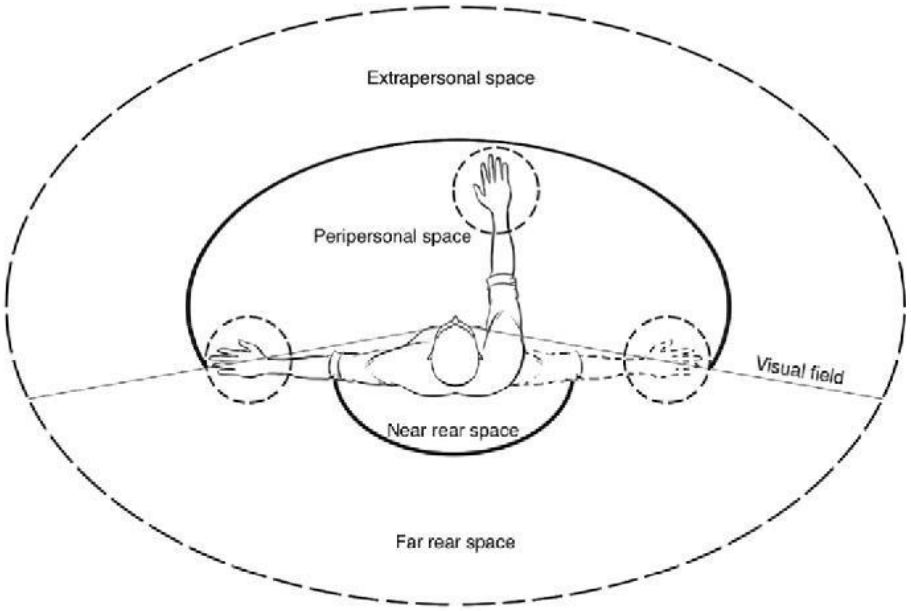

Figure 3. The figure of showing personal, peripersonal and extrapersonal space. (48)

2.1. Interoceptive Senses

The first known use of the term interoception as the perception of the internal state is found in Charles S. Sherrington's book "Integrative Action of the Nervous System". (49) According to recent studies on the functional anatomy of the lamina I spinothalamocortical system, the term interoception should be redefined as the sensation of the physiological state of the whole body, not just the internal organs. (50) Interoception is the ability to notice subtle changes such as tickling, coolness, warmth, hunger, thirst, pain, itching, sexual arousal, air hunger, pulse, muscle activity, swelling of the bladder, vasomotor activity, rectum or oesophagus, swelling. It is constructed by the sensual information from body systems, including joints, muscles, viscera, and skin. (51) This homeostatic afferent system transmits signals from small diameter primary afferents to autonomic and homeostatic centers in the spinal cord and brain stem. These afferent signals represent the physiological state of all body tissues. Thus, it provides the afferent complement of the efferent autonomic nervous system. Visceral sensory receptors are defined as pain receptors (nociceptors) terminating in the free nerve and physiological receptors that monitor the continuing function of the viscera and mediate visceral reflexes. Some of these physiological receptors are specialized, such as chemoreceptors, osmoreceptors, and thermoreceptors. Visceral afferent fibers are mostly in parasympathetic nerves. The stimulation of the receptors that control the visceral reflexes does not consciously occur. Afferents from parasympathetic cranial

nerves synapse in the brainstem, including cranial nerves VII, IX, and X in the Nucleus of The Solitary tract (NTS). All other afferents synapse at the spinal cord level when they enter the CNS. (52) Along with this afferent activity transmitted by the NTS**,** warmth, pain,itching, and other somatic emotions that are very important to primates are conveyed, creating a direct thalamocortical representation of the body's state. This anatomical organization constantly going on that represents the body's physiological state indicates that there are sensory aspects of homeostasis. We can also say that these feelings are extremely resolved. (50) This is necessary for the maintenance of homeostatic states. (53) It is known that the insular cortex has connections with many sensory, emotional, and cognitive neuronal systems. According to neuroanatomical studies, the middle and posterior parts of the insula receive afferent extensions from the somatosensory cortex that receive and process interoceptive information from the body and use this information to maintain nociceptive, thermal, and homeostatic balance. It has been shown that while posterior and middle insular regions are activated for interoception, many anterior insular areas are activated during interoceptive awareness. (54). Cardiovascular, respiratory, genitourinary, gastrointestinal, nociceptive, thermoregulatory, immune, and endocrine systems and soft touches are related to interoceptive physiology. (Figure 4) (11) Alimentary system includes the taste and olfactory receptors in addition functions from the oesophagus to the rectum in processing hunger and thirst (55) Literatür states that the interaction of homeostatic and interoceptive processes is necessary for starting and maintaining motivation and creating human self-awareness. (50)

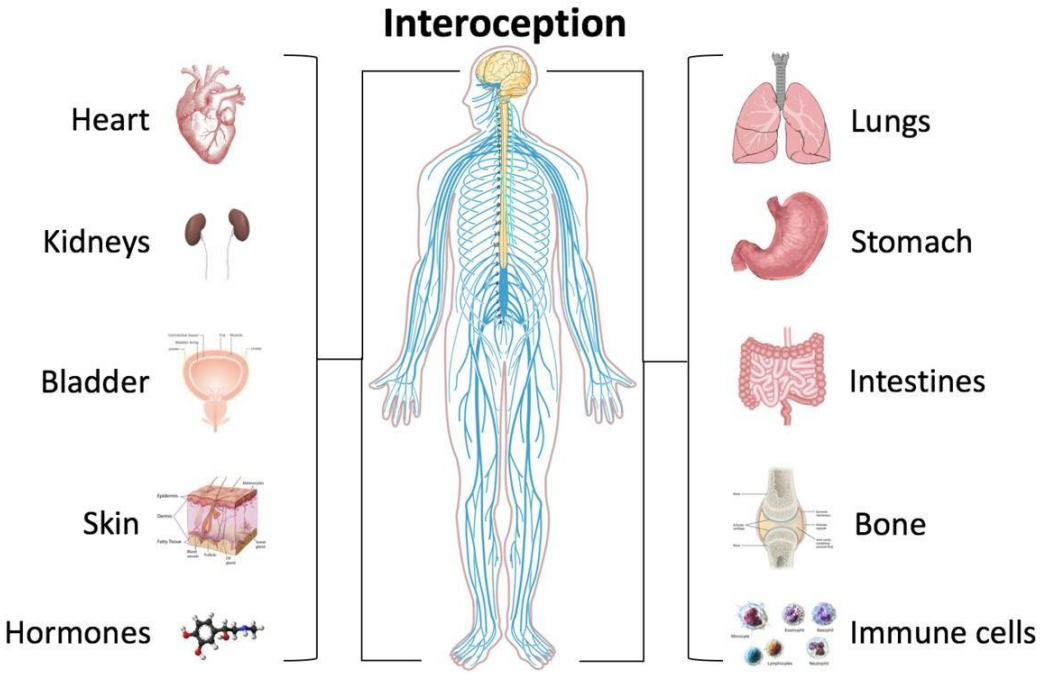

Figure 4. The relationship of interoception with many different physiological systems such as gastrointestinal system, cardiorespiratory system, nociceptive system, immune and endocrine systems. (11)

2.2. Proprioceptive Senses

2.2.1. Proprioceptive System

Proprioception was first defined by Charles S. Sherrington in 1996 as the sense of movement and position of the body. (11, 55) Afferents information from mechanoreceptors in muscle, tendon, ligament, joint capsule, and skin from the proprioceptive sense. The proprioceptive and tactile senses are formed by transforming mechanical changes of tissues (muscles, ligaments, tendons and skin) into neural signals. Proprioceptors in muscles, tendons, ligaments, and skin transmit sensory information about the position and movement of limbs and the forces they exert. Receptors found in muscles, tendons, and ligaments can be defined into three groups: Golgi tendon organs (GTOs), muscle spindle afferents, and joint receptors. Cutaneous mechanoreceptors are found in the skin of the whole body, but their densities differ by body region. The hands and lips inculude the highest mechanoreceptor density in primates, while the legs and back have the lowest density. We can divide cutaneous mechanoreceptors into five categories: Merkel receptors, Meissner corpuscles, Ruffini corpuscle, Pacinian corpuscle, and hair follicles. Different types of receptors are innervated bynerve fibres or afferents that carry tactile and proprioceptive signals to the

brain. (Figure 5) (56) Proprioception is divided into dynamic (kinesthesia) and static (joint position sense). Dynamic proprioception (kinesthesia) is joint movement awareness. It is expressed as the awareness of the place of the joint in space, known as static proprioception (joint position sense). Both are important and necessary for the body parts to perform the movement in harmony while the body is in motion. (57,58) The immediate perception of the senses of discrimination, touch, and body position is the task of the proprioceptive sensory system. This sensory system needs to work properly to perform activities such as throwing balls, walking, carrying bags, washing dishes. Proprioception is very important for controlling human movements, which is necessary when performing every activity we need in daily life. When the proprioceptive sensory muscle system contracts and relaxes, it sends information to the CNS, allowing it to be known where and how the movement takes place. (59,60) The proprioceptive sensory system transmits information to the CNS, such as where the object and its parts are in space, the speed of movement of objects in space, how much power the body spends for functional movements, the timing of the movement, the speed and amount of stretching of the muscles. (60) Static and dynamic proprioceptive senses develop when we do exercise. Special proprioceptive exercise approaches increase body awareness for preventive purposes before the injury and therapeutic purposes after surgery or injury. In the event of any injury, we observe a decrease in proprioceptive senses. At the same time, owing to proprioceptive exercises, it is possible to protect from musculoskeletal injuries by providing the appropriate pattern and smoothness of the movement. (61) In addition to when there is a disorder in the proprioceptive sense in children, the required level of body awareness cannot occur. Coordination disorder and learning speed are affected in children with poor body awareness. (62) The proprioceptive information plays an important role in continuing the posture, in performing movements and in the perceiving capacity of the shape and location of body parts. (63)

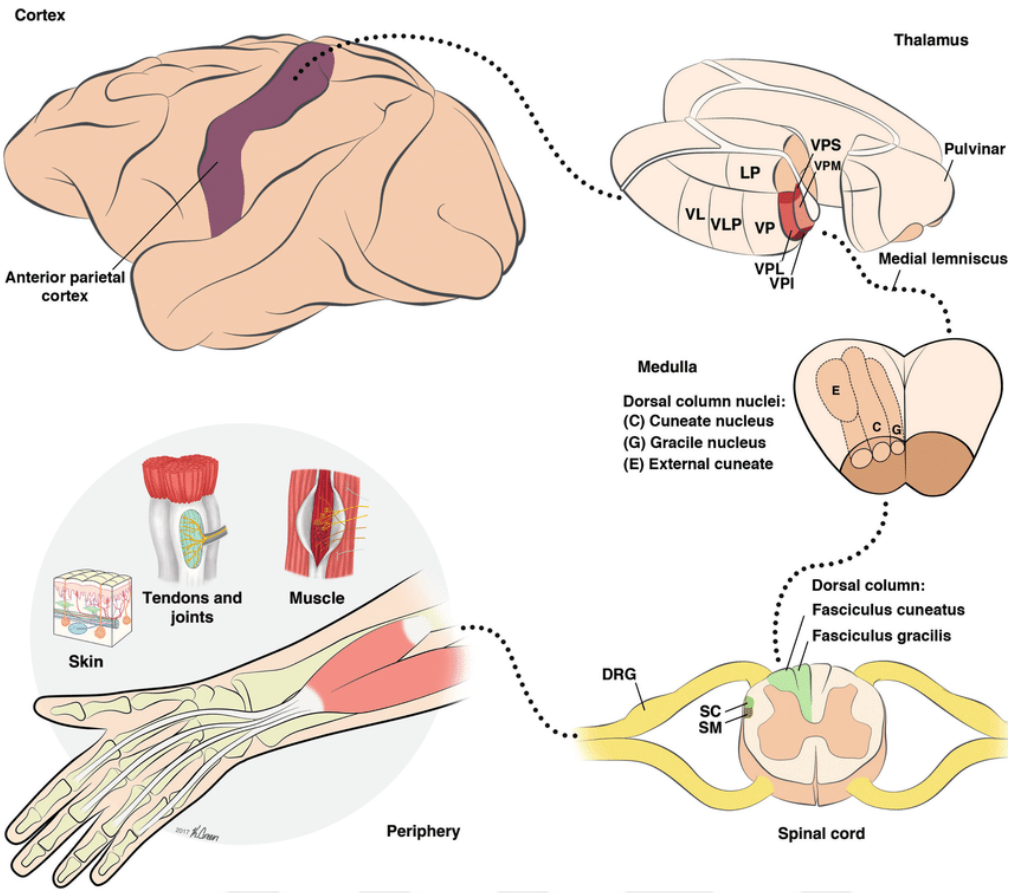

Figure 5. Illustration of the functioning of the proprioceptive system (56)

2.2.2. Vestibular System

The vestibular system is the sensory system that influences spatial orientation, motor coordination, and balance in mammals. The vestibular system is a complex sensory organization of intricate connections between the peripheral vestibular apparatus, the visual system, body muscles, brain stem, cerebellum, and cortex. (64) Vestibular system's receptors are located in the inner ear close to those of the auditory system. Vestibular receptors are hair cells located in the otolith organs and the three semicircular canals (lateral, posterior, and anterior). The task of the three orthogonal semicircular channels is to detect rotational movements. Otolith organs are divided into utricle and saccule. Utricle detects horizontal linear accelerations, and saccule detects vertical linear accelerations. (Figure 6) Sensory information acquired by otolith organs is necessary to determine the position of the body and head in space and to control posture. These receptors are responsible for static purposes. The dynamic element of the vestibular system is the semicircular canals. These structures respond to the movement of the head in space. (65,66,67) The vestibular system is effective in many important

functions in daily life, from reflexes to the highest levels of perception and consciousness. Even when we are inactive, the otolith organs continue to perceive gravity, a linear form of acceleration. (67)

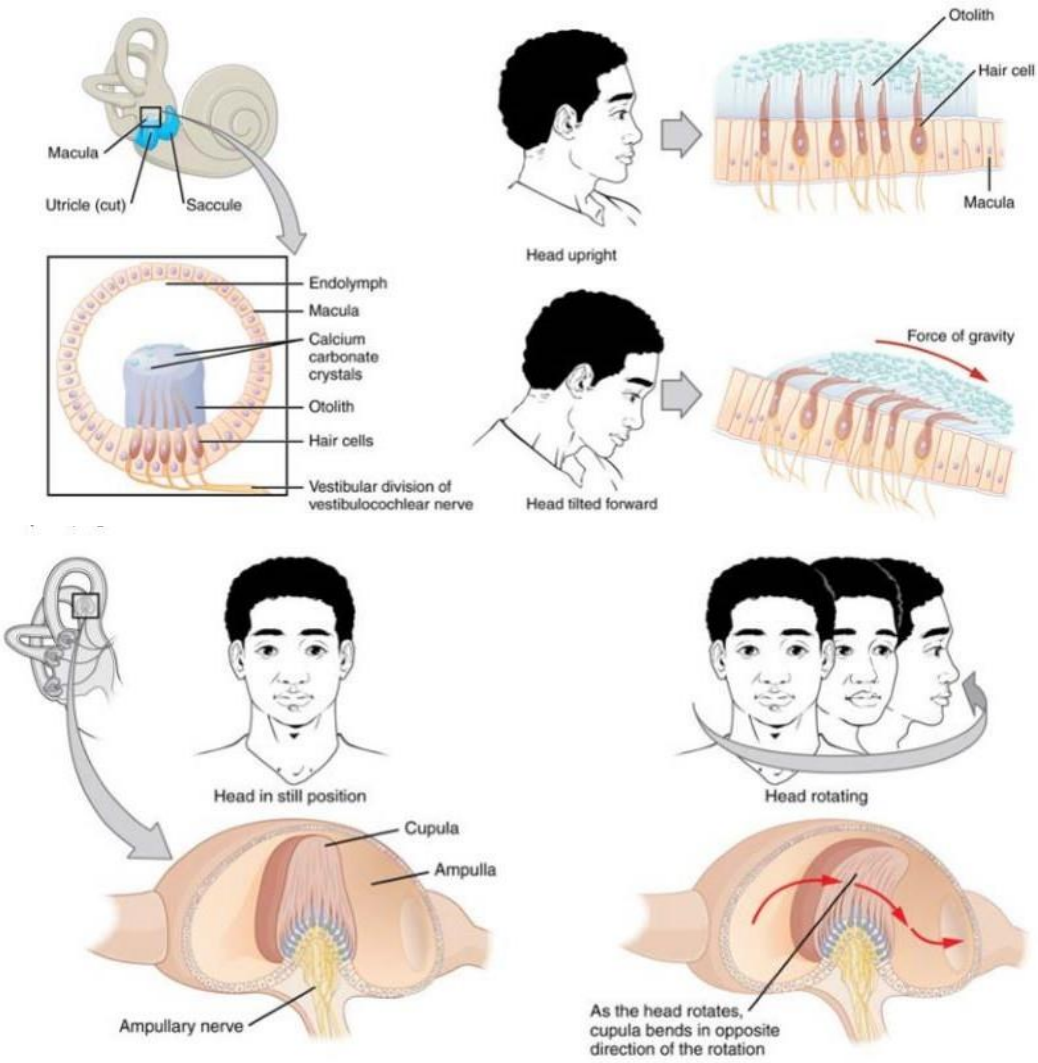

Figure 6. The utricle detects horizontal linear accelerations and the saccule detects vertical linear accelerations. (39)

Therefore, every individual knows the experience of gravity and space. The vestibular system provides the formation of this insight. The perception of these basic senses provides physical and emotional confidence. Without the vestibular senses, a proper static stance against gravity or a proper dynamic stance in space would not be possible. In this system, individuals with functional disorders have problems in free movement and fear of falling. Stress is experienced against involuntary and sudden

movements, and the person tends to keep their movements under control. Thanks to the vestibular system, awareness in space is created with the regular flow of information from external factors in space, and body awareness is increased in this way. (68)

2.3. Exteroceptive Senses

2.3.1. Tactile System

Touch is our first sense to develop. Cutaneous and trigeminal somatosensory receptors are mature at approximately 4-7 weeks of pregnancy. It progresses in weeks, and then somatosensory functions begin to be observed. (69) The priority development of touch in the early stages shows how important tactile perception is for the organism. The tactile system forms the sensory scaffold to understand our bodies and the outside world. In addition, touch allows direct access to objects in the outside world. Tactile senses are of great importance in our daily life, and they also have aspects such as social function, mediating interpersonal bonds. (70) Touch, pressure and vibration were defined by Guyton and Hall (2011) as different forms of tactile stimulation. (71) Somatosensory receptors in the skin detect various mechanical stimuli, including light brushing of the skin, texture, vibration, touch, and noxious pressure. (Figure 7) (72) According to the stimulus feature, mechanoreceptors are stimulated by mechanical effects, chemoreceptors are stimulated by chemicals released by cells as in damaged cells or infection, and thermoreceptors are stimulated with heat or cold. (73) After the mechanoreceptors perceive the sensory stimulus, the receptor potential occurs. This receptor potential is converted into an action potential in the distal axon and enters the CNS and upper centres from the dorsal root of the spinal cord by moving along the axon. The sensory information is then transmitted to the upper centres via the Spinothalamic tract and DCML. Composed of fine myelinated fibres that carry coarse touch, pressure, heat, and pain, the Spinothalamic tract influences emotional state with its extensions to the reticular and limbic systems. DCML consists of thick myelinated fibres that carry distinct touch, deep touch, vibration, and proprioception. (74) It is estimated that the skin and its tactile receptors make up about 18% of body mass in a human body. (11) Tactile stimuli in the developmental stages effectively restructure the dendritic organization in many brain regions. It also has effects on the behaviour of adults. (75) According to literature, vibration, moderate pressure massage, and superficial massage reduce the anxiety scores of individuals, and massage modulates stress responses and affects body composition and metabolism. (76,77)

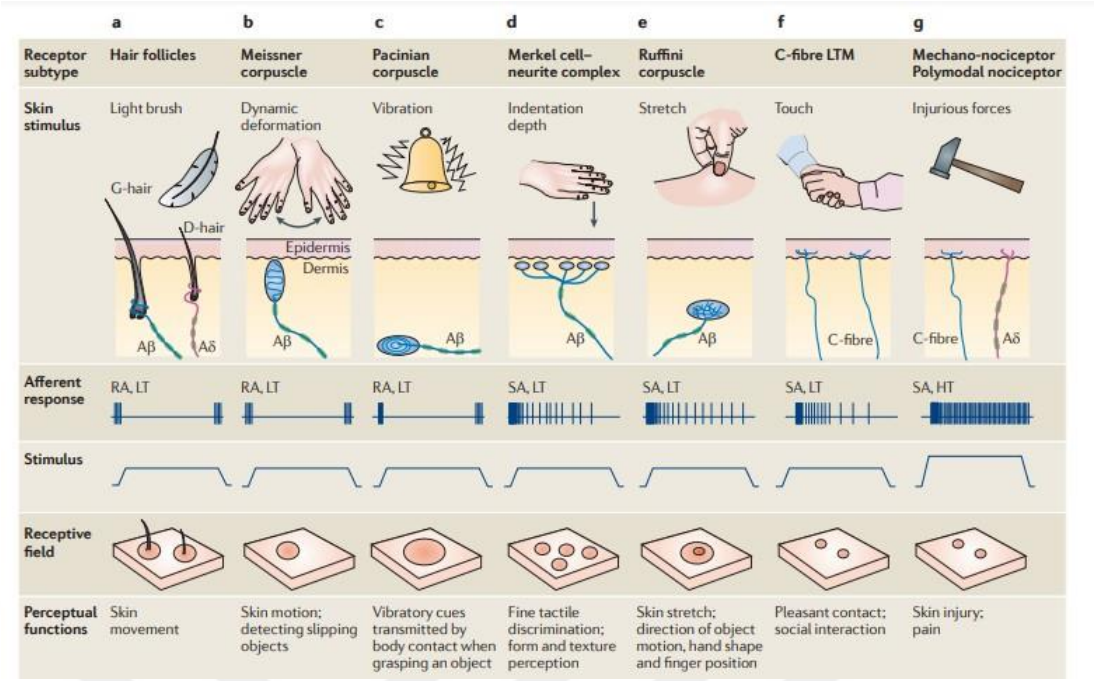

Figure 7. Illustration of tactile receptors and their physiological properties. (72)

2.3.2. Visual System

The eyes consist of an optic part that focuses visual information on receptor cells and aneural part that converts visual information into action potentials. (78) The retina, an extension of the CNS, develops from the neural ectoderm. The visual function begins when light rays emanating from an object in the field of view enter the eye from the transparent light refracting the eye's structures and reaching the retina, which is a multilayered neural network layer. Visual information enters the retina through photoreceptor cells. Photoreceptor cells are of two types, rods and cones. (Figure 8) Cone cells in the macula are responsible for central vision and colours. Rod cells located outside the macula are responsible for peripheral vision and vision in the dark. (79) Visual information, converted into electrical stimulation in the retina, is transferred to the optic nerve and then to the visual centre in the occipital cortex. Photoreceptors constantly perceive and transmit external visual images. The neural parts of the retina (bipolar cells, photoreceptors, inner plexiform cells, ganglion cells, amacrine cells) undergo a series of processes that increase the quality of these images and change their properties. (80,81)

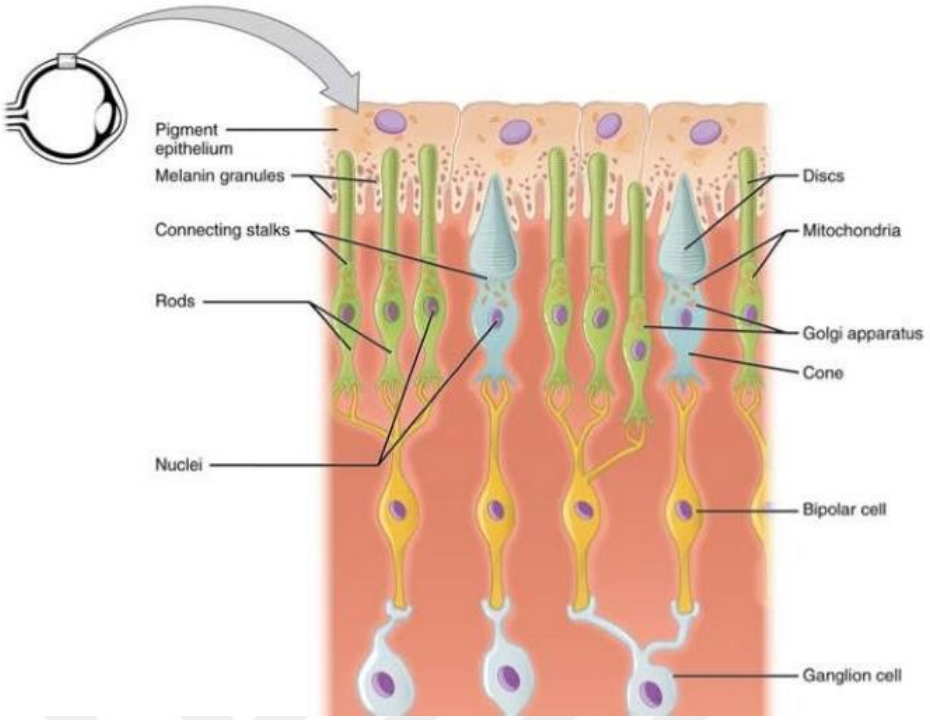

Figure 8. The appearance of photoreceptor cells (rods and cones). (39)

When a baby is born, sight is the least developed of the senses. Visual pathways begin to myelinate after birth. Visual function improves as the visual cortex matures. Visual perception capacity is very important for a person to provide, adjust and maintain an upright posture. (11) The area of visual perception is located specifically in the right lateral occipital-temporal cortex, and it works as a specialized neural system for visual perception. Here, information about the position and configuration of the human body, as well as other objects or someone else's body, is processed. (82)

2.3.3. Auditory System

The ear is the sensory organ responsible for hearing and balance functions and is located in the temporal bone in the skull. It consists of three parts, the outer ear, middle ear, and inner ear. (Figure 9) The outer ear consists of the auricle and external auditory canal, collecting external auditory information. The middle ear consists of the eardrum, middle ear cavity, ossicles and eustachian tube structures. There are cochlea, the organ of hearing, and vestibular system elements in the inner ear, which are responsible for the balance. (83, 84). Sound energy is a vibration. The diffusion of this energy occurs by the successive compression and relaxation of molecules in the environment. (83) Sound energy is collected through the auricle, transmitted to the internal structures, and transmitted to the hearing centres in the brain after certain processes in different parts of

the ear. This incoming sound energy is analyzed and interpreted by the centres responsible for hearing in the brain. Hearing is the name given to the whole process, from the sound energy reaching the ear to its interpretation. The tasks of the outer ear include detecting the angle of incidence of sound waves and comparing the difference in intensity of sound between the ears. In this way, we can understand where the sound is coming from. In the organ of Corti, acoustic signals are carried to hair cells, and these signals are converted into chemical and electrical potentials. Information such as pitch, timbre, phase and intensity of the acoustic signal is coded here and transmitted to the hearing centre in the brain. The auditory cortex, the uppermost structure where incoming information is processed, is located in the upper parts of the temporal lobe, on the right and left. It is where high-level functions such as determining the loudness and pitch of the incoming sound, recognizing speech sounds, making sense of sounds and associating them with learned sounds occur. (85).

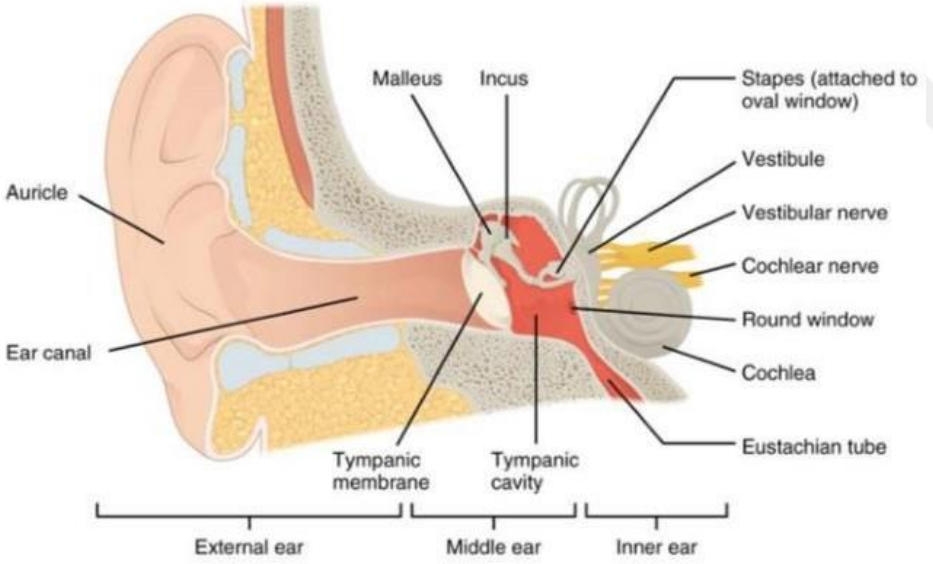

Figure 9. General anatomical structure of the auditory system. (39)

A research study found that when an approaching auditory stimulus is perceived at a limited distance, it increases the processing of an accompanying tactile stimulus on the body surface, thereby delineating the peripersonal space. (86) It is applied that vibratory-tactile stimuli to the chest of the participants in the study by Noel et al. (2015) Participants's reaction times of response were evaluated and the peripersonal space limits were determined. Response times increased when auditory stimuli entered the peripersonal space. During multi-sensory processing, we seem to assign a unique relationship to understanding the proximity of the auditory stimulus or dynamically approaching the body. (87)

2.3.4. Olfactory System

The nose is the human organ responsible for breathing and perceiving smell. Inhaled air is transmitted to the olfactory epithelium above and behind the nasal cavity. (88) The nasal mucosa consists of two parts, Regio Olfactoria and Regio Respiratoria. The olfactory area is Regio Olfactoria, and the colour of it is brown. The olfactory epithelium is located in this olfactory area and is responsible for the perception of the sense of smell and the task of taste perception. (Figure 10) To smell, after inhaled air reaching the olfactory region, the water- orfat-soluble compounds in this air must come into contact with the mucus layer covering the receptor cells. The odour molecules carried by the movements of the hairs in the nose and the inward airflow during breathing reach the mucus around the olfactory epithelium in the upper and posterior parts of the nose. (88, 89) While the chemical identity of the odour signal reaching the piriform cortex, located at the junction of the frontal and temporal lobes, is encoded in the anterior piriform cortex, the complex perceptual representation of an object that is the source of the odour is analyzed and encoded in the posterior piriform cortex. At the same time, the Piriform cortex associates these incoming odour data with the current emotional state of the individual in order to recognize objects, associate them with old experiences and archive new experiences. Odour related information is strongly associated with effective learning and memory. (90) The Orbitofrontal Cortex (OFC) is the secondary olfactory region and consists of the hypothalamus, basolateral amygdala, hippocampus, perirenal cortex, and striatum. This structure analyzes the incoming olfactory data and transmits it back to the olfactory bulb and primary olfactory cortex. The main task of the secondary olfactory region is to determine the value produced for these data. The Mediodorsal thalamic nucleus (MDT) in the thalamus has a unique sensory function and importance as it connects the primary olfactory cortex to the OFC,

which is the secondary olfactory cortex.

MDT kernel; smell preference and sense of pleasure are closely related to complex and high- level functions related to odour, such as attention to odour, associative learning, error estimation, rewarding, and as a result, the right choice of odour-specific behaviour and emotions. (91)

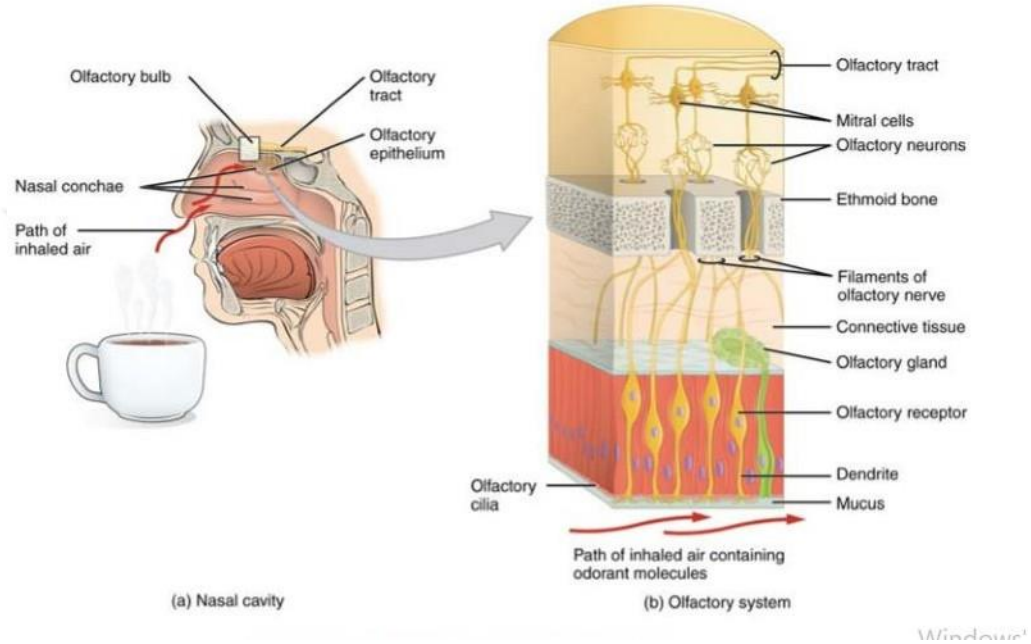

Figure 10. General anatomical structure of the olfactory system. (39)

2.3.5. Gustatory System

Perceiving the taste of food includes chemical taste, sense of smell, and feeling the texture of the food through the mouth. (92) After the food is taken into the mouth, the flavouring substances in the food dissolve due to mechanical and chemical digestion in the mouth. Afterwards, these substances are perceived by the taste buds (Figure 11) and transmitted to the brain, and the taste of the food takes place. Although some of these taste buds are located on the buccal mucosa, palate, larynx, and pharynx epiglottis, most of them are located on the tongue's upper surface. The higher the chemical substance density, the moreintense the aroma. The primary taste cortex, which includes the anterior operculum and anterior insula, is the first part of these signals to reach. The taste signal is analyzed and classified according to five flavours: sweetness, saltiness, bitterness, sourness, and umami (glutamate) taste. The second taste cortex,

which includes the OFC and the amygdala, is responsible for taste reward. In addition, additional signals from OFC are transmitted and processed to the hypothalamus. As a result, autonomic and hormonal reactions (e.g. insulin release) are managed in the homeostatic control of the nutrition. (93) It is known that there is a direct relationship between general anxiety level and taste perception. For example, the differentiated taste perception and appetite observed in mood disorders indicate a real change in the taste system. (94) After tough conditions (physical and mental fatigue and stress conditions), the perception time of bitter, sour and sweet taste sensations is shortened. Mental and physical tasks affect taste perception, but the mechanism of this relationship is not yet clear. (95)

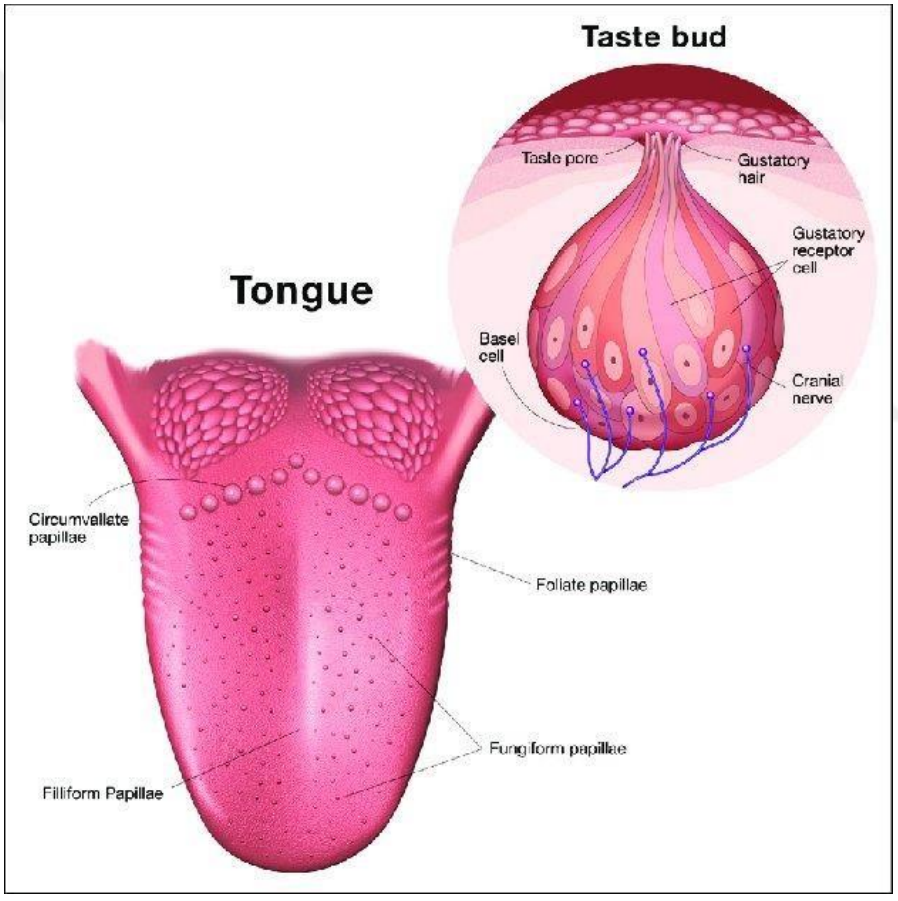

Figure 11. Anatomical structure and location of the taste buds of the gustatory system (96)

2.4. Body Awareness And Health

The brain must adapt to the constantly changing body needs. A continuous bidirectional interaction continues between the interoceptive and exteroceptive senses. The brain creates appropriate and adequate responses to stimuli from the outside world,

and at thesame time, constantly makes somatic adjustments to be ready and respond to changing situations and demands. When we consider individuals who experience sensations coming from body as uncomfortable, painful, or very intense, it is less accurate when compared to a normal individual in sensing subtle body sensations (i.e., finer body awareness). (6) It is known that body experiences can help patients occur a more positive experience with their bodies and themselves. (7) There are many studies in the literature showing the relationship between body awareness and many diseases.

2.4.1. Fibromyalgia and Chronic Fatigue Syndrome (CFS)

Fibromyalgia and chronic fatigue syndrome (CFS), qualified by chronic, unknown cause fatigue, intolerance of exercise and stress, are related to social, professional, physical, and mental inability. (97) There is hypersensitivity in patients with fibromyalgia and CFS because bodily sensations are not properly processed mentally. (98) For many, these feelings are very difficult and meaningless to express. The inability to process the mental representation of the signals coming from the body leads to a more body- focused coping strategy in the individual. (99) In the past, clinicians hypothesis that an increased body awareness might cause more intense anxiety symptoms and negatively cause more pain. (6) However, it has also been shown in later studies that patients can evolve a more affirmative experience about their bodies and themselves through body-focused approaches that are helping the improvement of internal integration. (6,7) Symptoms encountered in fibromiyalgia and CFS usually show little spontaneous improvement. Although both have restricted and moderate effects in fibromyalgia and CFS, many studies investigated exercise therapy or cognitive-behavioral therapy (CBT). (100, 101) A feasible reason for the minimal influence on pain symptoms in these patients, conventional treatments such as CBT and exercise do not give enough significance to psychological stress regulation. (99) It is also known that patients who have had pain for a long time often complain about depression and anxiety and/or a lack of confidence in their bodies. (7,102) Mind-body treatment methods (MBT) such as yoga, hypnotherapy, mindfulness, meditation, body awareness therapy, tai chi are used in treating fibromyalgia. MBT approaches effectively treat pain, stiffness, depression, fatigue, poor sleep. CFS and fibromyalgia patients suffer from physical, mental, social and occupational inadequacy. These body awareness-focused MBT methods aim to develop body function, behaviour, and interaction with the self and with others and the environment and at the same time increase awareness of how the body is used. (7,103) In the literature, studies with these therapy approaches found significant improvements in poor memory, anxiety,

depression, sensitivity, poor balance, environmental awareness, physical function quality, and self-efficacy parameters in the fibromyalji and CFS patients. (104, 105, 106, 107,108)

2.4.2. Rheumatic Diseases

Rheumatoid arthritis (RA), which influences the small joints of the shoulders, hips, knees, hands and feet, is a chronic autoimmune inflammatory disease. Inflammation of the lining of synovial joints causes painful joint swellings and bone erosion, joint deformity and subsequent infirmity. Other organs and systems such as the lungs, kidneys, hearts, skin, and eyes can also be adversely affected in RA.

RA rehabilitation consists of passive and active exercises for the feet and hands under the guidance of a physiotherapist, but more holistic techniques such as MBT are also needed. MBT aim to strengthen self-awareness and body awareness, thereby helping patients accept the body and the disease state and shift their perspective from illness to well-being. (109,110,111) With MBT approaches, a person's movement performance, posture, and attitude can be corrected and improve independence, quality of life, psychological state, and muscle strength. Especially when a RA patient is in an active phase where other rehabilitation methods cannot be used, MBT approaches may be beneficial. (112) According to recent studies, it has been observed that general physical function, psychological well-being, body awareness, confidence in movement, balance and pain sensations improve after the Tai Chi method is applied to RA patients. (113,114) Many studies show that yoga reduces pain, infirmity, and depression, and increases balance and quality of life in RA patients. (115,116,117,118,119,120)

Ankylosing spondylitis (AS) is a chronic autoimmune inflammatory disease that especially affects the axial skeleton (spine and rib cage) and it can also affect peripheral joints such as the hips, heels, feet, shoulders, and sometimes extra-articular organs and systems (eyes, intestines, skin, and rarely the lungs and heart). Rehabilitation (stretching and strengthening exercises) and drug therapy are generally used in their treatment. (112) In the literature, MBT were reviewed and found to be successful in pain management, self-efficacy, psychological state, pain and coping with pain in patients with a rheumatic disease. (121, 122) However, the number of studies using MBT treatment in AS is not high in the literature, despite its potential benefits. (112)

2.4.3. Autism Spectrum Disorder (ASD)

Autism spectrum disorders (ASD) are multiple sensory processing disorders. ASD is considered an umbrella term including Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder. (123) There are sensory perception abnormalities in the diagnosis of ASD. This is because, in these individuals, their sensory processing abilities are often interrupted or faulty. (124) Functional impairments in recognizing and responding to sensations such as hunger, thirst, temperature, and satiety are observed in individuals with ASD. For example, excessive fluid drinking behaviours may appear as water intoxication. (125) Hyperreactivity is defined as high sensitivity to stimulation, while hyporeactivity is defined as low or decreased sensitivity to stimulation. (124) Current research has found that hyperreactivity or hyporeactivity, or a combination of both, elicit a response to these sensory perception abnormalities, and these responses can lead to unusual behaviour. (126) For example, hypersensitive people may abstain from sounds and noises and make sounds repeated to block out other sounds. Similarly, those hypersensitive to visual stimuli may admire reflections and brightly coloured objects and move their fingers or objects. (124,126) According to the results of the current studies, those on the ASD show low inner perceptual awareness. (124)

2.4.4. Eating Disorders

Anorexia nervosa and bulimia nervosa are the most widespread eating disorders. (127) Anorexia nervosa is defined as a nutritional disorder including abnormally low body weight, dense fear of putting on weight and a distorted perception of the body. Individuals diagnosed with anorexia nervosa are inclined to make major modifications in their own lives for controlling their weight and so body shape. Bulimia nervosa patients are not weak, and after binge eating, they are in a cycle of abstinence and exercise, intending to get rid of calories. In the study of Thörnborg et al. (2010), they found that patients with a core Eating Disorder (Bulimia Nervosa, Anorexia Nervosa, and Unspecified Eating) have a shallow breathing type and reduced body awareness. (128) The findings of various authors in the literature show negative relationships between malnutrition behaviours and lack of hunger-satiety awareness in individuals with eating disorders. Negative relationships can also be expected between eating-disorder attitudes and body signals in appearance orientation and dietary restriction. When dieting becomes a significant effort for individuals to obtain or continue a slim body aim, this can result in a general insensitivity to internal bodily cues. (129) Studies

are reporting that increased body awareness reduces binge eating. It was concluded that yoga and meditation, which are body-focused MBT treatment approaches, can develop and support better eating habits when applied regularly. (130) In addition, Basic Body Awareness Therapy (BBAT), one of the other MBT approaches, has a significant impact on cognitive processes (conscience, attention, memory) by helping individuals with eating disorders perceive and analyze their body diagrams and images more realistically. They stated that BBAT could be beneficial, especially in childhood trauma and binge eating disorder patients. (131)

2.4.5. Phantom Pain

When we lose a limb, there are differences in peripheral proprioceptive and visual stimuli and morphological changes. Patients are aware that their limbs are no longer present, but they will feel they still exist. This is because the motion control processes of the CNS are altered at different levels. (132) Haggard and Wolpert (2005) constituted body schema disorders' groups by functional deficiencies. According to this classification, phantom phenomena belong to body size disorders.(133)

Studies with amputees negatively found a relationship between prosthetic satisfaction and disordered body image, and a negative relationship is observed between disordered body image and movement ability. (134,135) Another study also found a positive correlation between physical activity and body image. A full-body image has been observed in amputees who engage in regular physical activity. (136) In a study examining the relationship between the body schema and vestibular system with phantom pain patients, the transient perception of the phantom limb and the observed reduction in pain perception specify that vestibular stimuli are very considerable in forming a person's body diagram. (137) In addition, the use of prostheses in amputees also affects the body diagram. (132) The idea of an integrated system view in bidirectional, down-top and top-down interaction was supported in post-traumatic restructuring situations such as phantom sensations and the brachial plexus. (138) We can draw a framework for phantom pain mechanisms as impaired peripheral-spinal pain mechanisms, and plasticity in supraspinal and central sensorimotor body representations. (139)

2.4.6. Obsessive Compulsive Disorders (OCD)

Obsessive-Compulsive Disorders consist of obsessions (repetitive urges or thinkings, and they cause discomfort) and compulsions (recurrent actions or rituals carried out to decrease the anxiety that is consequent of obsessions). OCD has extensive

variations of distinctive obsessions and compulsions. Common ones include washing-cleaning compulsions and contamination fears, concerns of being liable for sabotaging control behaviors, taboo or bothering thinkings including sexual or religious subjects, anxieties, obsession with excessive symmetry, and the need to have everything "right" about an organization. (140,141) Studies show that people with OCD are hyper-aware of their body sensations. OCD patients exhibit a maladjusted profile that includes depressive mood caused by disturbing sensations, anxiety about disturbing sensations, and inability to feel their own body as secure. (142) Previous researches on body awareness and interoception examined anxiety sensitiveness with OCD patients, and pointed out that more sensitiveness for body sensations and sensory-based symptoms may be interrelated in OCD. (143,144,145,146)

2.4.7. Dysmenorrhea

Dysmenorrhea is pathophysiologically divided into primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is characterized by pain during menstruation without fundamental pelvic dysfunction or issue. In secondary dysmenorrhea, menstrual pain is caused by a pelvic disfunction or pathology. (147) Pain begins at the first hours after menstruation starts, and it rises gradually on the second day and the day after. MBT approaches decrease muscle spasms/tension and sympathetic activity and increase the myometrium's blood supply. (148) In addition to physical concerns, women with dysmenorrhea often experience mood or behaviour changes. These conditions disrupt the course of daily life and cause significant social inadequacies. (149) Dysmenorrhea negatively affects psychosocial state and cognition. Especially in adolescents, it causes absenteeism from school and work. Continuous severe chronic pain causes functional and structural changes in the CNS.

One study investigated the connection of primary dysmenorrhea and signs of depression and anxiety with adolescent female students and observed higher depression and anxiety scores than healthy, same-aged adolescent girls. It has also been reported that dysmenorrhea affects parameters such as pain experience, statement of pain, behaviors caused by pain and coping responses against pain. (150) Growing evidence in the literature stated that depression and anxiety symptoms accompany dysmenorrhea. The possible reason is the concept of pain perception dysfunction, defined as nociceptive transmission and modulation issue within the CNS. Furthermore, in conclusion, psychological and social states such as incapability to go to school or work, concentration deficiency, and incapability to be part of social life are affected. (148,150,151,152,153)

2.4.8. Depression

Depression is a global threat to public health with increased adverse effects and is globally one of the major reasons for functional disability. (154) Depression is often associated with many somatic symptoms and grievances, including motor weakness, back and chest pain, vigorous fatigue, headaches, and gastrointestinal problems, in addition to symptoms such as negatively feeling of the body, reducing sexual interest and vitality. (155) Considering these symptoms that affect daily functioning, it can be said that depressive disorders are effective in changes in mood and cognition and the subjective experience of one's own body. (156) The relationship of signs of depression and experience of the body increases the idea of whether a holistic approach as body-focused psychological treatment would effectively improve depressive symptoms. (157) There are studies using this idea as a frame of reference. (155,157) Body-focused treatment approaches focus on sensorial awareness and physical well-being, and abilities to develop incomplete or incorrect body experiences of patients. It also focuses on impaired emotional processing and affects regulation by promoting the relationship of emotion regulation and motor systems. (157)

Studies point to a finding of significantly higher body dissatisfaction in patients with depression. (158, 159, 160) In addition, one study reported that an appearance-related item in the Beck Depression Inventory (BDI) containing the phrase 'I fear I look ugly and disgruntled'was strongly associated with chronic depression. (161) Depression variously affects the aspects of body experience, it is necessary to measure body dissatisfaction and general attitude towards the body and body awareness. Danielsson and Rosberg (2015) pointed the significance of body awareness effects and improving body awareness to treat people with major depression. (162) Harshaw (2015) hypothesized that decreased perception body signals and expression of this signals are key symptoms of depressive illness. (163)

2.5. Measuring Body Awareness

Several questionnaires and scales measure body perception, body awareness, and inner perception. Some of these are translated the Turkish language and some of them have not translated the Turkish language yet.

2.5.1. Body Awareness Questionarrie (BAQ)

Body Awareness Questionnaire (BAQ) is, developed by Shields (1989), consisting of 18 statements, used to determine body composition, normal or abnormal

sensitivity level, consisting of four subgroups as changes in body process, sleep-wake cycle, estimation at the onset of the disease. Each statement is scored with numbers from one to seven, and the rating is calculated as a total score in the questionnaire. It is an indicator of high body sensitivity with an increase in score. (164) In the Turkish validity and reliability study of the BAQ, the Cronbach's alpha value was found to be 0.91. In the original version of the scale, the Cronbach's Alpha value was 0.83. When the results were evaluated, it was found that there was a statistically high and significant correlation between the test-retest scores of BAQ. ($r=0.83$, $p<0.01$) Item-total test correlation values of BAQ vary between 0.486 and 0.724. Inthe light of these results, it was stated that the Turkish version of the BAQ is a consistent assessment scale. (2)

2.5.2. Body Perception Questionarrie (BPQ)

Body Perception Questionnaire (BPQ) was developed by Stephen Porges (2019), andoriginally it consisted of 122 items. BPQ's objectives are; to assess body awareness, stress response, autonomic nervous system reactivity, stress style, and health history. BPQ consistsof 46 items rated from 5 (always) to 1 (never). It consists of 26 items to assess "Body Awareness", 15 items to assess "Supradiaphragmatic Reactivity", and six items to assess "Diaphragmatic Reactivity". (34) Cronbach's Alpha scores were found to be between 0.8 and 0.9 as a result of the internal consistency analysis of the subscales of the BPQ, for which Turkish validity and reliability studies were conducted. According to this result, the Turkish version of the BPQ is valid and reliable. In addition, the reliability of the questionnaire, which has been published in Czech, German, Dutch, Swedish, Portuguese, Spanish and Catalan versions,supports the claim that it is a useful and reliable questionnaire. (11)

2.5.3. Multidimensional Assessment of Interoceptive Awareness (MAIA)

The Multidimensional Assessment of Interoceptive Awareness (MAIA) is a 32-item self-report questionnaire that assesses eight dimensions of internal bodily awareness. Participants mark each statement as '0-Never' and '5-Always' as appropriate. Higher scores onthe MAIA represent higher inner perceptual awareness. The scale is translated into 20 languages (e.g. Persian, Korean, Polish, German, Spanish, Italian, Lithuanian, Chinese). The scale has eight sub-scales (a) awareness of body sensations (Recognition scale), (b) emotional response to sensations and attentional response (no distraction), (c) capacity to regulate attention (Attention Regulation scale), (d) awareness of mind-body integration (Emotional Awareness, Self-Regulation and Body Listening scales), (e) confidence in body sensations (Confidence scale). Reliability

analyzes of four subscales of this scale showed correct internal consistency values (Attention regulation: $\alpha = 0.87$; emotional awareness: $\alpha = 0.82$; self- regulation; $a = 0.83$; body listening: reported as $\alpha = 0.82$). According to the construct validity results, MAIA is able to differentiate at the maximum level between experienced teachers of mindfulness-based integration training programs and students of such programs. (165)

2.5.4. Body Awareness Scale-Health (BAS-H)

The Body Awareness Scale-Health (BAS-H), a variation of the Body Awareness Scale (BAS) and created by Roxendal in 1985 and evaluated in the rehabilitation of schizophrenia, was developed in 1992. Items of BAS-H scale involve activities of daily living such as running, jumping, standing on a stool or lying down. The BAS-H scale occurs from 24 items and has a 7-stage scoring system from 0 to 6. A score of '0' indicates that the subject performs the movement in a harmonious, relaxed and lively manner, while '6' indicates a problem pattern in the movements. Gyllensten et al. (2004) studied the validity and reliability of the BAS-H scale and showed that the inter-rater reliability of the sum of results (n = 70) was 79.9% with an acceptable agreement (assuming a scale-step difference) and 48.7% with excellent agreement. Weighted Kappa ranges from 0.34 to 0.92. The mean test-retest reliability for both raters (n = 54) was 90.5% for BAS-H sum with an acceptable agreement and 60.4% with excellent agreement. Weighted Kappa ranges from 0.65 to 0.92. When used according to the guidelines, BAS-H is valid and reliable evaluation method in the rehabilitation of patients with chronic pain or psychiatric disorders and healthy controls. (166)

2.5.5. The Interoception Sensory Questionnaire (ISQ)

Criteria were taken into account while creating ISQ's articles, (a) difficulty in identifying and describing internal perceptual bodily signals unless they are excessive, (b) hypo-reactive and hyper-reactive perception, (c) allodynia of affective touch, (d) reliance on external cues, (e) reduced emotional/hyperreactive effects on bodily states. Motivational components. Consisting of 60 items, participants rate the items on a scale from 1 ("not at all true for me") to 7 ("very true for me"). Three items were reverse-scored (e.g. “I am aware of my body and the sensations. I am feeling such as hunger, thirst, and heartbeat”). According tothe reliability study results, the ISQ is a reliable tool for measuring internal perceptual confusion in adults with autism, with evidence of a single-factor construct. As a result of the analysis, it was reported that the 20-item ISQ had sufficient convergence and discriminant validity, as well as excellent internal

consistency. (α = 0.96) (167)

2.5.6. Awareness Body Chart (ABC)

Developed by Ursula Danner (2017), ABC was divided into 51 regions by dividing it into two parts, anterior and posterior, taking into account the anatomical structures of male and female bodies. The person is asked to try to feel his body and colour each region on the map with one of the following colours according to their perception:

- Orange = “I can perceive very detailed”,
- Yellow = “I can perceive in detail”,
- Green = “I can detect”,
- Blue = “I can perceive vaguely.”
- Black = “Cannot detect”.

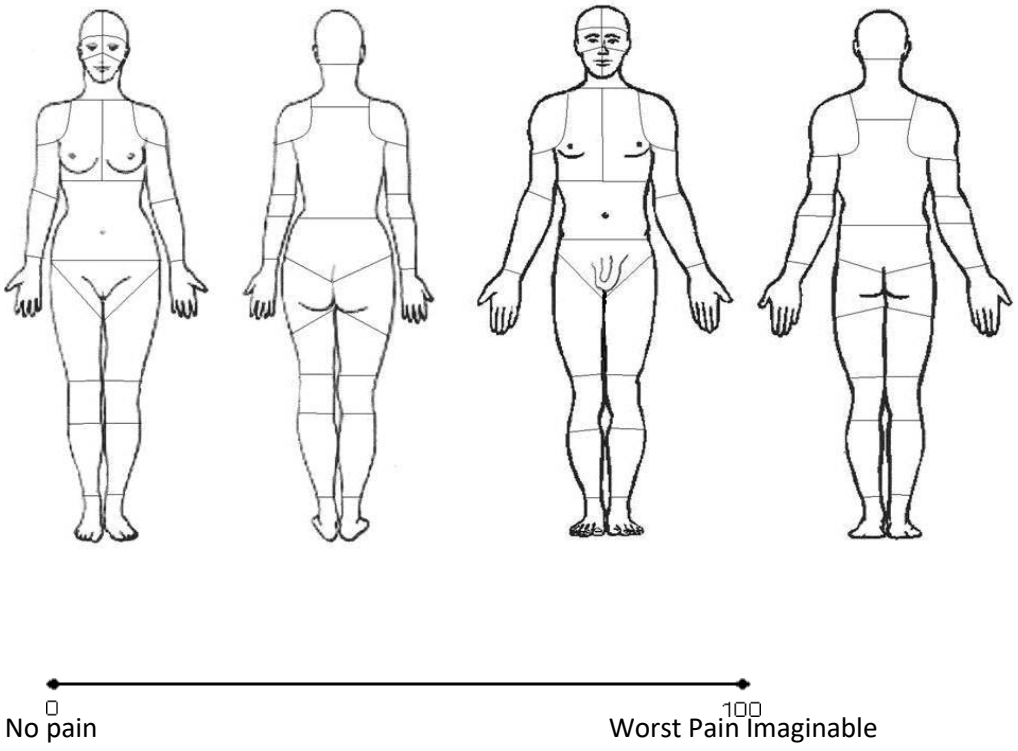

Figure 12. The appearance of Awareness body chart (4)

Each zone should be coloured using a single colour. In physical pain, you can mark the localization and spread of pain (e.g. point, strip, patch) with a red felt-tip pen. At the endof the form, a pain scale shows how much pain is felt in the areas where the pain is felt. In case of pain in more than one area, the name of the painful area can be written next to the sign. (Figure 12)

The study assumed that a homogeneous study group with adequate health and body awareness of the physiotherapy students participating was formed based on a standardized physical screening test regarding the professional qualifications performed before being accepted to the undergraduate physiotherapy program. 106 students out of 172 students agreed to participate in the study. (79 women 27 men). Other tools used in the study are KEKS (short validated body awareness questionnaire) and the Beck Depression Inventory-II.(BDI- II) The order of the questionnaires: Personal data, ABC, KEKS, ABC (retest), ABC- Feedback, BDI-II. These processes took 30-45 minutes in total. In the study, ABC, which was divided into 51 regions by considering the anatomical structures, was examined as 14 regions. (skull, face, neck/waist area, chest/abdomen, back, shoulder, upper arm, lower arm/elbow, hand, genital area, thigh/hip, knee, lower leg and foot)

The total score showed an acceptable high value of Cronbach's alphas (α= .64 - .97).The test-retest reliability showed values between ρ= .71 and ρ= .96. The correlation between ABC and KEKS (r = .66, p<.001) confirmed validity. The BDI-II score correlated highly significantly with the ABC total score (ρ= -.41; p< .001). Correlations with the BDI-II have further validity indications about comparisons of subgroups. According to the study results, ABC exhibits good psychometric properties with acceptable to high internal consistency, acceptable to high test-retest reliability, and satisfactory validity. It provides a new perspective on body awareness patterns in different disease groups. (4)

3. MATERIALS AND METHODS

This study was conducted to examine the validity and reliability of the Turkish translation of the Awareness Body Chart. ABC is a visual scale, developed by Danner et. al. (2017), that evaluates body awareness by colouring method, consisting of anterior and posterior parts and divided into 51 zones, taking into account anatomical structures. There are many limitations to written or oral questionnaires (reading and interpretation issues; insufficiently defined concept). Many healthcare professionals use anatomical maps, body charts, or drawings to communicate with patients (e.g. localizing emotions within the body or localizing pain). As a result, the unusual colouring approach of the affected area in body mapsis accepted in children and adults. (4)

3.1. Ethical Aspects of the Study

In order to examine the validity and reliability of the Turkish version of ABC, necessary permission was obtained from Ursula Danner via e-mail. (Appendix 1) Ethical approval was received for this study from the Yeditepe University Clinical Research EthicsCommittee (19.11.2021-15). (Appendix 2)

3.2. Subjects

320 volunteers over the age of 18 participated in the study. 51 participants were excluded for different reasons. (Figure 13) A total of 269 people, 194 men and 75 women, were included in the study. The purpose and plan of the current study were explained, and written informed consent was obtained from each participant. (Appendix 3)

Inclusion criterias;

- Accepting to participate in the study voluntarily,
- Being a university student,
- Being between the ages of 18-25,
- Being able to understand and follow commands.

Exclusion criterias;

• Being under the age of 18, over the age of 25,

• Use of psychotropic medications,

• Did not complete the questions

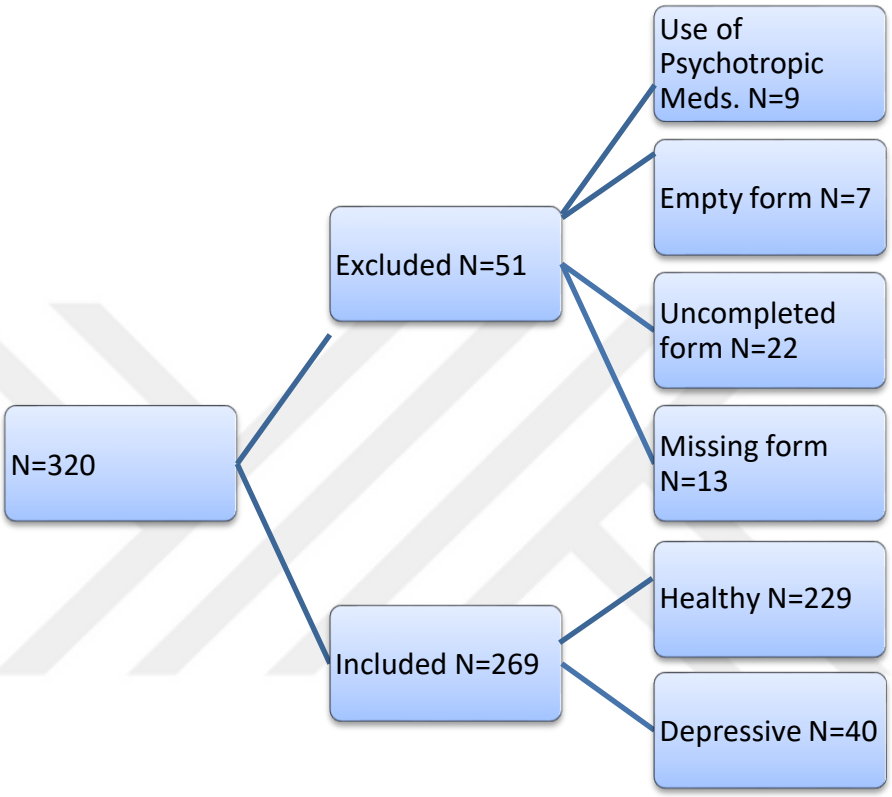

Figure 13. Diagram showing the inclusions and exclusions of the participants

3.3. Determination of the Sample Size

The literature states that the sample size should be at least five or even ten times the number of items in the questionnaire, and 100 poor, 200 moderate, 300 good, 500 excellent, and 1000 excellent. In the ABC scale, the human body was divided into 51 regions considering the anatomical structures, and these regions were evaluated as items in the verbal questionnaires, and the sample size was determined as 255 at least. (168,169,170)

3.4. Methods

3.4.1. General Framework of the Study

In this study, the Awareness Body Chart was first translated into Turkish, then cross-culturally adapted, and the validity and reliability of the Turkish scale were tested. The Turkish translation and intercultural adaptation were made according to the "Guiding Principles for the Process of Intercultural Adaptation of Intercultural Self-Report Criteria" published by Beaton et al. (2000) (Fıgure 14; 171)

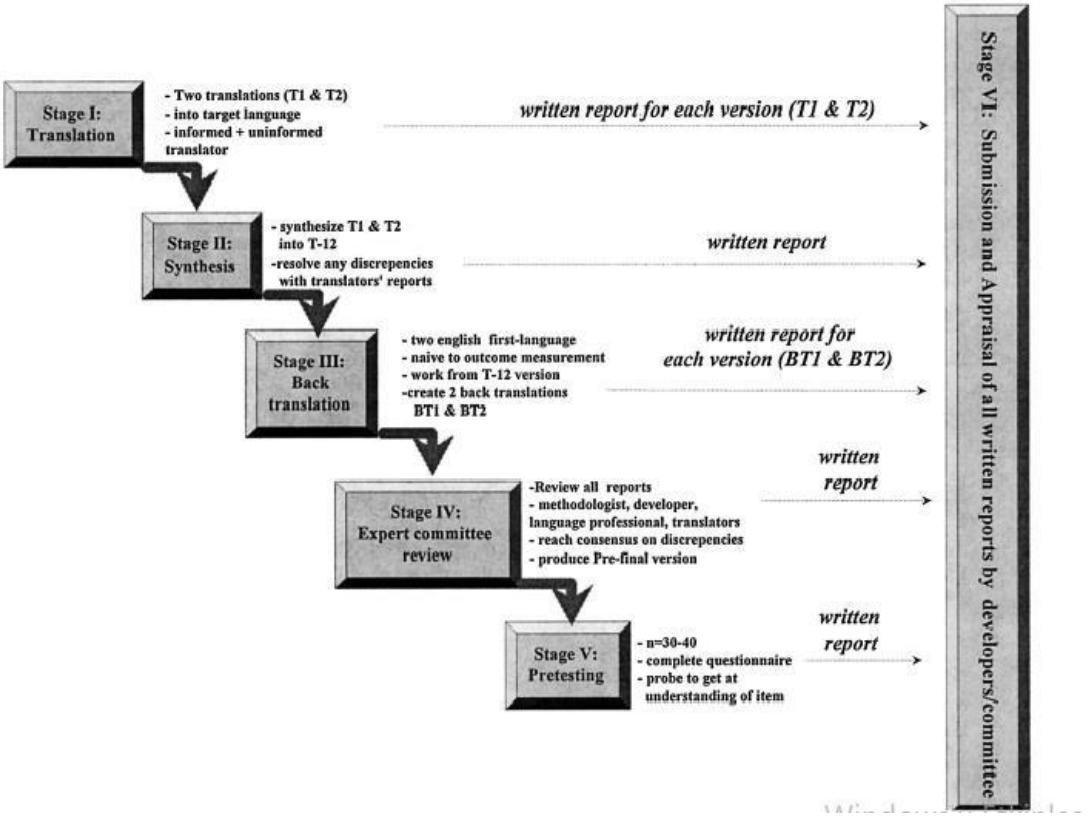

Figure 14. Guiding Principles for the Process of Intercultural Adaptation of Intercultural Self-Report Criteria. (171)

3.4.2. Translation and Intercultural Adaptation Process

ABC was translated into Turkish by two native speakers, and they expressed their views on the substance, content and applicability. These two translations were combined into one translation of ABC. The Turkish version of ABC, which is a combination of two translations, was translated back into English by two different native speakers. Two English translations and one Turkish questionnaire obtained were reviewed at the committee meeting held in the form of conference calls over the internet. All translators attended the committee meeting, and the Turkish version was revised.

3.5. Evaluation of Participants

3.5.1. Sociodemographic Information Form

Information such as name, surname, age, weight/height, alcohol/smoking habits, chronic diseases or any medication used regularly were learned by filling out the sociodemographic information form of the participants. (Appendix 4)

3.5.2. BECK Depression Inventory (BDI)

BDI, a 21-item scale that gives objective data about the depression level of individuals(minimal, mild, moderate, severe), was created by Beck et al. (1961). (172) Nesrin Hisli (1989) conducted the Turkish validity and reliability study of the BDI. The 'co-validation' method was used to measure validity, and the depression scale of the Minnesota Multiphasic Personality Inventory (MMPI), which was standardized in Turkish, was determined as the criterion. Its sample is 63 psychiatric clinic patients. As a result of statistical analysis, the correlation coefficient between these two scales was r=63. A BDI score of 17 has been suggested as an appropriate dividing point to identify clinical depression. The Turkish versionof the BDI is valid, reliable and frequently used. (173) (Appendix 5) The table below is used for evaluation.

Degree of depression	Total
• Minimal depression	0-9
• Mild depression	10-16
• Moderate depression	17-29
• Severe depression	30-63

3.5.3. Awareness Body Chart (ABC)

Developed by Ursula Danner, ABC is divided into 51 regions in two parts as anterior and posterior, taking into account the anatomical structures of the male and female bodies. Of the colors, orange means 'I can perceive in great detail.', yellow means 'I can perceive clearly.', green means 'I can perceive.', blue means 'I can perceive vaguely.' and black means 'Icannot perceive'. If there is an area where pain is felt, the body chart is painted with a red pen.At the end of the form, there is also a pain scale to mark how much pain is felt in the areas where pain is felt. In case of pain in more than one area, the name of the area is written next tothe marking. (Appendix 6)

3.5.3.1. Calculating Raw Scores

To evaluate the data of colours, a number is appointed for each colour: orange (= 5), yellow (= 4), green (= 3), blue (= 2), black (=1). An increase in total score means better bodyawareness. ABC, which originally consisted of 51 regions, was categorized into 14 sections defined as 'skull, face, neck/waist region, chest/abdomen, back, shoulder, upper arm, lower arm/elbow, hand, genital area, thigh/hip, knee, lower leg and foot ' in this study. (Fıgure 15)

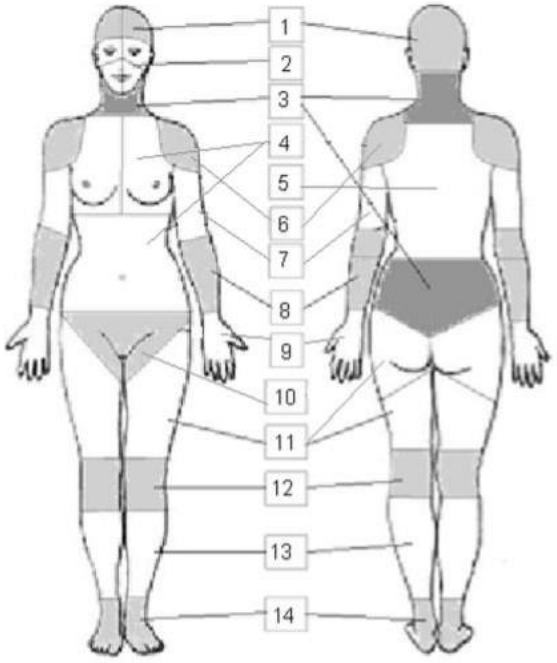

Figure 15. Illustration of 14 categories of ABC (skull, face, neck/waist region, chest/abdomen, back, shoulder, upper arm, lower arm/elbow, hand, genital area, thigh/hip, knee, lower leg and foot) (4)

3.6. Statistical Analyzes

Statistical analyzes were performed with the help of SPSS version 25.0 program. The conformity of the variables to the normal distribution was examined by histogram graphics and the Kolmogorov-Smirnov test. Mean, standard deviation, and median values were used when presenting descriptive analyzes. Categorical variables were compared with the Pearson Chi-Square Test. The Mann Whitney U Test was used when evaluating non-normally distributed (nonparametric) variables between two groups. Spearman Correlation Test was used in the analysis of the measurement data with each other. Significant cut-off value was investigated by ROC analysis. Intraclass Correlation Coefficient (ICC) was used for test-retestevaluations. Cases with a P-value below 0.05 were considered as statistically significant result.

4.RESULT

4.1. Descriptive Information

This study was carried out between April 2021 and January 2022 at Yeditepe University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation. A total of 269 people, 194 men and 75 women, participated in our study, in which the Turkish validity and reliability of the Awareness Body Chart visual scale used to evaluate body awareness were investigated. (72.12% male, 27.88% female) The participants' physical characteristics (Table 4.1) and sociodemographic and health conditions (Table 4.2) are shownbelow.

The mean age of the participants was 20.99±2.18 years. The mean Body Mass Index (BMI) value was calculated as 21.50±3.00. The average BMI value of the participants is normal according to the BMI classification. In people with pain in their body, pain is felt in atleast one region and at most 19 different regions, and the median value of the number of painful regions is 3. (Table 1)

Table 1. Physical characteristics of the subject

	Mean	S.D.	Median	Min	Max
Age	20,99	±2,18	20,00	18,00	25,00
Height (cm)	168,13	±8,01	168,00	153,00	198,00
Weight (kg)	61,16	±12,03	58,00	41,00	115,00
BMI	21,50	±3,00	20,96	16,05	37,55
Number of painful areas	3,70	±3,25	3,00	1,00	19,00

Among the participants, 88 people use alcohol, and 69 people smoke. Those who do not use alcohol (67.29%) are more than those who use (32.71%). Likewise, non-smokers (74.35%) are more than smokers (25.65%). There are 27 (10.04%) people with chronic diseases and 17 (6.32%) people who use medications. There were 69 (25.65%) people who marked that they had pain in their bodies. (Table 2)

Table 2. Sociodemographic and Health status of the subject

		N	%
Group	Healthy	229	(85,13)
	Depressive	40	(14,87)
Gender	Male	194	(72,12)
	Female	75	(27,88)
Using alcohol	No	181	(67,29)
	Yes	88	(32,71)
Smoking habits	No	200	(74,35)
	Yes	69	(25,65)
Chronic Diseases	No	242	(89,96)
	Yes	27	(10,04)
Using medication	No	252	(93,68)
	Yes	17	(6,32)
Pain existence	No	200	(74,35)
	Yes	69	(25,65)

4.2. The Mean Value of the Responded Items From ABC in the Study Group

The distribution of the answers of all participants is given in Table 3.

Table 3. Distribution of responses of ABC (n=269)

	Mean	S.D	Median	Min.	Max.
ABC_1	4,33	±0,91	5,00	1,00	5,00
ABC_2	4,36	±0,88	5,00	1,00	5,00
ABC_3	4,14	±0,82	4,33	1,33	5,00
ABC_4	4,07	±0,85	4,00	2,00	5,00
ABC_5	3,97	±1,05	4,00	1,00	5,00
ABC_6	4,16	±0,89	4,00	1,00	5,00
ABC_7	4,18	±0,90	4,00	1,00	5,00
ABC_8	4,19	±0,91	4,33	1,00	5,00
ABC_9	4,41	±0,84	5,00	1,50	5,00
ABC_10	4,13	±0,98	4,00	1,00	5,00
ABC_11	4,04	±0,89	4,00	1,00	5,00
ABC_12	4,04	±0,96	4,00	1,50	5,00
ABC_13	4,03	±0,97	4,00	1,00	5,00
ABC_14	4,21	±0,97	5,00	1,00	5,00
ABC Total	212,62	±35,94	217,00	88,00	255,00

4.3. Factor Analyses of Awareness Body Chart

In order to examine the factor structure of ABC, 14 components that make up the test were subjected to factor analysis. Since the test originally consisted of a single factor structure, the factor number was entered as one by the original test in determining the factor number of the test. Exploratory factor analysis was performed for ABC. Prior to this, the Kaiser-Meyer-Olkin (KMO) test proficiency measurement and Barlett's Sphericity test were used to test whether our data were suitable for Exploratory Factor Analysis. Accordingly, the KMO value of 0.897 is considered good. ($p < 0.05$) (Table 4) It was also observed that 57.68% of the variance was explained. (Table 5) The factor load value expresses the importance of the presence of that item in the test. When factor loads were examined in our study, it was seen that all factor loads were >0.600. (Table6)

Table 4. KMO and Barlet's Test Results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,897
Bartlett's Test of Sphericity	Approx. Chi-Square	3124,431
	Df	91
	P value (p)	<0,001

Table 5. Component Distribution and Ratio of Awareness Body Chart

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,075	57,681	57,681	8,075	57,681	57,681
2	1,271	9,080	66,761			
3	0,954	6,814	73,575			
4	0,826	5,902	79,477			
5	0,605	4,322	83,799			
6	0,425	3,034	86,833			
7	0,403	2,880	89,713			
8	0,339	2,423	92,137			
9	0,286	2,044	94,181			
10	0,237	1,695	95,876			
11	0,213	1,518	97,394			
12	0,158	1,131	98,525			
13	0,119	0,849	99,374			
14	0,088	0,626	100,000			

Table 6. Factor loadings of the items of the Awareness Body Chart

	Component
ABC_1	0,692
ABC_2	0,728
ABC_3	0,816
ABC_4	0,738
ABC_5	0,646
ABC_6	0,775
ABC_7	0,820
ABC_8	0,826
ABC_9	0,768
ABC_10	0,661
ABC_11	0,810
ABC_12	0,766
ABC_13	0,803
ABC_14	0,755

4.4. Validity and Reliability of ABC

The alpha coefficient (Cronbach's alpha) was used to test the reliability of the ABC items. Cronbach's alpha value for ABC total score was found to be 0.942. (Table 7) Cronbach's Alpha Scores for 14 items of ABC were > 0.8. These results showed that ABC is hightly reliable assesment tool.

In this study, the ABC scale, which consists of 51 items, was categorized as 14 regions for easier examination. As explained in detail in the method part of our study, each of the 14 items consists of sub-items, but since this categorization is made by considering the anatomical structures, ABC 5 and ABC10 items each consist of one region. For this reason, Cronbach's alpha scoring or Cronbach's Alpha if Item Deleted comparison cannot be made. The "Cronbach's Alpha if Item Deleted " value was calculated in order to determine effects of the items. When we examine the

Cronbach's Alpha if Item Deleted column in the Table 8, ABC7, ABC22 and, ABC32 itemswere slightly higher that can be ignored.

Table 7. Mean of Cronbach's Alpha Scores of ABC's items

Reliability Statistics	
Cronbach's Alpha	N of Items
0,942	14

Table 8. Effects of reliability of items factors

		Cronbach's Alpha	Cronbach's Alpha if Item Deleted
1	ABC1	0,920	0,826
	ABC2		0,828
	ABC7		0,998
2	ABC3	0,974	0,967
	ABC4		0,967
	ABC5		0,965
	ABC6		0,965
3	ABC8	0,805	0,687
	ABC9		0,642
	ABC32		0,857
4	ABC14	0,884	0,740
	ABC15		0,740
	ABC22		0,992
6	ABC10	0,955	0,941
	ABC11		0,942
	ABC12		0,939
	ABC13		0,940
7	ABC17	0,969	0,961
	ABC18		0,960
	ABC19		0,957
	ABC20		0,958
8	ABC21	0,976	0,973
	ABC23		0,974
	ABC24		0,973
	ABC25		0,972
	ABC26		0,968
	ABC27		0,968

9	ABC28	0,982	0,976
	ABC29		0,976
	ABC30		0,975
	ABC31		0,975
11	ABC34	0,947	0,945
	ABC35		0,945
	ABC36		0,936
	ABC37		0,935
	ABC38		0,932
	ABC39		0,932
12	ABC40	0,963	0,953
	ABC41		0,950
	ABC42		0,951
	ABC43		0,950
13	ABC44	0,976	0,968
	ABC45		0,966
	ABC46		0,967
	ABC47		0,970
14	ABC48	0,979	0,975
	ABC49		0,971
	ABC50		0,971
	ABC51		0,971

Test-retest reliability was evaluated using the Intraclass Correlation Coefficient (ICC) in the study. A test-retest comparison was made for the ABC total score. Accordingly,the ICC was found to be 0.993 and a significant increase was observed in the retest result. ($p < 0.05$; Table 9)

Table 9. Test-Retest reliability of ABC (n=53)

	Test			Retest			ICC	P
	Mean	S.D.	Median	Mean	S.D	Median		
ABC total	195,87	±34,63	201,00	202,49	±34,19	210,00	0,993	**<0,001**

ICC: Intraclass Correlation Coefficient

BDI is a questionnaire whose validity and reliability have been accepted in Turkish and is widely used in both clinical practice and scientific studies, and it evaluates the depression levels of individuals. While n=229 of the participants scored 16 or less according to the BDI, they formed the healthy group of our study, while n=40

people scored 17 or higher to form the depressive group. ABC was also applied to the depressive group according to the BDI questionnaire to assess the distinctiveness of ABC scores because people with depression have less body awareness than healthy people. Age, height, weight, BMI and number of painful areas were compared between the healthy and depressive groups, and no significant difference was found. The two groups are similar in age, height, weight, BMI and number of painful areas. ($p > 0.05$; Table 10)

Table 10. Comparison of physical characteristics of healthy and depressive groups

	Healthy (n=229)			Depressive (n=40)			P
	Mean	S.D.	Median	Mean	S.D.	Median	
Age	20,97	±2,20	20,00	21,10	±2,07	21,00	0,535
Height (cm)	168,19	±8,00	168,00	167,83	±8,16	167,00	0,773
Weight (kg)	61,10	±12,00	58,00	61,50	±12,38	56,50	0,953
BMI	21,45	±2,89	20,96	21,77	±3,57	20,95	0,969
Number of painfull areas	3,49	±3,03	3,00	4,28	±3,85	3,00	0,670

Mann Whitney U Test

The rates of gender, using alcohol, smoking habits, chronic disease, using medication and pain existence were compared between healthy and depressive groups. There is no significant difference between the two groups regarding gender distribution. ($p > 0.05$) On theother hand, the rates of using alcohol, smoking habits, chronic disease, medication use and pain existence were higher in the depressive group than in the healthy group. ($p < 0.05$; Table11; Figure 16)

Table 11. Comparison of sociodemographic and health status of healthy and depressive groups

		Healthy		Depressive		P
		N	%	N	%	
Gender	Male	163	(71,18)	31	(77,50)	0,411
	Female	66	(28,82)	9	(22,50)	
Using alcohol		68	(29,69)	20	(50,00)	**0,012**
Smoking Habits		52	(22,71)	17	(42,50)	**0,008**
Chronic Diseases		19	(8,30)	8	(20,00)	**0,023**
Using medication		11	(4,80)	6	(15,00)	**0,014**
Pain existence		51	(22,27)	18	(45,00)	**0,002**

Chi-Square Test

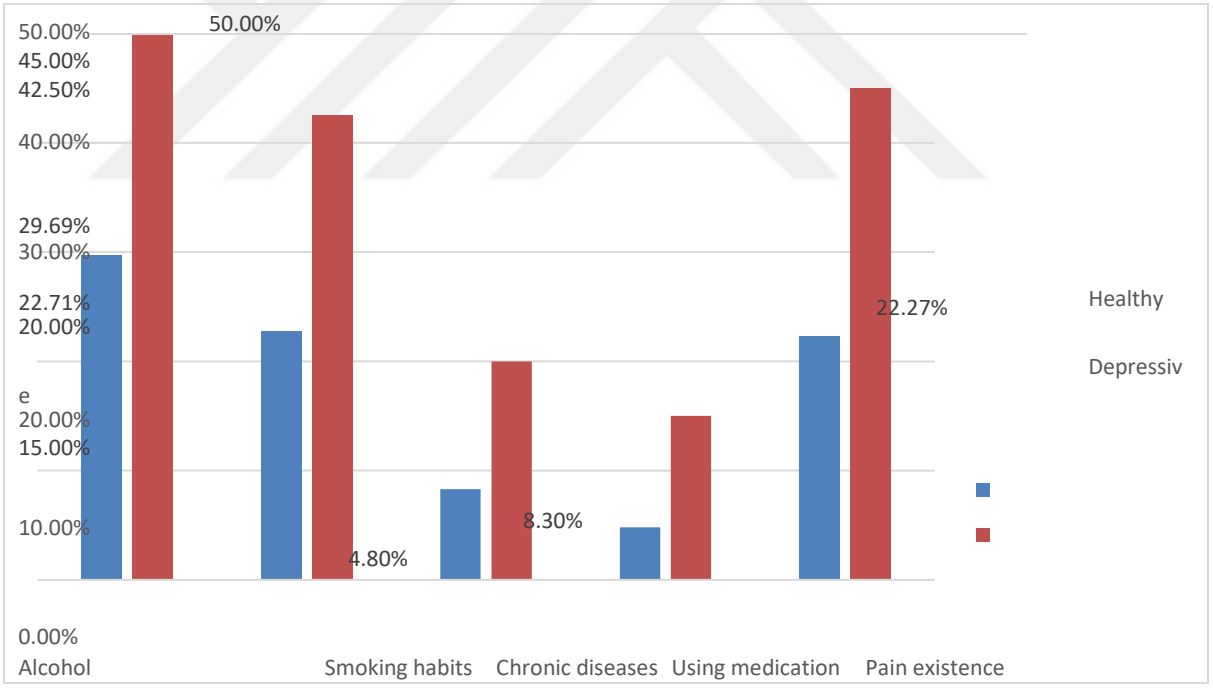

Figure 16. Graphic of comparison of healthy and depressive groups according to using alcohol, smoking habits, chronic diseases, using medication and pain existence

ABC values between males and females in the healthy group were compared. Accordingly, ABC 1, ABC 6, ABC 7, ABC 8, ABC 10, ABC 11, ABC 13, and ABC Total values are higher in females than in males. ($p < 0.05$; Table 12)

Table 12. Comparison of ABC values between males (n=163) and females (n=66) in the healthy group

Healthy	Male			Female			P
	Mean	S.D.	Median	Mean	S.D.	Median	
ABC_1	4,26	±0,92	4,67	4,54	±0,76	5,00	**0,030**
ABC_2	4,32	±0,89	5,00	4,52	±0,72	5,00	0,133
ABC_3	4,11	±0,84	4,33	4,33	±0,74	4,67	0,066
ABC_4	4,05	±0,87	4,00	4,22	±0,84	4,33	0,174
ABC_5	3,96	±1,01	4,00	4,09	±1,06	4,00	0,250
ABC_6	4,15	±0,89	4,00	4,42	±0,74	5,00	**0,048**
ABC_7	4,16	±0,91	4,00	4,44	±0,77	5,00	**0,028**
ABC_8	4,19	±0,88	4,33	4,42	±0,82	5,00	**0,050**
ABC_9	4,43	±0,81	5,00	4,55	±0,83	5,00	0,124
ABC_10	4,04	±0,99	4,00	4,39	±0,96	5,00	**0,004**
ABC_11	4,01	±0,87	4,00	4,23	±0,88	4,33	**0,045**
ABC_12	4,07	±0,92	4,00	4,19	±1,02	5,00	0,180
ABC_13	4,03	±0,93	4,00	4,27	±0,97	5,00	**0,040**
ABC_14	4,18	±0,97	4,50	4,40	±0,92	5,00	0,071
ABC Total	211,86	±35,12	216,00	222,74	±35,19	232,50	**0,011**

Mann Whitney U Test

In the depressive group, ABC values were examined between males and females, and nosignificant difference was observed. ($p > 0.05$; Table 13)

Table 13. Comparison of ABC values between males (n=31) and females (n=9) in the depressive group

Depressive	Male			Female			P
	Mean	S.D	Median	Mean	S.D.	Median	
ABC_1	4,22	±1,11	5,00	4,48	±0,80	5,00	0,546
ABC_2	4,23	±1,08	5,00	4,33	±0,87	5,00	0,915
ABC_3	4,02	±0,88	4,00	3,59	±0,60	3,67	0,114
ABC_4	3,94	±0,83	4,00	3,78	±0,82	4,00	0,597
ABC_5	3,94	±1,21	4,00	3,44	±1,13	3,00	0,223
ABC_6	3,87	±1,05	4,00	3,44	±0,53	3,00	0,158
ABC_7	3,95	±1,06	4,00	3,56	±0,53	4,00	0,168
ABC_8	3,92	±1,06	4,00	3,33	±0,71	3,00	0,077
ABC_9	4,19	±0,98	4,00	3,72	±0,67	4,00	0,071
ABC_10	4,00	±0,97	4,00	4,11	±0,93	4,00	0,758
ABC_11	3,87	±1,00	4,00	3,74	±0,86	4,00	0,657
ABC_12	3,85	±0,91	4,00	3,17	±0,94	3,50	0,104
ABC_13	3,65	±1,13	3,50	3,50	±0,71	4,00	0,644
ABC_14	3,98	±1,10	4,00	4,00	±0,66	4,00	0,748
ABC Total	202,13	±40,03	206,00	188,44	±16,64	190,00	0,189

Mann Whitney U Test

ABC values between healthy and depressive groups were compared. Accordingly, when Table 14 is examined, ABC 6, ABC 7, ABC 8, ABC 9, ABC 12, ABC 13, and ABC Total scores are higher in the healthy group than in the depressive group.($p<0.05$)

Table 14. Comparison of ABC values between healthy and depressive groups

	Healthy (n=229)			Depressive (n=40)			P
	Mean	S.D	Median	Mean	S.D	Median	
ABC_1	4,34	±0,88	5,00	4,28	±1,04	5,00	0,934
ABC_2	4,37	±0,85	5,00	4,25	±1,03	5,00	0,627
ABC_3	4,18	±0,82	4,33	3,93	±0,84	3,67	0,060
ABC_4	4,10	±0,86	4,00	3,90	±0,82	4,00	0,107
ABC_5	4,00	±1,02	4,00	3,82	±1,20	4,00	0,496
ABC_6	4,23	±0,86	4,25	3,77	±0,97	4,00	**0,004**
ABC_7	4,24	±0,88	4,50	3,86	±0,97	4,00	**0,015**
ABC_8	4,26	±0,87	4,50	3,79	±1,02	4,00	**0,003**
ABC_9	4,47	±0,82	5,00	4,09	±0,93	4,00	**0,005**
ABC_10	4,14	±0,99	4,00	4,02	±0,95	4,00	0,340
ABC_11	4,08	±0,88	4,00	3,84	±0,96	4,00	0,144
ABC_12	4,10	±0,95	4,00	3,70	±0,95	4,00	**0,009**
ABC_13	4,10	±0,94	4,00	3,61	±1,05	3,75	**0,004**
ABC_14	4,24	±0,96	5,00	3,99	±1,01	4,00	0,088
ABC Total	215,00	±35,41	220,00	199,05	±36,37	202,50	**0,009**

Mann Whitney U Test

The relationship between ABC items and physical properties for all participants (n=269) was examined. Among all participants, there was a positive correlation between age parameter and ABC 3 region and between height parameter and ABC 1 region. In the healthy group, there was a positive relationship between age parameter and ABC 3 region and between height parameter and ABC 1 and ABC 14 regions. In the depressive group, age parameter and ABC 12 and ABC 13 regions had a positive relationship, and there was a positive correlation between BMI parameter and ABC 2 region. ($p < 0.05$; Table 15)

Table 15. Evaluation of correlation values between ABC values and physical characteristics in terms of healthy (n=229), depressive (n=40) groups and all participants (n=269).

		Total					Sağlıklı					Depresif				
		Yaş	Boy (cm)	Kilo (kg)	BMI	Ağrılı bölge sayısı	Yaş	Boy (cm)	Kilo (kg)	BMI	Ağrılı bölge sayısı	Yaş	Boy (cm)	Kilo (kg)	BMI	Ağrılı bölge sayısı
ABC_1	R	0,026	0,129	0,073	0,004	-0,017	0,067	0,163	0,071	-0,028	-0,129	-0,233	-0,009	0,123	0,185	0,194
	p	0,667	**0,034**	0,236	0,945	0,892	0,316	**0,014**	0,285	0,673	0,368	0,148	0,955	0,451	0,252	0,440
ABC_2	R	0,029	0,079	0,078	0,045	-0,009	0,037	0,111	0,059	-0,015	-0,070	-0,030	-0,079	0,201	0,315	0,146
	p	0,634	0,198	0,201	0,461	0,942	0,576	0,095	0,376	0,821	0,627	0,854	0,628	0,214	**0,047**	0,563
ABC_3	R	0,136	0,052	0,058	0,058	-0,006	0,149	0,107	0,092	0,062	0,012	0,005	-0,248	-0,035	0,128	-0,071
	p	**0,026**	0,394	0,344	0,343	0,959	**0,024**	0,105	0,164	0,348	0,931	0,977	0,122	0,828	0,431	0,780
ABC_4	R	0,021	0,013	-0,024	-0,029	-0,022	0,008	0,020	-0,033	-0,051	-0,077	0,112	-0,055	0,068	0,118	0,191
	p	0,727	0,827	0,700	0,641	0,858	0,909	0,760	0,622	0,441	0,591	0,491	0,737	0,678	0,468	0,449
ABC_5	R	0,075	-0,016	-0,042	-0,039	0,059	0,062	0,021	-0,042	-0,062	0,057	0,171	-0,203	-0,013	0,078	0,032
	p	0,221	0,794	0,491	0,523	0,631	0,350	0,752	0,523	0,352	0,692	0,292	0,208	0,937	0,632	0,898
ABC_6	R	0,015	0,087	0,105	0,083	-0,064	0,001	0,128	0,121	0,075	-0,105	0,135	-0,150	0,106	0,222	0,013
	p	0,801	0,154	0,085	0,173	0,601	0,988	0,052	0,068	0,261	0,462	0,406	0,354	0,515	0,168	0,959
ABC_7	R	0,016	0,059	0,057	0,039	-0,052	0,009	0,097	0,084	0,044	-0,025	0,086	-0,178	-0,081	0,043	-0,170
	p	0,795	0,335	0,353	0,520	0,669	0,887	0,142	0,203	0,511	0,864	0,596	0,271	0,621	0,794	0,501
ABC_8	R	0,020	0,060	0,063	0,050	0,043	0,007	0,095	0,097	0,068	0,025	0,125	-0,151	-0,096	-0,016	0,060
	p	0,747	0,326	0,302	0,413	0,724	0,915	0,151	0,142	0,306	0,864	0,442	0,353	0,555	0,922	0,814
ABC_9	R	-0,005	0,056	0,054	0,043	-0,026	0,010	0,103	0,060	0,019	-0,093	-0,048	-0,169	0,068	0,176	0,215
	p	0,939	0,364	0,374	0,479	0,835	0,876	0,119	0,364	0,779	0,518	0,769	0,299	0,675	0,276	0,391
ABC_10	R	0,032	0,106	0,070	0,035	-0,060	0,051	0,106	0,056	0,023	0,030	-0,094	0,095	0,181	0,118	-0,279
	p	0,597	0,084	0,253	0,570	0,626	0,439	0,109	0,401	0,734	0,835	0,565	0,558	0,265	0,467	0,263
ABC_11	R	0,034	0,039	0,008	-0,001	0,083	0,012	0,043	0,019	0,005	0,072	0,177	0,007	-0,024	-0,020	0,076
	p	0,578	0,519	0,897	0,986	0,496	0,862	0,520	0,779	0,938	0,614	0,275	0,967	0,884	0,901	0,766
ABC_12	R	0,058	-0,001	0,012	0,023	0,102	0,005	0,035	0,020	0,021	0,055	0,431	-0,216	-0,015	0,032	0,225
	p	0,346	0,993	0,841	0,704	0,404	0,943	0,598	0,759	0,753	0,703	**0,005**	0,181	0,926	0,846	0,369
ABC_13	R	0,028	0,028	-0,005	-0,003	-0,013	-0,019	0,056	0,003	-0,011	-0,109	0,374	-0,148	-0,012	0,054	0,225
	p	0,648	0,647	0,930	0,956	0,916	0,779	0,399	0,966	0,870	0,444	**0,017**	0,362	0,942	0,739	0,369
ABC_14	R	-0,026	0,111	0,056	0,024	-0,144	-0,039	0,130	0,043	0,004	-0,227	0,097	-0,001	0,183	0,144	0,145
	p	0,673	0,070	0,358	0,699	0,237	0,561	**0,049**	0,520	0,956	0,109	0,550	0,996	0,259	0,374	0,566
ABC Total	R	0,025	0,083	0,054	0,028	-0,023	0,007	0,122	0,071	0,023	-0,073	0,125	-0,178	-0,011	0,086	0,105
	p	0,681	0,173	0,377	0,651	0,851	0,918	0,065	0,282	0,726	0,609	0,441	0,271	0,948	0,597	0,679

Spearman Korelasyon Testi

The ability of the ABC Total score to predict the group with low body awareness was examined, and a significant cut-off value was found as 212. When body awareness was considered low for those below this value, 67.50% sensitivity, 56.77% specificity, 21.43% PPVand 90.91% NPV were obtained. (Table 16; Figure 17)

Table 16. ROC analysis results for ABC total score

Alan	Standart Error	P	%95 Confidence interval		Cut-off	Sensitivity	Specifity	PPV	NPV
			Lower limit	Upper limit					
0,630	0,047	**0,009**	0,537	0,723	≤212	%67,50	%56,77	%21 ,43	%90 ,91

ROC Analysis

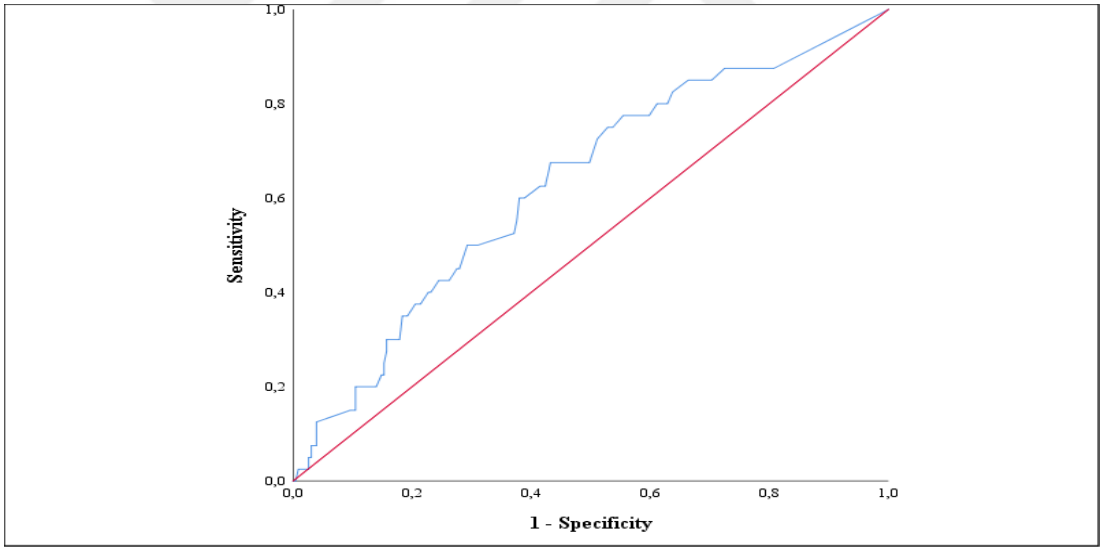

Figure 17. Graphic of ROC curve for ABC Total score

In this study, the sensitivity ratio is how much the depressive group has low body awareness. 27 out of 40 depressive people had low body awareness, and a sensitivity of 67.50% was obtained. It gives the specificity ratio of how many the healthy group have high body awareness. In the 229 healthy individuals, 130 had high body awareness, and a specificity of 56.77% was obtained.

According to the ABC Total score, how much of those with low body awareness is depressive gives the Positive Predictive Value (PPV). According to ABC Total score,

27 out of 126 people with low body awareness were depressive, and 21.43% PPV was obtained. According to the ABC Total score, the Negative Predictive Value (NPV) of how many of those with high body awareness is healthy. According to the ABC Total score, 130 of the 143 people with high body awareness were healthy, and 90.91% NPV was obtained (Table 17), and the percentage expression of the results is stated in Table 18.

Table 17. Distribution of depressive and healthy individuals according to ABC scores

		Depressive	Healthy	Total
ABC Total (≤212)	Lower body awareness	27	99	126
	Higher body awareness	13	130	143
	Total	40	229	269

Table 18. Percentile values of distribution of depressive and healty indivudials according to ABC values

		Depressive	Healthy	Total
ABC Total (≤212)	Lower body awareness	%10,04	%36,81	%46,85
	Higher body awareness	%4,83	%48,32	%53,15
	Total	%14,87	%85,13	%100

5.DISCUSSION AND CONCLUSION

The present study investigated ABC's Turkish validity and reliability, which evaluates body awareness with the colouring method over a visual chart, unlike other verbal questionnaires and tests. This study demonstrated that ABC is a valid and reliable tool for assessing body awareness in the Turkish population. Although there are some scales whose validity and reliability studies have been conducted in Turkish in which body awareness is evaluated with verbal directions, the Turkish reliability and validity study of the ABC scale is very important in removing the limitations related to reading and interpretation.

269 participants between the ages of 18-25 were included in our study. 75 of these participants were female (27.88%), and 194 (72.12%) were male. The mean age of the participants was 20.99±2.18 years, and the mean BMI value was calculated as 21.50±3.00 kg/m2. In Danner et al.'s (2017) study, 106 students participated. 79 of the participants were females (74.5%), and 27 were males (25.5%). Age median stated as 21-22. The cultural adaptation and validity-reliability of the BAQ that evaluates body awareness with verbal questions were examined in the study of Karaca (2021). 180 students were included in the study. 99 (55%) of the males and 81 (45%) of the females were undergraduate students. The mean age was 21.87±2.36 years, and the mean BMI was 24.46±4.47 kg/m2. When the sample parameters of studies are examined, the male-female ratio and mean age of our study are similar to the original study, but our study has a larger sample than both.

In the investigation of Danner et. al. (2017), ABC showed for each body part both an acceptable to high internal consistency, determined by Cronbach's alpha score. (α= .64 - .97) Ten items showed Cronbach's alpha score of > 0.9, one was > 0.8, and one was >0.6.), The Cronbach's alpha of total score was observed as α= .96 (95%CI.95 - .97). In the current study, the internal consistency for each body part was calculated by Cronbach's alpha (α > .8), and the internal consistency of the ABC total score was found highly reliable. (α= .942) Eventually, these two studies similarly showed ABC is a validated and reliable scale. The highest Cronbach's alpha scores were shown in hand, face, and foot and the lowest awareness was found for the cervical/lumbar region in the study of Danner et. al. (2017) In accordance with the previous study, the results of the our study showed the regions with high Cronbach's alpha scores were observed as hand and foot, and lowest Cronbach's alpha scores observed in the cervical/lumbar and

chest/abdomen regions. In previous research done by Danner et al. (2017), low awareness was not reported in the chest/abdomen region , but in our study, low awareness was found in these region as well. The main sensory receptive area for the sense of touch is known for a large representation of face, hand, and sole of foot in the brain. The findings of the two studies mentioned above are in accordance with the cortical homunculus of the primary somatosensory cortex. (39,174)

Test-retest consistency of the ABC was evaluated by giving the questionnaire to the same individuals with an interval of two weeks. A test-retest comparison was made for the ABC total score. Renewability and time invariance of ABC was statistically found excellent. ($p < 0{,}001$) Test-retest reliability was found to be $r = .993$, and a significant increase was observed in the retest result. ($p < 0.05$; $n=53$) According to the results of Danner et. al. (2017), Test-retest reliability was found to be $r = .96$ (95% CI.93 - .97).

All items (body regions) assembled under a factor showed loadings higher than .40 in the previous study of that assessed ABC's properties.(4) As noted by Danner et. al. (2017), the psychometric properties of ABC were performed in a larger sample in the current investigation. The result of the exploratory factor analysis found that the items could be collected under one factor and explain 57.68% of the ABC variance by applying Varimax Rotation in the present study. Based on the factor analysis findings, it was seen that all factor loads were > .6.

Among the participants in our study, non-smokers were in the majority, and also, the number of non-alcohol users was observed to be higher than those who used alcohol. This may be because the selected sample consisted of young people between 18-25. In this study, the participants were divided into two groups: the study group (healthy) and the control group (depressive), and no significant difference was found between the groups in terms of age, height, weight, BMI, and the number of painful areas. Although there was no significant difference in terms of gender in the two groups, they had significantly higher rates in the depressive group in terms of alcohol use, smoking habits, chronic disease and regular medication use. An explanation for the causal linkages between alcohol and depression is that alcohol exposure may cause metabolic changes that increase the risk of major depression. (175,176) In addition to this, previous studies have reported a positive association between smoking and mental illness, with smoking rates increasing with the severity of the disease. (177,178) One review study stated that the majority of papers found that patients tend to experience

depression or anxiety due to being diagnosed with a chronic disease. Additionally, they also defined some studies that highlighted the experience from anxiety or depression to chronic disease, and others described a cyclical relationship between the two. However, some patients with chronic disease sense no relationship between their chronic disease and mental health conditions. (179)

There are two perspectives on the relationship between body awareness and depression in the literature. The first comes from studies pointing that bodily signals significantly influence symptoms related to depression. In many cases, depression is influenced by somatic signals transmitted to the brain via the vagus nerve, one of the major neural relays between brain and body. (180, 181) Apart from this, in another study by Sacheim et al. (2001), Vagal Nerve Stimulation (VNS) in humans has been found to improve mood significantly and to be an effective treatment for refractory cases of depression. (182) Similarly, VNS has been declared antidepressant-like effects in rodent models in another article. (183) The second is the examination of the neural mechanisms underlying the relationship of depression with interoception, which is the internal perception of the state of the body. The insula, often considered the primary interoceptive cortex converts raw somatic signals into accessible emotions. (184) In the former imaging studies, the insula is among the regions frequently associated with depression. (185,186) As mentioned in the studies above, there is a strong relationship between body awareness and depression. The findings of our study also found that there is an inverse correlation between the depression level of the person and the score of ABC scale, which evaluates body awareness. In the study by Danner et. al. (2017), eighty-seven of the participants showed a BDI-II score lower than 9. Seventeen participants had a BDI-II score between 9–13 points, indicating minimal depression. Two participants had a BDI-II score between 14-19 which stated mild depression. From this example, we may not draw any conclusions about the relationship between body awareness and mood in people with depressive disorder. But on the other hand the BDI-II score correlated highly significantly with the shoulder (ρ= -.35; p< .001), thigh/hip (ρ= -.41; p< .001), chest/abdomen, (ρ= -.35; p< .001) back (ρ= -.34;p< .001), and ABC total (ρ= -.41; p< .001). There are 40 volunteers with depression in the study group of our research. (BDI score $\geq$ 17) Thirty-four people had a score corresponding with moderate depression (17-29), and four people had a score that meant severe depression (30-63). As a result of the comparison of ABC values between healthy and depressive groups, shoulder (p=0.004), upper arm (p=0.015), elbow/lower arm (p=0.003), hand (p=0.005), knee (p= 0.009), lower leg (p=0.004) and ABC total score (p=0.009) were

found to be considerably higher in healthy individuals than in depressive individuals.($p< 0.05$)

Results of our study found the total score of ABC and scores of a few items (skull, shoulder, upper arm, elbow/lower arm, genital area, thigh/hip, lower leg, and total score) was found significantly higher in females than males in healthy group ($p <0,05$). There were no statistically significant between males and females in the depressive group. ($p>0,05$) Another previous study examined the translation and validity-reliability of the Body Perception Questionnaire. There were three subscales of the Body Perception Questionnaire used to assess body perception among individuals with anxiety and healthy individuals. Accordingly, "Body Awareness" subscales, the mean score of healthy participants were found statistically higher in females than males ($p<0,05$), while the mean score of "Body Awareness" subscales of participants with anxiety was found statistically similar in both gender. ($p>0,05$) (11) Apart from this, in other previous qualitative investigations declared that males and females did not differ in their degree of body awareness. (187, 188) Our suggestion that future research should further examine the relationship between the gender difference and body awareness Although no relationship was found between these items in the study of Danner et. al. (2017), a relationship was observed between age parameter and neck region and height parameter and skull region among all participants in our study. In addition, there was a relationship between age parameter and neck region and height parameter with skull and foot regions in the healthy group. In the depressive group, a relationship was found between the age parameter and the knee and lower leg regions, and between the BMI parameter and the face region.

When the relationship between the presence of pain and body awareness was examined in our study result similarly with the study of Danner et. al.(2017), no significant relationship was found between body awareness and pain variables. (4) Body awareness and pain perception are suggested to be parts of the interoceptive system by Craig (2003), but the relationship between them is still unclear.(189) This idea is supported by studies showing that the insula provides the neural basis of awareness to interoceptive states, and it is part of the processing of noxious and innocuous stimuli and their subjective discrimination. (190) Moreover, one study found a negative relationship between body awareness and experimental pain ratings using the discrimination of heat stimuli. (191) On the other hand, the author of another study declared a significant correlation between body awareness and the pain sensitivity

observed in people with lower pain thresholds. (192,193) Pain catastrophizing expresses an excessive negative orientation for pain and somatic sensations. And also pain catastrophizing predicts a well-knownindicator of pain perception. Body awareness is not directly related to pain habituation or catastrophizing. It may be implied that when the orientation to bodily signals is not catastrophic/anxious, body awareness simply serves to sense the natural changes occurring in thebody. (194,195)

Scales and questionnaires evaluating body awareness are based on subjective experiences. One research about the relationship between bodily symptoms and emotions statethat mood changes are often a consequence of alteration of awareness and vice versa. (196) Many situations affect it, such as the person's current mood (whether he is sad, excited or in a hurry) or physiological needs (does he feel hunger, thirst?). Therefore, the concept of body awareness needs to be evaluated multidimensionally. (4) The fact that the ABC visual scale evaluates this concept differently from other scales is very valuable for the literature.

In the investigation done by Danner et. al. (2017), the feedbacks of participants showed that the ABC not only assessed the momentary state of awareness but also affected in modulating the awareness, which opens the therapeutic field for the ABC-form as a tool for self- control. (4) One of the common elements of the mind-body therapy approaches is perceiving and discriminating physical sensations. (3) While colouring ABC, the person's attention is focused on the body parts, which encourages thinking about how much that area is perceived and whether there is a pain in the area. ABC's therapeutic effects can be found in future studies; untilnow, the therapeutic effect of the implementation of the ABC has not been examined.

ABC can be in wide use assessment tool for evaluating body awareness in different age groups from childhood to adulthood. The study's main limitation was that only participants aged 18-25 were included in this study as in the previous study. The new studies should also examine different age groups as less than 18 and more than 25.

Consequently, understanding body awareness may guide to organize more holistic treatments for patients. The importance of body awareness as a guiding factor in the planning oftreatment programs of depression cannot be ignore. Our study's findings showed a relationship between body awareness and depression as well; our findings were consistent with the literature. Accordingly, our results showed ABC is a discriminative tool when assessing body awareness with depressive individuals. When

we investigated the validity and reliability of the Awareness Body Chart in the Turkish population, we found that ABC is a valid and reliable tool for assessing body awareness in adults. Finally, these findings supported that ABC is an easy-to- use, low-cost, non-invasive, and verbal skills-free scale. It is a highly reliable and valid tool in clinic applications and scientific studies.

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APPENDIX 1. Permission Letter of Translation of ABC

Permission - ABC translation Harici Gelen Kutusu ×

ursula.danner
Alıcı: ben

6 Eylül Pzt 10:34

To my knowledge there is no official turkish version of the Awareness Body Chart (ABC) test published by us in PlosOne:

Danner U, Avian A, Macheiner T, Salchinger B, Dalkner N, Fellendorf F, Bengesser S, Birner A, Platzer M, Kapfhammer H-P, Probst M, Reininghaus E. "ABC" – the Awareness-Body-Chart: A New Tool Assessing Body Awareness. PLoS One. 2017 Oct 16;12(10):e0186597. doi: 10.1371/journal.pone.0186597. eCollection 2017. PMID: 29036217

You can translate and adapt it for turkish population.

Kind regards
Ursula Danner

APPENDIX 2. Informed Consent Form

Tarih:……..

Sayın katılımcı,

Yeditepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Fizyoterapi ve Rehabilitasyon bölümü yüksek lisans öğrencisi Fatma Şahin'in 'Vücut Farkındalık Şeması Ölçeği'nin Türkçe Uyarlaması ve Geçerlilik-Güvenilirlik çalışması' konulu yüksek lisans tez çalışmasına katılımızdan dolayı teşekkür ederiz. Bu çalışma, 18-25 yaş arası yaklaşık 300 üniversiteöğrencisinin katılımıyla gerçekleşecektir. Verdiğiniz yanıtlarla Vücut Farkındalık Şeması ölçeğinin Türk popülasyonunda klinik ve bilimsel çalışmalarda kullanım uygunluğunu belirlenmiş olacaktır. Çalışma sırasında bir seferliğe mahsus olarak katılımcılardan sırasıyla Sosyodemografik bilgiler formu, Vücut Farkındalık Şeması , BECKEnvanteri, Vücut Farkındalık Şeması (tekrar test) doldurmaları istenilecektir. Bu işlemler yaklaşık 30-45 dakika sürecektir.Anket sorularını cevaplarken öncesinde araştırmacının size açıkladığı konulara özen gösterip sorulara içtenlikleyanıt vermeniz büyük önem taşımaktadır.Araştırmaya katılım isteğe bağlı olup dilediğiniz zaman herhangi bir cezaya veya yaptırıma maruz kalmaksızın,hiçbir hakkınızı kaybetmeksizin araştırmaya katılmayı reddedebilirsiniz.Araştırma yürütücüleri, etik kurul üyeleri, kurum ve ilgili sağlık personellerinin katılımcıların orijinal anket sonuçlarına erişimi bulunup bu kişiler dışında araştırma sonuçlarının yayımlanması halinde dahi katılımcılarınkimliğini ortaya çıkaracak kayıtlar gizli tutulacak ve kamu oyuyla paylaşılmayacaktır.Araştırma konusuyla ilgili ve gönüllünün araştırmaya katılmaya devam etme isteğini etkileyebilecek yeni bilgilerelde edildiğinde gönüllünün veya kanuni temsilcisinin zamanında bilgilendirileceği tarafımızca garanti edilmektedir.

Bu çalışmaya katılarak herhangi bir parasal yük altına girmeniz talep edilmeyecek ve tarafınıza herhangi bir ödemeyapılmayacaktır.Çalışma ile ilgili herhangi bir sorunuz olduğunda aşağıda ismi ve iletişim bilgileri verilen araştırmacıyla iletişimegeçebilirsiniz.Bilgilendirilmiş gönüllü olur formundaki tüm açıklamaları okudum. Bana yukarıda konusu ve amacı belirtilen araştırma ile ilgili yazılı ve sözlü açıklama aşağıda adı belirtilen araştırmacı tarafından yapıldı. Araştırmaya gönüllüolarak katıldığımı, istediğim zaman gerekçeli veya gerekçesiz olarak araştırmadan ayrılabileceğimi biliyorum.Bu çalışma sonuçlarının kullanılmasını kısıtlamamayı, yayın, rapor ve benzeri bilimsel dokümanlarda kullanılmasınıkabul ediyorum.

Katılımcının;	Araştırmacının;	Tanık olan kişinin;
Adı/Soyadı:	Adı/Soyadı:	Adı/Soyadı:
Telefon no:	Telefon no:	Telefon no:
Adresi:	Adresi:	Adresi:
İmzası:	İmzası:	İmzası:

İLETİŞİM
Prof.Dr. Rasmi Muammer - Yeditepe Üniversitesi, Sağlık Bilimleri Fakültesi, Fizyoterapi ve Rehabilitasyon Bölümü
Dr. Fzt. Aymen Balıkçı - Fenerbahçe Üniversitesi, Sağlık Bilimleri Fakültesi, Ergoterapi Bölümü
Fatma Şahin- Yeditepe Üniversitesi- Sağlık Bilimleri Fakültesi, Fizyoterapi ve Rehabilitasyon Bölümü-

APPENDIX 3. Sociodemographic Information Form

TARİH:……..

SOSYODEMOGRAFİK BİLGİLER FORMU

AD/SOYAD:……. **YAŞ:…….**

BOY(cm):…….. **KİLO(kg):……**

CİNSİYET: **KADIN** ☐ **ERKEK** ☐ **BELİRTMEK İSTEMİYORUM** ☐

ALKOL KULLANIMI: **HAYIR** ☐ **EVET** ☐ **Evet seçeneğini işaretlediyseniz sıklığı..…**

SİGARA KULLANIMI: **HAYIR** ☐ **EVET** ☐ **Evet seçeneğini işaretlediyseniz sıklığı...…**

KRONİK RAHATSIZLIĞINIZ VAR MI? VARSA BELİRTİNİZ……..……..

KULLANILAN İLAÇLAR VARSA BELİRTİNİZ……..

APPENDIX 4. BECK Depression Inventory

BDE

Aşağıda, kişilerin ruh durumlarını ifade ederken kullandıkları bazı cümleler verilmiştir.Her madde bir çeşit ruh durumunu anlatmaktadır. Her maddede o ruh durumunun derecesini belirleyen 4 seçenek vardır. Lütfen bu seçenekleri dikkatle okuyunuz. Son bir hafta icindeki (şu an dahil) kendi ruh durumunuzu göz önünde bulundurarak, size en uygun olan ifadeyi bulunuz. Daha sonra, o maddenin yanındaki harfin üzerine (X)işareti koyunuz.

1) a. Kendimi üzgün hissetmiyorum b. Kendimi üzgün hissediyorum c. Her zaman için üzgünüm ve kendimi bu duygudan kurtaramıyorum d. Öylesine üzgün ve mutsuzum ki dayanamıyorum
2) a. Gelecekten umutsuz değilim b. Gelecek konusunda umutsuzum c. Gelecekten beklediğim hiç bir şey yok d. Benim için bir gelecek olmadığı gibi bu durum değişmeyecek
3) a. Kendimi başarısız görmüyorum b. Herkesten daha fazla başarısızlıklarım oldu sayılır c. Geriye dönüp baktığımda, pek çok başarısızlıklarımın olduğunu görüyorum d. Kendimi bir insan olarak tümüyle başarısız görüyorum
4) a. Her şeyden eskisi kadar doyum (zevk) alabiliyorum b. Her şeyden eskisi kadar doyum alamıyorum c. Artık hiçbir şeyden gerçek bir doyum alamıyorum d. Bana doyum veren hiçbir şey yok. Her şey çok sıkıcı
5) a. Kendimi suçlu hissetmiyorum b. Arada bir kendimi suçlu hissettiğim oluyor c. Kendimi çoğunlukla suçlu hissediyorum d. Kendimi her an için suçlu hissediyorum
6) a. Cezalandırılıyormuşum gibi duygular içinde değilim b. Sanki bazı şeyler için cezalandırılabilirmişim gibi duygular içindeyim c. Cezalandırılacakmışım gibi duygular yaşıyorum d. Bazı şeyler için cezalandırılıyorum
7) a. Kendimi hayal kırıklığına uğratmadım b. Kendimi hayal kırıklığına uğrattım c. Kendimden hiç hoşlanmıyorum d. Kendimden nefret ediyorum
8) a. Kendimi diğer insanlardan daha kötü durumda görmüyorum b. Kendimi zayıflıklarım ve hatalarım için eleştiriyorum c. Kendimi hatalarım için her zaman suçluyorum d. Her kötü olayda kendimi suçluyorum

9) a. Kendimi öldürmek gibi düşüncelerim yok b. Bazen kendimi öldürmeyi düşünüyorum ama böyle bir şey yapamam c. Kendimi öldürebilmeyi çok isterdim d. Eğer bir fırsatını bulursam kendimi öldürürüm
10) a. Herkesten daha fazla ağladığımı sanmıyorum b. Eskisine göre şimdilerde daha çok ağlıyorum c. Şimdilerde her an ağlıyorum d. Eskiden ağlayabilirdim. Şimdilerde istesem de ağlayamıyorum
11) a. Eskisine göre daha sinirli veya tedirgin sayılmam b. Her zamankinden biraz daha fazla tedirginim c. Çoğu zaman sinirli ve tedirginim d. Şimdilerde her an için tedirgin ve sinirliyim
12) a. Diğer insanlara karşı ilgimi kaybetmedim b. Eskisine göre insanlarla daha az ilgiliyim c. Diğer insanlara karşı ilgimin çoğunu kaybettim d. Diğer insanlara karşı hiç ilgim kalmadı
13) a. Eskisi gibi rahat ve kolay kararlar verebiliyorum b. Eskisine kıyasla şimdilerde karar vermeyi daha çok erteliyorum c. Eskisine göre karar vermekte oldukça güçlük çekiyorum d. Artık hiç karar veremiyorum
14) a. Eskisinden daha kötü bir dış görünüşüm olduğunu sanmıyorum b. Sanki yaşlanmış ve çekiciliğimi kaybetmişim gibi düşünüyor ve üzülüyorum c. Dış görünüşümde artık değiştirilmesi mümkün olmayan ve beni çirkinleştiren değişiklikler olduğunu hissediyorum d. Çok çirkin olduğumu düşünüyorum
15) a. Eskisi kadar iyi çalışabiliyorum b. Bir işe başlayabilmek için eskisine göre daha çok çaba harcıyorum c. Ne olursa olsun, yapabilmek için kendimi çok zorluyorum d. Artık hiç çalışamıyorum
16) a. Eskisi kadar kolay ve rahat uyuyabiliyorum b. Şimdilerde eskisi kadar kolay ve rahat uyuyamıyorum c. Eskisine göre bir veya iki saat erken uyanıyor, tekrar uyumakta güçlük çekiyorum d. Eskisine göre çok erken uyanıyor ve tekrar uyuyamıyorum
17) a. Eskisine göre daha çabuk yorulduğumu sanmıyorum b. Eskisinden daha çabuk ve kolay yoruluyorum c. Şimdilerde neredeyse her şeyden, kolayca ve çabuk yoruluyorum d. Artık hiçbir şey yapamayacak kadar yorgunum
18) a. İştahım eskisinden pek farklı değil b. İştahım eskisi kadar iyi değil c. Şimdilerde iştahım epey kötü d. Artık hiç iştahım yok

19) a. Son zamanlarda pek fazla kilo kaybettiğimi/aldığımı sanmıyorum b. Son zamanlarda istemediğim halde iki buçuk kilodan fazla kaybettim/aldım c. Son zamanlarda beş kilodan fazla kaybettim/aldım d. Son zamanlarda yedi buçuk kilodan fazla kaybettim/aldım
20) a. Sağlığım beni pek endişelendirmiyor b. Son zamanlarda ağrı, sızı, mide bozukluğu, kabızlık gibi sıkıntılarım var c. Ağrı sızı gibi bu sıkıntılarım beni çok endişelendiriyor d. Bu tür sıkıntılar beni öylesine endişelendiriyor ki başka bir şey düşünemiyorum
21) a. Son zamanlarda cinsel yaşantımda dikkatimi çeken bir şey yok b. Eskisine göre cinsel konularla daha az ilgileniyorum c. Şimdilerde cinsellikle pek ilgili değilim d. Artık cinsellikle hiç bir ilgim kalmadı

N. (1989). Beck Depresyon Envanterinin Üniversite Öğrencileri İçin Geçerliği Güvenirliği, PsikolojiDergisi, 23, 3-13.

Hisli, N. (1989). Beck Depresyon Envanterinin Geçerliği Üzerine Bir Çalışma, Psikoloji Dergisi, 22, 118-126.

APPENDIX 5. Awareness Body Chart

You can choose the female or male body charts.

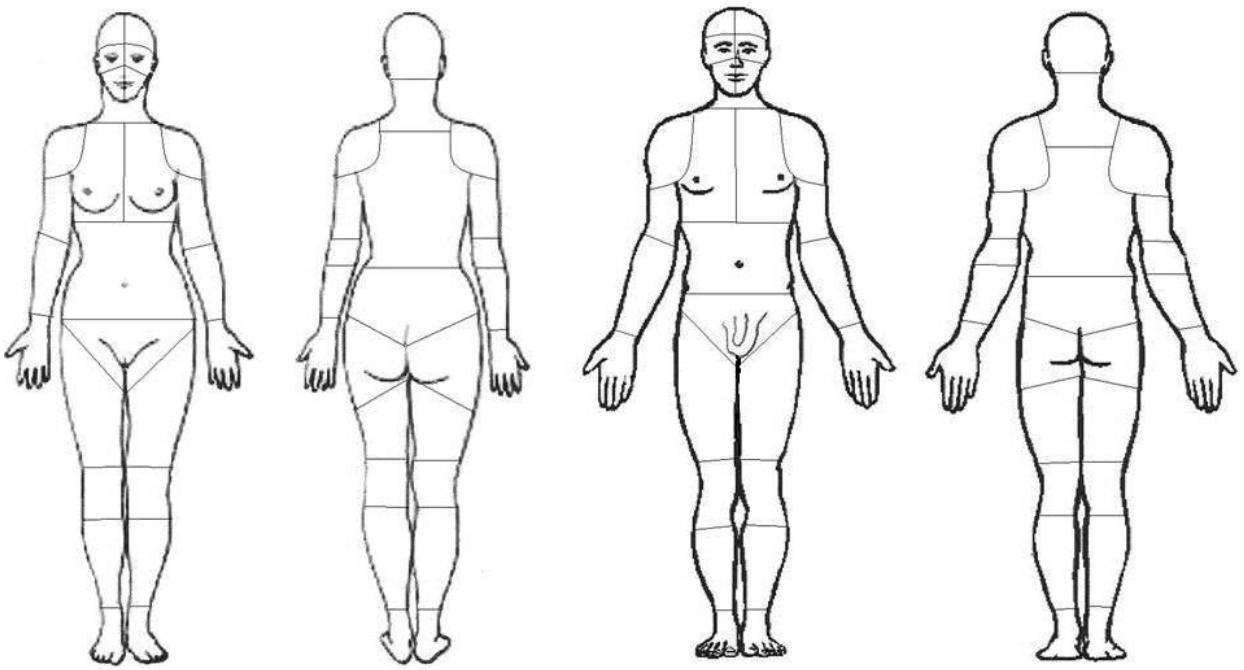
Try to feel into your body and colour each region on the charts according to the perception with one of thefollowing colours:

- **Orange = “I can perceive with much detail”**
- **Yellow = “I can perceive distinctly”**
- **Green = “I can perceive”**
- **Blue = “I can perceive indistinctly”**
- **Black = “I cannot perceive”**

(each region only one colour and don’t forget to colour each region)

Afterwards – in case of an actual physical pain – you can mark the **localisation and expansion of thepain** (e.g. a dot, a strip, a patch) **with the red felt tip pen** in the body charts.

On the following line, representing a scale ranging from “No pain” to “Worst pain imaginable” you can **mark the intensity of the pain with a cross**. In case of several pain regions, name the referring regionnext to the cross.



No pain — Worst pain imaginable

0 — 100

APPENDIX 6. CURRICULUM VITAE

Kişisel Bilgiler

Adı	Fatma	**Soyadı**	Şahin
Doğum Yeri		**Doğum Tarihi**	-
Uyruğu		**TC Kimlik No**	-
E-mail	-	**Tel**	-

Öğrenim Durumu

Derece	**Alan**	**Mezun Olduğu Kurumun Adı**	**Mezuniyet Yılı**
Doktora	-	**-**	-
Yüksek Lisans	Fizyoterapi ve Rehabilitasyon	**Yeditepe Üniversitesi**	2022
Lisans	Fizyoterapi ve Rehabilitasyon	**Acıbadem Üniversitesi**	2017
Lise	MF	**Kerem Aydınlar Ana. Öğt. Lisesi**	2013

Bildiği Yabancı Dilleri	**Yabancı Dil Sınav Notu (#)**
İngilizce (YÖKDİL)	75

Başarılmış birden fazla sınav varsa(KPDS, ÜDS, TOEFL; EELTS vs), tüm sonuçlar yazılmalıdır

İş Deneyimi (Sondan geçmişe doğru sıralayın)

Görevi	**Kurum**	**Süre (Yıl - Yıl)**
Fizyoterapist	Özel Pendik Fizik Tedavi ve Rehabilitasyon	2021-2022
Fizyoterapist	Ümran Tıp Merkezi	2019-2019

Bilgisayar Bilgisi

Program	**Kullanma becerisi**
Microsoft Office Program	Çok iyi
SPSS	Orta

*****Çok iyi, iyi, orta, zayıf olarak değerlendirin

Uluslararası bilimsel toplantılarda sunulan ve bildiri kitabında (*Proceedings*) basılan bildiriler

CP'li bir olgunun Ayres duyu bütünleme teorisine ve Nöronal grup seleksiyon teorisine göre değerlendirilmesi. F., Balıkçı A. and Karaca E. Duyu Bütünleme Derneği-2019. 1. Uluslararası Katılımlı Duyu Bütünleme Kongresi, İstanbul, Türkiye

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