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Investigation of mindfulness and problem solving skills in terms of demographic and psychological variables[1]

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Summary

The aim of this study is to examine the relationship between mindfulness and problem solving skills in terms of cognitive psychology approach and the effect of some independent variables.

Relational survey **method** was used in the study. The sample population consisted of 125 third and fourth year students of the Faculty of Education who were determined through disproportionate element sampling. The data collection tools used were "Personal Evaluation Questionnaire", "Mindfulness Awareness Scale (MBAS)" and "Problem Solving Inventory (PSI)". For data analysis, t-test analysis, one-way analysis of variance (ANOVA) and Pearson moment correlation analysis were used.

In terms of **the findings**, no relationship was found between mindfulness and problem solving skills. Demographic characteristics and being a numerical or verbal major had no effect on mindfulness and problem solving.

Participants who were traumatized or had psychological complaints had lower levels of *mindfulness*. The mindfulness levels of the participants whose life philosophies and lives were in harmony were found to be high.

Participants with persistent illnesses perceived themselves as more inadequate in problem solving skills. Participants who have received or are receiving psychotherapy process consider themselves more competent in problem solving. It was found that as the participants' contribution to their own education plans decreased, they considered themselves more inadequate in problem solving skills. Participants who were asked for help to solve problems considered themselves more competent in problem solving.

As a result, significant relationships were found between some variables and mindfulness and problem solving skills. No direct relationship was found between mindfulness and problem solving skills.

Keywords: Mindfulness, Conscious, Conscious Awareness, Attentiveness, Problem Solving.

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Introduction

It is historically observed that people and societies can progress as they become aware of and consciously solve the problems they face in their lives. According to Bergson, what distinguishes primitive societies from modern societies is probably problem solving by demonstrating the influence of intelligence over instinct (1986, s. 189). From a historical point of view, all the civilizations that humanity has built are the result of the answers they have given by realizing the problems they face. (Birkök, 2018, p. 66). Recognizing the problem is a necessary condition for the thinking process to begin. In all societies, the more problems solved, the higher the level of civilization. Human survival depends not only on physical skills but also on social skills (Breuning, 2018, p. 126). At this point, it is necessary to understand the relationship between being aware of the problem and solving it.

The World Economic Forum has published studies showing that problem solving skills will be one of the most important outcomes in the near future. Problem solving skills, together with complex communication and self-directed learning, constitute deep learning competencies. (*New vision for education*, 2016, p. 11). Determining the factors affecting problem solving skills, which is one of the qualities sought in all areas of social life, and providing individuals with these skills are becoming increasingly important.

It is necessary to prevent the problems encountered in daily life at the first stage and without harming the human self. Increasing individuals' conscious awareness about their lives and improving their problem solving skills are important in terms of preventive services in mental health. Considering all these, determining the variables affecting mindfulness and problem solving skills may have positive contributions to preventive mental health services.

Theoretical Framework

Mindfulness, Psychology and Psychological Approaches

In the study, mindfulness and problem solving skills were evaluated in terms of cognitive psychology, structuralism and functionalism approaches in psychology. Accordingly, it is possible to analyze consciousness by dividing it into its elements through introspection (Arkonaç, 2005). Other accepted approaches in the field are behaviorism, gestalt psychology, psychology of cognition and psychoanalytic approaches. (Arkonaç, 2005; Richards, 2003)

Development of Awareness and Problem Solving Skills in Human History

Anthropological research has found that humans go through four distinct stages of development. These are adapting to life on land (terrestriality), becoming bipedal (bipedalism), evolving into the cortical part of the brain (encephalization) and civilization (civilization). (Lewin, 2005, p. 8). Since the word problem is a concept created by today's civilization, it would not be correct to claim that this species encountered a cognitive problem in the first three periods. The same can be said for the concept of awareness. It is obvious that the genus *Homo* encounters difficult situations and continues its existence by reacting through the survival instinct .

The qualities of the genus Homo in its earlier stages were the same as those of various primates at similar levels today; it did not have any special features that differed from others in terms of awareness and problem solving (Harari, 2015, p. 18). However, when the homo genus stood up as Homo Erectus, there was a leap in awareness and problem solving skills. Homo, which previously stood on four legs, was able to dominate larger areas by expanding its field of vision by standing up (erectus). Homo's standing up enabled him to use his hands for other tasks. As a result of evolutionary pressure, the hands and especially the fingers became capable of very fine and complex tasks. These

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processes are also the evolutionary processes of awareness and problem solving. (Harari, 2015, pp. 22-23). On the other hand, the homo who stood up started to use his sense of sight and sense of touch even more. The increase in his senses also improved his perceptions. Developing and diversifying perceptions led to the development and evolution of awareness. Thus, the Homo Sapiens species emerged.

Along with the above biological development process, a cultural development has also occurred. It can be said that awareness and problem solving emerged in phases within the development process of the *sapiens* species. According to Harari, the phases that shaped the course of history for sapiens are the Cognitive Revolution (approximately 70 thousand years ago), the Agricultural Revolution (12 thousand years ago) and the Scientific Revolution (5 thousand years ago). (2015, s. 17). It can be accepted that problem solving with mindfulness gained its current meaning with the developments in these periods and that it is one of the main factors that enabled to reach contemporary civilization.

The human species was not very different from other species 70,000 years ago. As the human species stood up, its biological structure began to change and differentiate from other living things. This change caused women to give birth prematurely. Since premature babies could not survive on their own, they needed two separate needs. It is very difficult for the mother to take care of the baby and find food on her own; at the same time, the premature baby also needs education. Social structures began to emerge to solve these life problems. Since raising a child required help from other people, strong social bonds were established, solving the problem of the continuation of the human species despite premature birth. (Harari, 2015, pp. 23-24). The development of problem solving skills has distinguished human beings from other species and enabled them to strengthen, develop and create today's civilization.

As with other primates, humans have evolved a biological brain for their basic needs; they have also evolved a cultural mind to solve social problems arising from their social structure (Gellatly, 2012, p. 3). As the human brain evolved, the awareness of Homo sapiens developed. The more aware humans became, the more they dominated their environment, solved more complex problems and created limitless social structures. The modern human civilization, now called Homo sapiens sapiens, is the result of such a development.

Mindful Awareness

Mindfulness is a skill. It is the ability to consciously focus the mind's attention on the here and now, to sense, perceive and know what is happening in the moment as it is, without judgment. Mindfulness is considered one of the fundamental and subtle processes of therapeutic change and is one of the basic skills that counselors and clients are expected to have (Şahin & Yeniçeri, 2015).

Development of Awareness

Mindfulness continues to change in parallel with the development of the brain. The brain, which thousands of years ago was only aware of self and other, started to realize itself with Homo erectus. In general, psychology sources explain this by likening it to the development of the human infant. When a baby is placed in front of a mirror, it does not realize that the image is itself. Towards the age of 2, as the brain develops, it begins to realize that the baby in the mirror is itself. In the period before Homo erectus, the human species was in a similar situation to a baby under the age of 2. Self-awareness started during the Homo erectus period. With Homo sapiens, awareness has developed further. It no longer only has self-awareness but also psychological awareness and social awareness. According to paleoanthropological findings, the first hints of high intelligence and cognitive function in humans date back to Homo habilis, which lived about two million years ago. Approximately 100,000 years ago, ornaments found as evidence of Homo sapiens' idea of influencing the thoughts of others about themselves can be considered as evidence of the early periods of

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awareness. The jewelry made of seashells found clearly shows that humans are now aware of and care about other people's feelings and thoughts about themselves. (Torrey, 2018, pp. 27, 61).

The Emergence of Mindfulness Today

The first scientific studies on mindfulness emerged in the late 1970s. The studies on mindfulness were based on two different schools of thought led by Langer and Kabat-Zinn. "For Langer, mindfulness is a conscious mental state (mode) that has nothing to do with eastern philosophies, while for Kabat-Zinn it is a method of intervention that can be learned, taught and based on an adaptation of eastern philosophies integrated with western science." (Şahin & Yeniçeri, 2015, pp. 49-50).

Mindfulness: Brain, Consciousness and Mind

Brain, consciousness and mind have been curious concepts throughout human history. The mind has often been confused with the brain and sometimes called the soul. While the brain is a concrete concept formed by networks of neurons, the mind is an abstract concept that includes subjective emotional state experiences. Solving the physical or neurological structure of the brain cannot directly reveal the functioning of the mind (Shorter, 2005, p. 9). Although it is known that they are fundamentally different concepts, how they interact emerges as an important problem. This problem is called dualism in philosophy and social sciences. It is not known exactly why and how there is a connection and coordination between physical behaviors and mental activities (Schacter et al., 2009, p. 5).

According to Mithen, there are at least two types of consciousness. The first is the awareness of colors, sounds or movements in our bodies, called sensations. The other is reflexive consciousness, which is a higher order related to the Neanderthal's own mental state, interaction with the social world and even the natural world. (1999, s. 170).

The mind, although sometimes used synonymously with consciousness, can essentially be defined as a stream of consciousness. Mind refers to the processes of thought, perception and awareness. "It is the network of ordered relationships inherent in the system that gives rise to behavior" (Özakpınar, 2013, p. 18). Consciousness is the sensation of being aware of the brain. It is the perception that arises as a result of the bio-chemical reactions that occur in the brain. They are abstractions called "souls" in ancient explanations. Different states of consciousness can be deliberately created through various chemical substances taken into the body or through actions such as meditation. Examples include the altering effects of caffeine, alcohol, nicotine, morphine and hallucinogenic or stimulant substances such as heroin, marijuana, amphetamines on consciousness and behavior. (N. Hayes, 2011, pp. 95-104). In short, consciousness is a neurological perception of the brain and the mind is the flow process of these perceptions.

Our experience of images, sounds and other sensations is produced in the region within the posterior cortex (Koch, 2018, p. 10). Since we know in which region of the brain conscious behavior is produced, can we observe mindfulness in the brain? We can answer this question with the general neuronal workspace (GNWF) theory of psychologist Bernard J. Baars and neuroscientists Stanislas Dehaene and Jean-Pierre Changeux:

> *"The starting point of the theory is the observation that when you are conscious of something, there is access to this information at many different points in the brain. But if you are acting unconsciously, this information is only available in the specific sensory motor system area that is task-specific to the process. For example, when you type fast on the keyboard, you do it automatically. If they ask you how you do it, you cannot tell them. Because you have little conscious access to this information and it is located in the area of the brain circuits that connect your eyes to fast finger movements." (Koch, 2018, p. 20).*

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As can be understood from this theory, all conscious processes are a high-level cognitive process that allows us to perform many interactions in the brain. Developing technology increases our knowledge about consciousness. We now know that consciousness is everything we experience. (Gellatly, 2012). According to Schopenhauer, knowledge can only be acquired through self-consciousness (2014, s. 129). We can observe the processes that take place in the brain when we act with mindfulness.

Types of Mindfulness

In terms of the approach in this study, it is possible to talk about three different types of mindfulness successively. These are awarness, self-awareness and mindfulness.

Awareness

It is the state of being aware (awarness[5]) at the most basic level in cognitive structure. It is actually a skill that all living things have. Thanks to this skill, they are protected from dangers and can access nutrients. For example, when you bring fire close to a plant, it recognizes the fire and shrinks its leaves to protect itself; a turtle recognizes the current danger and retreats into its shell. It can be said that basic awareness has become more than a simple biological action-reaction mechanism.

Self-awareness

A higher level of awareness is self-awareness. It is present in all normal individuals. Self-awareness is the ability to sense one's own existence and to draw attention to oneself. It is a prerequisite for higher level cognitive processes (Torrey, 2018, p. 62). Self-awareness begins to form and develop from the age of 2.

Self-awareness is expected to develop in everyone, with some exceptions. Self-awareness may not develop at all in some children with intellectual disabilities or may be impaired in some adults. For example, in some people with schizophrenia, Alzheimer's disease or dementia, the loss of self-awareness is disease-related (Torrey, 2018, p. 63).

Mindfulness (Mindfulness)

The highest level of cognitive awareness is mindfulness. It is the most comprehensive and highest level of awareness, including the basic types of awareness mentioned above. The ability to consciously focus the mind's attention on the here and now, to sense, perceive and know what is happening in the moment as it is, without judgment, is called mindfulness. (Collin et al., 2014, p. 210). This process essentially means seeing what exists in our inner world. Since seeing is caused by the effect of light, this realization is also called enlightenment. "Stopping to think about how our mind works will undoubtedly bring us both inner enlightenment and relaxation." (Small & Vorgan, 2013, p. 328).

Mindfulness can be expected to develop over time. However, in some exceptional cases, mindfulness may regress like self-awareness. Mindfulness also decreases in pathological conditions or when consciousness is affected, such as brain damage. (Shorter, 2005, p. 276). On the other hand, awareness may also vary according to the psychological state of the individual. Mindfulness is a fundamentally functioning process that has physiological sources such as sensation, perception and attention as well as psychological sources.

The skill of mindfulness is important not only for individual enlightenment but also for social enlightenment. However, social awareness or cultural awareness is different from individual

[5] awareness [Eng. awareness] [es. t. consciousness]; The comprehension of an event or entity without regard to its details. (Enç, 1980a, p. 29)

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awareness. While it is individuals who embody and transmit culture, collective phenomena are beyond conscious actions (Arkonaç, 2015, p. 86). The Renaissance, the Age of Enlightenment, the French Revolution and the establishment of the republic in Turkey can be given as the best historical examples of what the mindfulness skill in human beings in social areas means and how important it is as cultural awareness in social life.

Factors Affecting Mindfulness

Sensory information is formed by two separate processes. These are sensation and perception. These two processes through which conscious awareness is formed are briefly explained below.

Physiological Factors

Sensation

It is the simple awareness that arises in consciousness as a result of the stimulation of a sense organ by an external effect (Schacter et al., 2009, p. 90). The information contained in the stimuli from an environment is grasped by the relevant sensory system, taken into the system and transmitted to the physiological centers in the brain (Cemalcılar, 2012, p. 101). Our first awareness of stimuli occurs through sensation. According to Morgan, sensations are the raw materials of our experiences. (Morgan, 2011, p. 242). We obtain these raw materials through our five senses. These are sight, hearing, taste, smell and touch.

Everything we know about reality is limited by the capacity of our sense organs. Therefore, it is of fundamental importance to address the issue of sensation when explaining the process of mindfulness through which we experience reality. Individuals can only have information within the capacity of their sense organs and can only be consciously aware of this information. The energy transmitted to the brain through sensations is transformed into perceptions under the influence of the individual's experiences. The mind emerges as a combination of perceptions. Perceptions are the data that constitute mindfulness. The mindfulness method helps to transform the data that reaches the brain through sensation into objective and non-judgmental perceptions.

Perception

Experiences start with the information we receive through the sense organs. All our perceptions are also sensations. However, the phenomenon called experience does not only consist of sensation.

The sensations reaching the brain are interpreted and made meaningful by neuronal processes. This process of interpretation and meaning-making is called perception. "The brain works on the information received and generates hypotheses about reality without our conscious instructions, so what we ultimately become aware of is a combination of sensory stimulation and interpretation" (Butler & McManus, 1998, p. 25).

The perceptions of all living beings are limited and restricted. But how limited are human perceptions and what are they limited to? The answer to this question is not clear. Eagleman explains how perception is limited as follows:

> *"Every living thing can only perceive its own slice of reality. In a world closed to light and sound, the signals a tick can perceive from its environment are limited to temperature and body odor. ...These are the thin slices that these creatures can perceive within their ecosystems. No creature experiences objective reality itself; all it can experience is what its evolutionary process allows it to experience. Nevertheless, it probably lives under the assumption that its slice of reality encompasses the entire objective world. What would be the point of imagining that there is something beyond what we perceive? ...There is not even such a thing as smell beyond our brains. Molecules floating in the air bind to receptors in our noses and are interpreted by the brain as different odors.*

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The real world is not a place full of sensory riches; it's all about our brain illuminating the world for us with its own sensitivity." (2016, pp. 71-72).

As a result, human beings construct what they do not perceive or are not aware of. Thus, they create a cultural reality that is not completely independent of physical reality but separate from it and develop a perception here. As people's awareness and problem solving skills increase, it can be thought that in addition to what they can perceive in terms of quantity, their perception as a capacity also increases.

There are different types of perception generated by our different physical sensations. These also include types of awareness. It is possible to talk about 5 types of perception: self-perception, body perception, other perception, environmental perception and time perception. There are also 7 sub-types of perception depending on these. Related perceptions are sexual perception, belief perception, consciousness perception, age perception, pain perception, temperament perception and value perception.

Perceptions are not standard physical movements. It is natural that each one is distinct from the other. "The faculty of perception can never be likened to a camera; perceptions always contain something of the individuality of the person" (Adler, 2008, p. 18). According to Ponty , the psychology of perception is loaded with philosophical presuppositions, with sensation, mental image and memory as permanent entities. (2006, s. 21). In reality, what is perceived is formed once and uniquely under the influence of internal and external factors.

Another factor affecting perceptions is the language we speak. The influence of language on perceptions is probably through the interpretative feature of language. Speaking different languages leads to different perceptions of reality (Butler & McManus, 1998, p. 75). Language is both cause and effect in the perception relationship. The concepts produced by individuals as a result of their different perceptions of the environment can be grouped spontaneously over time, resulting in the emergence of separate languages. The transformation of language into writing has been a determining factor in the structuring of common perception in the progressive process of humanity. In the absence of writing, psychological perception occurs but cannot be sustained socially. (Martinet, 1998, p. 18).

As language creates differences in perception between individuals, it can also cause differences between social groups. People who speak a certain language are influenced by a different perception than groups speaking another language. It can also be expected that perception will increase in parallel with the development of language over time. Indeed, Darwin states that emotion, perception and understanding are evolutionary adaptations (Collin et al., 2014, p. 211). Perception also differs according to cultures.

The mere presence of a stimulus is not enough for perception. For example, the sight of stars in the sky is not enough to enjoy watching them. The meanings attributed to images are constantly changing according to individuals, societies and time. "Some people do not pay attention to star clusters that attract the attention of others; the groupings made accordingly vary from person to person, from culture to culture. In each culture, different aspects of the stimulus field are emphasized, so that the field can be formalized in completely different ways." (Sharif, 1985, p. 40). In any stimulus-perception relationship, the individual's perception is more open to the elements that exist in his/her own culture.

At the point we have reached today, "if we can organize our perceptions in a way that makes sense, remember any information when we need it, and use that information to think, reason, and communicate, we can plan, get ideas, solve problems, dream, and tell others about it all" (Butler & McManus, 1998, p. 62). Therefore, problem solving is based on a cognitive perception process.

The constancy of perception is an example of this. Interpretations and meanings of the perceived object such as color, size, shape, etc. can maintain their existence for a while despite the change of the stimulus object. There are three types of constancy in perception: brightness and color

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constancy, size constancy and shape constancy. For example, even if an object looks smaller as it moves away from us, we continue to perceive it in its actual size.

Another issue related to perceptions that can be reflected in awareness and problem solving skills is the issue of mistaken perceptions. False perceptions, such as illusion and hallucination, are the perception of non-existent stimuli as if they exist or different from what they are. It can be caused by sensory organ dysfunction, psychological reasons, the situation in which the stimulus is present and past experiences.

The individual thinks that they are aware of everything they perceive. But most of the time the perceptions are automatic and they are not aware of what they are perceiving. These perceptions that we are not consciously aware of are called unconscious perception (Butler & McManus, 1998, p. 35). In order to protect ourselves, we put things we perceive that may disturb us into the unconscious. Freud called this mechanism to keep bad memories away from consciousness repression. (Collin et al., 2014, p. 204). Unconscious perception is an important factor in mindfulness processes. The skill of mindfulness is influenced by the level of consciousness and unconscious perceptions. "Unconscious mental activities affect us visibly, even if they remain outside of awareness" (Butler & McManus, 1998, p. 65). Sometimes the solution to the problem comes to the individual's mind in an instant, even if he or she does not consciously realize it. This happens when unconscious perceptions come into play.

Intelligence and Education

Intelligence is an innate characteristic that can be developed and measured through education. (Wenke et al., 2004, p. 160). Considering that education increases intelligence, it is expected to increase mindfulness. However, it is not possible to directly increase intelligence through education for every individual. Various health problems, disabilities, lack of motivation and many other reasons affect the success of education (Sternberg, 2009, p. 183). Education teaches the individual why to do a behavior and enables them to internalize it. Thus, it raises from the level of awareness to the level of conscious awareness. For example, an individual learns that he/she should wear clothes in infancy, but he/she does not know why he/she wears them. He is aware, but it is not at the level of conscious awareness. Not only the individual's own education, but also the education of his/her family is expected to have an impact on mindfulness skills. As the education level of the family increases, it is possible for the quality of the education to be given to the child to increase and the level of intelligence to improve.

Effects of First Experiences

It is expected that the attitudes of the people around the individual who take care of him/her after birth will affect his/her awareness. In such a case, family structures, experiences, attitudes and even traumas that are passed down through generations have an impact on awareness. All these influences are probably transmitted to new generations in a hidden language (Wolynn, 2016, p. 8). Family and kinship systems are at the same time a unique system of social organization made up of biological, legal, influential, geographical and historical ties. (Carr, 2006, p. 5). It embodies everything that exists in society; social structure, social change and transfers it to new generations. (Waite, 2006, p. 88). It determines the qualities and will of the individual, giving them a position in the network of social obligations and ensuring that they are passed from father to son (Evans-Pritchard, 1951, p. 107). As a result of these effects, behavioral family attitudes can be divided into three groups: authoritarian, democratic and protective families. Each attitude is likely to affect the individual's awareness.

The oppressive attitudes of authoritarian families can lead to the formation of a personality in children who are generally withdrawn, insecure and easily influenced by others. Individuals raised in such families may feel inadequate in their abilities, seeing themselves as different from who they are. This is because the authoritarian family, with its pressures, often did not give them the

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opportunity to become aware of their own feelings and thoughts, and therefore their skills and competencies. Due to oppression during childhood, mindfulness skills may be underdeveloped.

Families with democratic attitudes allow their children to develop self-management mechanisms as self-confident individuals by giving them the chance to make choices. In such families, children are given the opportunity to become aware of their own feelings and thoughts, and are expected to have more developed mindfulness skills.

Foster families, on the other hand, are overly attached and protective of their children. They are afraid of their children doing wrong and do not allow them to do anything on their own, so they grow up with low self-confidence, unable to make decisions on their own and dependent personalities. In such families, the child may not be given the opportunity to think and make decisions on his/her own as an individual, and thus may not develop mindfulness skills.

However, there is a very important point to keep in mind. Despite the above-mentioned attitudes of families, individuals may grow up in ways contrary to them. In this case, the influence of factors outside the family overcomes the influence of the family. Or the individual may have developed a tendency in the opposite direction as a reaction to the family's attitude in later periods.

Mindfulness-Based Therapies and Transfiguration of Emotions

Individuals may react differently to the same stimulus. This situation arises as a result of thought and perception processes that differ according to the experiences of individuals. There are many methods used to change emotions. It is quite difficult to change the emotions themselves, but it is easier and more effective to change the cognitive processes and thoughts that create them. Cognitive therapy methods aim to change emotions by changing cognitive processes. One of these methods is mindfulness-based therapies. Using the mindfulness method, it is aimed to create metamorphosis in emotions.

Meditation Monitoring the Mind and Developing Mindfulness

In ancient civilizations, since it was not possible to examine the mind from the outside, direct examination was attempted through introspection and awareness. For this purpose, methods were developed for the individual to systematically monitor his or her own mind. These methods are called meditation in the Eastern tradition. Although meditation has historically been associated with religion and mysticism, it is a method of monitoring the mind that is not really related to these concepts and only allows one to direct attention to the mind (Harari, 2018, pp. 282-4). Through meditation, one senses, perceives and knows one's emotions and thoughts by simply watching them without intervening. (Harari, 2018, pp. 279-287). "The practice of meditation is the systematic, continuous and objective observation of bodily sensations and mental reactions to these sensations in a systematic, continuous and objective manner, thereby revealing the fundamental patterns of the mind" (Harari, 2018, pp. 284-285). This meditation practice is a practical method for developing mindfulness.

After World War I, interest in eastern philosophy increased and the concept of meditation began to be introduced to western culture. Thus, mindfulness meditation has emerged as a frequently used practice in the field of psychology in recent years. The medical benefits of meditation have attracted the attention of many psychologists and started to be used in cognitive therapies. There are quite common studies on this subject in the literature (Collin et al., 2014, p. 210; S. C. Hayes et al., 2004; Herbert & Forman, 2011; Roemer & Orsillo, 2009).

Should We Be Consciously Aware Every Moment?

Consciousness and awareness are not essential for all brain functions. Some behaviors are done automatically without waiting for mental processes. This saves time, which can be used to deal with vital problems. Such processes are called reflexes and allow the brain to be used for other tasks at the same time. One can ride a bicycle and have a conversation at the same time. "Olympic runners

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take action a tenth of a second before they consciously perceive the sound of the pistol signaling the start" (Butler & McManus, 1998, p. 65).

Problem Solving Skills

Problem solving has been studied by the science of psychology for more than 100 years ((Butler & McManus, 1998, p. 72). In order to explain problem solving skills, it is first necessary to address the concept of problem. The obstacle or conflict that an individual encounters while trying to reach his/her goal is called a problem. According to Popper, a problem arises from a disturbance in innate or discovered or learned expectations. (2006, s. 16). A problem is not only characterized by a conflict or obstacle situation, but also needs to be understood as a problem by the individual. The ability to analyze and overcome the situation faced by the individual when he/she moves towards his/her goal is called problem solving skills. (Morgan, 2011, p. 133). In the Turkish Language Institution's Dictionary of Psychological Terms, problem solving is defined as "selecting and using effective and useful tools and behaviors among various possibilities in order to achieve the desired goal". *(Enç, 1980b).*

Individuals achieve more satisfaction and happiness if they think about how difficult problems are and overcome them (Burger, 2006, p. 444). In the opposite case, i.e. when an organism is unable to solve a problem and its expectations are frustrated, it perishes. (Popper, 2006, p. 16). The motivation of the individual who achieves happiness increases towards the next problem. "In general, our problem-solving activities - thinking and reasoning - are more akin to bounded satisfaction than to deduction or the execution of an algorithm" (Churchland, 2013, p. 18). Bounded satisfaction is the optimal outcome of the interaction of various factors and possibilities to produce an appropriate answer to a question (Churchland, 2013, p. 19). In this case, a perfect result is not expected. It is sufficient if the problem has been fixed.

Key Factors in Problem Solving Skills

Thinking

Thinking is a mental process carried out through concepts. "Concepts are abstract ideas that simplify and summarize what we know; they contain general as well as specific information" (Butler & McManus, 1998, p. 63). Knowing and thinking about concepts helps to understand new concepts and new problems encountered and to get ideas. For example, when one has the conceptual knowledge that a vegetable is a food that can be cooked and eaten, one has an idea that asparagus is a type of vegetable that can be cooked and eaten, even if one does not know what asparagus is. Thinking with concepts also ensures that one does not act automatically. Thinking is a mindfulness skill and a key factor in problem solving.

Reasoning

Reasoning is cognitively divided into three sub-factors. These are sequential reasoning, inductive reasoning and quantitative reasoning (Lohman, 2005, p. 244). Inductive reasoning is the process of reaching general knowledge from the observation of phenomena. This general knowledge can be obtained by deductively observing the social reality again and obtaining new information. In both phases of this cycle, problem solving is carried out.

Philosophical reasoning is the processes of logic, dialectic and rhetorical thinking. Logic involves one's own thoughts, dialectic involves arguing with others, and rhetoric involves speaking to crowds. (Schopenhauer, 2014, p. 87). In order to solve the problems encountered, it is necessary to make new inferences with existing knowledge.

"Both the natural sciences and the social sciences always start from problems, from something that

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> *arouses our curiosity, as the Greek philosophers said. To solve these problems, the sciences use basically the same method as a healthy human logic: Trial and error. More precisely, it is the method of experimentally coming up with solutions to our problem and eliminating the wrong solutions because they are wrong. This method assumes working with a large number of experimental solutions. One solution after another is tried and eliminated" (Popper, 2006, p. 15).*

But trial and error is not a deterministic process. It does not always produce the right knowledge or awareness.

> *"Each new case must confirm or break a method of education, thereby dialecticizing it. Knowledge cannot be created by juxtaposition. Knowledge must always have the value of an arrangement, or rather a reorganization. To educate oneself is to become conscious of the value of the division of the cells of knowing. Knowledge must always be considered within the duality of applied rationality, a fact must always judge a method, and a method must always receive the approval of a fact. Empiricism and rationality can thus establish an everyday dialog. A dual philosophizing is essential for determining the values of culture." (Bachelard, 2009, p. 104).*

Schopenhauer states that the ability to solve problems through reasoning depends on four conditions. These are the correct comprehension of all data through intuition-perception, the formation of concepts, the examination of the accuracy of concepts, the drawing of judgments, and the bringing together of judgments (2014, p. 23). This is also a dialectical process. Dialectical reasoning is the ability to think critically to determine right and wrong or to analyze differences by evaluating opposing points of view. (Butler & McManus, 1998, p. 68).

Logic plays a role at every stage of problem solving. The simpler the problem situation is reduced to, the more logical it is. The more complex the situation becomes, the more illogical solutions are produced. In such a situation, problems are tried to be solved by using free association. When many facts and statements are given for a logical problem, it becomes more difficult for people to solve the problem. These methods of reasoning are influenced by psychological processes and form the basis of logic (Butler & McManus, 1998, p. 67).

Language

When a problem is encountered, it is thought, reasoned and analyzed. This process is realized through language skills. In their 1994 study, Miura and colleagues showed that bilingual Asian-American children were more successful in solving mathematical problems than children who spoke only English. (Butler & McManus, 1998, p. 76). Individuals' language capacities and their ability to speak different languages contribute to problem solving processes.

Individual Factors Affecting Problem Solving Skills

There are many factors that affect problem solving skills positively and negatively. Some of these are evaluated below.

Intelligence is a set of abilities and skills such as vocabulary, numbers, problem solving, etc. that are genetically inherited and developed under the influence of the environment. (Morgan, 2011, p. 399). As it is understood from the definition, intelligence is directly related to problem solving. Having high problem solving skills means that a person's intelligence level is also high. It can be said that the factors affecting intelligence are also factors that directly affect problem solving skills.

Motivation can be defined as the energy that mobilizes towards the solution of a problem. Emotions reveal this energy. Individuals can be motivated to the problem and its solution for various reasons. For example, they may be more motivated to solve problems that suit their interests. Motivations arising from the feeling of pleasure that will arise as a result of the solution of the problem can be effective. Subconscious factors arising from unrecognized experiences can increase

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motivation or cause avoidance of problem solving. Maslow's hierarchy of needs shows that motivations are formed in line with these needs. In order to move to the next step, the current need must be met. Needs are the basic and driving force affecting these skills. For example, in case of hunger, one is more aware of perceptions about food. It is possible to be more motivated to solve problems related to hunger. An unmotivated problem cannot be solved.

Set-up is the tendency to use the methods used in previously encountered problems in new problems. When an installation is formed by practicing on a subject, subsequent problems are tried to be solved with the installation gained. Installation also causes motivation towards a solution method. Even if there are easier solutions, the set-up prevents another easy solution from being seen.

Creativity is the state of thinking to use objects in a different place than their function. Using objects outside of their previously learned functions can lead to success in problem solving. The more functions an object can be used for, the more creativity is involved. Creativity and problem solving skills progress in parallel with each other. The more creativity increases, the more problem solving skills increase. (Butler & McManus, 1998, p. 74).

Education is a process that enables the individual to reveal his/her potential and develop himself/herself together with the family and school. Innate intelligence can be developed with the factor of education. Education aims to improve an individual's problem solving skills. For these reasons, as the education levels of individuals and their families increase, their skills are expected to improve.

The Biological Clock is the timing of the functions of the human body. In this way, body cells increase their activity at some times and decrease it at others. The biological clock makes daily, monthly and seasonal adjustments in body physiology (Senel, 2008, p. 58). It is of great importance for the physiological structure to adapt to environmental conditions and to make the best use of it. (Şenel, 2008, p. 59). This is also related to problem solving skills. It is possible to be more successful in biological time zones where problem solving skills are used more effectively. Discovering the biological hours when individuals are productive will enable them to use their problem solving skills more effectively.

Attention enables brain processes with limited capacity to be concentrated and used functionally. "Full attention means that working memory operates at a higher cognitive efficiency, achieving maximum clarity of mind" (Goleman, 2007, p. 243). Some factors, such as anxiety, can increase motivation and attention, while in other cases they can impair attention due to problems exceeding capacity. (Goleman, 2007, p. 243). Individuals who can use attention processes effectively focus on the problem situation more effectively and use problem solving skills more effectively.

Culture affects personality, identity, perceptions and thinking processes. The unique cultural structures of each country or region mean different ways of problem solving. Research shows that cultures influence the cognitive processes used in information processing. It is argued that Western cultures tend to choose the analytical style of processing information, while Eastern cultures tend to choose the holistic style. (Kağıtçıbaşı, 2017, p. 123; Nisbett, 2005, p. 15). Problem solving skills are a product of information processing processes. Therefore, it is influenced by the culture of the society.

Memory is a system for storing past experiences. Sometimes this system may not work perfectly and the information needed may not come to consciousness immediately. In this case, it may be necessary to "ruminate". This expression refers to conscious awareness. Memory comes into play when it is necessary to use information from previous experiences to solve the problem. By concentrating attention on the information needed, it is ensured that it is consciously recognized. This process facilitates problem solving skills. However, when a distortion or forgetting occurs in the memory, it can create a difficult effect on problem solving. Individuals who witness the same event may remember different things.

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The Contribution of Artificial Intelligence to Problem Solving

Artificial intelligence is one of the most important topics of the future. Scientific advances have accelerated the development of artificial intelligence. From the simple problems of daily life to the most complex scientific problems, it is one of the most important and basic tools in analyzing. It is also increasingly replacing individuals in all fields. Artificial intelligence is expected to develop further in the not too distant future and go beyond biological minds. It is possible that it will be able to solve the problems encountered instead of humans, perhaps without even realizing it. In the case of this technological quality, it is also possible to talk about the conscious awareness of artificial intelligence.

The Relationship Between Mindfulness and Problem Solving

Mindfulness enables us to pay attention and think about the problems we face and not solve them in a way that feels right to us. As an individual attitude, "Before you act, stop and think. Think about what you believe to be true about this issue and decide how you should act in line with what you believe." (Kağıtçıbaşı & Cemalcılar, 2014, p. 139) can be expressed in the form of mindfulness. Mindfulness is the ability to look at the problem from the outside in an objective way by monitoring our emotions while stopping and thinking. It is a process that makes it easier for us to solve the problem by transforming the psychological processes that may prevent us from solving the problem, that is, acting correctly according to us, into an "objective and uninterpreted" form. It enables us to become aware of the problem, to define and understand the problem and to realize how to solve the problem. (Soylu & Pala, 2018, p. 293).

Method

In this study, the relational survey method, one of the survey models, was used. Both types of correlational survey method (correlation type relationship and the relationship obtained by comparison) were utilized.

Population and Sample of the Study / Study Group

The study was conducted with disproportionate element sampling technique. The sample of this study consisted of 126 3rd and 4th grade students studying at Sakarya University Faculty of Education in the spring semester of 2018-2019.

Data Collection Tools and Data Collection Processes

In the study, a questionnaire form developed by us, the Mindfulness Scale developed by Brown and Ryan and the Problem Solving Inventory developed by Heppner and Petersen were used.

Findings

Findings Related to Mindfulness and Problem Solving Skills

Pearson product-moment correlation analysis was performed to examine whether there was a significant relationship between the scores obtained from the Mindfulness Scale and the scores obtained from the Problem Solving Inventory. The results are given in Table 1. As a result of the

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analysis, no significant relationship was found between mindfulness and problem solving skills (r=,118, p>0,01).

Table 1 Relationship between Mindfulness Scores and Problem Solving Scores

		Mindful Awareness
Problem Solving	r	,118
	p	,195

Findings on Childhood Traumas and Mindfulness Skills

An independent samples t-test analysis was conducted to examine whether mindfulness skills differed according to having or not having had any distressing emotional or physical experience. According to the results of the study, there was a significant relationship between mindfulness and trauma. Individuals who experienced trauma in childhood had higher mindfulness scores (p<.05, t= -2.087)

Findings on the Effect of Psychological Complaint and Psychotherapy Process on Mindfulness and Problem Solving Skills

An independent group t-test was conducted to examine whether mindfulness skills differed according to having or not having psychological complaints. According to the results of the study, it was found that there was a significant relationship between psychological complaints and mindfulness skills. Individuals without psychological complaints have higher mindfulness (p<.05, t= 3.363)

Independent group t-test was applied to examine whether problem solving skills differed according to whether they were receiving psychotherapy or not. According to the results of the study, a significant relationship was found between receiving or not receiving psychotherapy and problem solving skills (p<.05, t= 2,013). Individuals who do not receive psychotherapy consider themselves more inadequate in problem solving skills.

Findings Related to Life Satisfaction and Mindfulness

An independent group t-test analysis was conducted to examine the level of mindfulness according to the answer given to the question "Have you ever been satisfied with the decisions you have made about yourself?". According to the results of the analysis, a significant relationship was found between the answer to this question and mindfulness (p<,05, t=-3,870). Individuals who were satisfied with their decisions had higher levels of mindfulness.

An independent group t-test analysis was conducted to examine the level of mindfulness according to the answer given to the question "Have you ever been successful in your decisions about yourself?". According to the results of the analysis, a significant relationship was found between the answer to this question and mindfulness (p<,05, t=-3,437). Individuals who thought that they were successful in their decisions had higher levels of mindfulness.

An independent group t-test analysis was conducted to examine the level of mindfulness according to the answer given to the question "Are you sure that your philosophy of life matches with your life?". According to the results of the analysis, a significant relationship was found between the answer to this question and mindfulness (p<,05, t=-3,124). The mindfulness levels of individuals whose philosophy of life and life match were found to be higher.

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Conclusions and recommendations

The main problems of this research are the relationship between mindfulness and problem solving skills, which we think have contributed to the development of human history, and the effect of some variables on them. In the indexes searched, there were no studies on the direct relationship between these two basic skills. On the other hand, there are studies on the variables that may affect these two basic skills in the literature. The research will provide an idea about the relationship between these two variables and will contribute to the existing findings.

According to the results of the study, there was no significant relationship between mindfulness and problem solving skills. When we look at the mean scores of the sample group for these skills, both skills are at an average level. Based on these findings, we can say that these two skills exist at a basic level in the general population, except for some special cases. It is thought that trainings that will contribute to the development of mindfulness skills may contribute to problem solving skills.

The general findings that have a significant relationship with mindfulness skills are given below.

- Individuals with psychological complaints have low levels of mindfulness.
- Individuals who have experienced trauma have lower levels of mindfulness than those who have not.
- Individuals who think that they are satisfied and successful with their decisions have higher levels of mindfulness than those who do not.
- Individuals who think that their philosophy of life and their life are in harmony have higher levels of mindfulness.
- Those who think that the dress color they like to wear the most is their favorite color have higher levels of mindfulness.

The findings that have a relationship with problem solving skills are given below.

- Individuals who have received or are receiving psychotherapy consider themselves more competent in problem solving skills than those who have not received psychotherapy.
- Individuals with persistent illness consider themselves more competent in problem solving skills than individuals without persistent illness.
- As the rate of individuals' contribution to the planning of their own education increases, they consider themselves more competent in problem solving skills.
- Individuals who think that they can easily solve the problem transferred to them consider themselves more competent in problem solving skills.
- Individuals who are asked for help by the people around them to solve their problems consider themselves more competent in problem solving skills.

In general, mindfulness and problem solving skills were not found to be affected by family and environmental characteristics. However, in some studies, some of these variables were found to have effects in younger age groups.

It can be said that the rapidly developing phenomenon of artificial intelligence may affect our mindfulness and problem solving skills. Algorithms that solve many problems for us and increase our awareness may cause these skills to change in various directions in the future.

Recommendations

- There are no studies directly examining the relationship between mindfulness and problem solving skills in the literature. Therefore, new studies are needed to generalize the findings.

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- In this study, no direct relationship was found between mindfulness and problem solving skills. Training programs that develop mindfulness skills should be implemented and their effects on problem solving skills should be investigated.
- The sample group includes university students. Therefore, studies with different sample groups are needed.
- According to the research findings, a significant relationship was found between mindfulness and psychological complaints. Therefore, it will be important to organize training programs in a way to develop mindfulness skills in terms of preventive mental health services.
- Psychotherapy processes were found to have a positive effect on problem solving skills. Problem solving skills of all individuals can be improved by providing group psychotherapy services in schools.

Studies can be conducted on how artificial intelligence, one of today's current and important issues, will affect mindfulness and problem solving skills in the future.

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