African Educational Research Journal
Vol. 11(3), pp. 460-467, September 2023
DOI: 10.30918/AERJ.113.23.073
ISSN: 2354-2160
Full Length Research Paper

Exploring the relationship between cognitive flexibility and mindfulness with self-regulation in university students

İsmail Ay[1,2]

[1]Psychological Counseling and Guidance Application and Research Center, Atatürk University, Turkiye.
[2]Division of Educational Sciences, Kazım Karabekir Faculty of Education, Atatürk University, Erzurum, Turkiye.

Accepted 5 September, 2023

ABSTRACT

Self-regulation is at the center of human behavior and lies at the core of a healthy adaptation to life. Self-regulation refers to individuals' efforts to modify their thoughts, emotions, desires, and actions in line with the goals they want to achieve. Awareness and flexibility are effective cognitive skills for self-regulation. Although self-regulation is a widely researched subject, the variables it is associated with have not been studied much. However, a detailed examination of these relations will contribute to the development of qualified applications in this regard. So, this study examined the relationships among these three variables believed to be effective in individuals' problem-solving and adaptation to life. For this purpose, answers to the following questions were sought in the study; is there a significant correlation between mindfulness, cognitive flexibility and self-regulation and are mindfulness and cognitive flexibility significant predictors of self-regulation? This study was conducted using a correlational survey model. The population of the study comprises undergraduate students in 2018 and the study's sample group consists of 506 students. Pearson Product-Moment Correlation and Multiple Linear Regression analyses were utilized to investigate relationships between variables. According to the regression analysis results, cognitive flexibility and mindfulness have been found to be significant predictors of self-regulation. Accordingly, cognitive flexibility predicts 20% of the variance in self-regulation, while mindfulness predicts 11% of the variance. Furthermore, the results indicate that together, these two variables explain a substantial portion (46%) of the variance in self-regulation. These findings have been evaluated in the context of the relevant literature.

Keywords: Self-regulation, mindfulness, cognitive flexibility.

E-mail: E-mail: ismailay@atauni.edu.tr. +90533 546 02 94.

INTRODUCTION

The concept of self-regulation refers to the efforts of individuals to modify their thoughts, emotions, desires, and actions in line with the goals they wish to achieve (Vohs and Baumeister, 2004). In this context, self-regulation signifies that an individual is an active agent and decision-maker, representing a significant aspect of how one adapts to life without being a helpless spectator in the face of events (Baumeister, 2005). Definitions of self-regulation vary based on skills related to emotion, cognition, and behavior regulation. Embracing all these characteristics in a broad sense, self-regulation involves a person's ability to flexibly initiate, monitor, control, persevere, and adapt their behaviors, attention, emotions, and cognitive strategies in response to internal cues, environmental stimuli, and feedback from others, all with the aim of achieving personal goals (Moilanen, 2007). If inconsistencies between an individual's goals and current behaviors are identified, behavioral adjustments are made to align with the goal (Febbraro and Clum, 2007). Miller and Brown (1991) have conceptualized the self-regulation process in 7 stages: 1) informational input (related to a specific situation), 2) Self-evaluation, 3) instigation to change triggered by inconsistencies (when there is a mismatch between goals and current state), 4) Seeking ways to reduce inconsistencies, 5) Creating a plan for change, 6)

Implementing behavioral change, and 7) Evaluating the process in relation to the goal. In short, self-regulation requires individuals to be flexible in their thoughts and behaviors.

Individuals are exposed to diverse stimuli of varying qualities and intensities from various sources in their daily lives. According to the tenets of cognitive flexibility theory, it is improbable that individuals can navigate through every encountered situation solely relying on established cognitive schemas and predetermined reactions (Spiro et al., 2003). This is precisely where the concept of cognitive flexibility assumes significance. Broadly defined, cognitive flexibility epitomizes an individual's capacity to effectuate alterations in their cognitive paradigms and attitudes when confronted with diverse situations. Organisms that are best adapted to their environment can react quickly and effectively to repeated events, but they can change their actions by changing their goals or motivations when the learned responses are not appropriate. Executive attention is the cognitive mechanism that provides flexible regulation of thought and action, which is characteristic of purposive behavior (Rueda et al., 2023). Bonanno and Burton (2013) criticized the categorization of stress-coping responses as effective and ineffective, and the experts' assertion of certain coping patterns Emphasizing that a certain response may not be beneficial in every situation, they stated it would be more beneficial to apply the behavior in a flexible way in the face of stress, thus they have put forward the concept of "regulatory flexibility". Conducting research based on this concept, Bürgler et al. (2021) found that flexibility, which they considered a self-regulation strategy, was highly effective in managing daily self-control conflicts. Wenzel et al. (2023), also found that the variable use of self-regulation strategies was associated with higher self-regulation success and this success could contribute to the emotional well-being of individuals. Martin and Anderson (1998) emphasize that cognitive flexibility encompasses three fundamental elements. These include an individual's awareness of alternative paths and options, willingness to be adaptable and accommodating to situations, and the belief in possessing self-efficacy or the ability to be flexible.

The concept of "awareness" considered a uniquely human attribute, has been extensively explored in Eastern philosophies and religious beliefs (Özyeşil et al., 2011). Interest in this topic began to grow with the publication of a study based on meditation practices aimed at enhancing individuals' awareness in Eastern societies and their incorporation into psychology (Kabat-Zinn, 1982).

Mindfulness is the complete focus of one's attention on present experiences with every moment (Baer, 2003). Kabat-Zinn (1994) defines it as giving deliberate attention to the present moment, in a non-judgmental way, for a specific purpose. Mindfulness involves using this information when appropriate while not allowing concerns about the past or the future to prevent one from focusing on the present moment, enabling one to sustain the "here and now" experience (Baer, 2003; Baer et al., 2006; Özyeşil et al., 2011). Mindfulness, in this aspect, can be considered not only as paving the way for individuals to develop harmonious and healthy attitudes in various aspects of life but also as a significant attribute in enhancing self-regulation in terms of attention and consciousness. It is stated that the mechanism by which mindfulness meditation exerts its effects is an advanced self-regulation process, including attention control, emotion regulation, and self-awareness (Tang et al., 2015). In a meta-analytic study, it was found that mindfulness-based interventions support high self-regulation in children, especially those who need support (Bockmann and Yu, 2023). Opalinski and Martinez (2021) and Izhar et al. (2022) also found in their study that mindfulness supports self-regulation. The development of attentional mechanisms supports the capacity of human beings to self-regulate cognition and actions (Rueda et al., 2023).

Recent studies have indicated that self-regulation begins to develop from childhood, and the emergence of self-regulation during this period is a significant indicator of later-life achievements (Montroy et al., 2016). Furthermore, self-regulation has been identified as a foundational element for well-being (Stevenson et al., 2019; De Berardis et al., 2020), a strong predictor for psychopathologies in adulthood (De Berardis et al., 2020), and associated with psychopathologies and somatic issues (Martin et al., 1996; Moffitt et al., 2011). In their meta-analysis study, Robson et al. (2020) determined that self-regulation is associated with various factors such as social competence, school engagement, academic performance, peer bullying, aggression, delinquency, substance use, depression, anxiety, and obesity. They found that self-regulation predicts achievement, interpersonal behaviors, psychological well-being, and healthy living. Cognitive flexibility also plays a crucial role in individuals forming a belief in their competence to develop a healthy lifestyle. Cognitive flexibility is considered a part of a comprehensive neuropsychological structure referred to as executive functions, which encompass aspects such as goal setting, planning, insight, inhibition, focus, attention, and self-regulation (Anderson, 2002; Hughes, 2002; Rennie et al., 2004; Blair et al., 2005; Gündüz, 2013). Similarly, mindfulness meditation has the potential for the treatment of clinical disorders and can facilitate the development of a healthy mind and enhanced well-being (Tang et al., 2015). The application of mindfulness practices has been evaluated to reduce depression-like conditions by weakening rumination, which involves continuously creating scenarios related to the past (Ramel et al., 2004). Consequently, mindfulness enables individuals to immerse themselves in present experiences, allowing them to channel their energy into coping with negative psychological states. Moreover, research findings within the literature demonstrate the positive impact of mindfulness practices on individuals' self-regulation skills (Shapiro et al., 2006; Masicampo and Baumeister, 2007; Friese and Hofmann, 2016;

Kaunhoven and Dorjee, 2017; Leyland et al., 2019; Huguet et al., 2019; Strait et al., 2020; Djernis et al., 2023). Moreover, studies have also indicated the effectiveness of mindfulness and cognitive flexibility in behavior modification and therapeutic interventions (Spiro et al., 1988; Roemer and Orsillo, 2003; Kabat-Zinn, 2003; Spiro et al., 2003; Grossmann et al., 2004; Mace, 2007; McKay et al., 2012, Marcotte and Levesque, 2018).

In light of all this information, this study aims to investigate whether there is a significant relationship between cognitive flexibility, mindfulness, and self-regulation, which are important functions of the human mind. For this purpose, answers to the following questions were sought in the study:

1. Is there a significant correlation between mindfulness, cognitive flexibility and self-regulation?
2. Are mindfulness and cognitive flexibility significant predictors of self-regulation?

METHOD

Research design

This study was conducted using a correlational survey model. Correlational survey models aim to determine the presence and/or degree of co-variation among two or more variables. Although a correlational survey model does not establish a true cause-and-effect relationship, it allows for the prediction of one variable based on the knowledge of the state of another variable (Karasar, 2014; Büyüköztürk et al., 2014).

Research sample

The population of the study comprises undergraduate students who were enrolled at Atatürk University during the 2018 academic year. The study's sample group consists of 506 students from various faculties, selected through a convenience sampling method. For this population, the ideal sample size was calculated as 380 at the 95% confidence interval (Qualtrics, 2023). Therefore, it was accepted that the sample size was sufficient to represent the research population. Convenience sampling is utilized due to limitations in terms of time, cost, and workforce, selecting readily available and easily accessible units for the sample (Büyüköztürk, 2009). Out of the students, 351 (69.4%) were female, 137 (27.1%) were male, and 18 (3.6%) did not specify their gender. Furthermore, in terms of academic year classification, 35.6% (n = 180) of the students were in the first year, 15.4% (n = 78) were in the second year, 13.2% (n = 67) were in the third year, and 26.9% (n = 136) were in the fourth year. Meanwhile, 8.9% (n = 45) of the students did not indicate their academic year.

Data collection tools

Cognitive flexibility inventory

The Cognitive Flexibility Inventory (CFI), developed by Bilgin (2009), comprises 19 items. The inventory items are formulated as pairs of adjectives. Respondents are instructed to select the option that they feel more closely aligned with among the provided adjectives. Scores obtained from the inventory range between 19 and 95. Higher scores on the inventory indicate greater proximity to cognitive flexibility. In the 19-item CFI, the items account for a total variance of 51.3%. In another validation study of the scale, criterion validity was established using the Dysfunctional Attitudes Scale, resulting in a correlation of -.44 between the two scales. Reliability studies conducted on the scale revealed a reliability coefficient (Cronbach's Alpha) of α = .92 for the overall scale. The item-total correlations of the scale items ranged from .49 to .63. The correlation coefficient obtained through the test-retest method was .77, while the reliability coefficient calculated using the split-half method was .87. For this study, the reliability coefficient of the scale was calculated as α = .90.

Mindful attention awareness scale

The Mindful Attention Awareness Scale (MAAS), developed by Brown and Ryan (2003), consists of 15 items and utilizes a 6-point Likert-type rating. Possible scores on the MAAS range from 15 to 90, with increasing scores indicating higher levels of mindful attention awareness in individuals. The adaptation of the MAAS to Turkish culture was carried out by Özyeşil et al. (2011). The adaptation study confirmed the one-dimensional structure of the MAAS among university students according to the results of confirmatory factor analysis (χ^2/df = 2.08, RMSEA = .06, SRMR = .06, GFI = .93, AGFI = .91). Furthermore, the Cronbach's alpha reliability coefficient for the MAAS was determined to be (α = .76), and the test-retest reliability coefficient was .86. In this study, the reliability coefficient of the scale was found to be α = .80.

Self-regulation questionnaire

The Self-Regulation Questionnaire, developed by Dan et al. (2005), was adapted to Turkish culture by Ay (2013). Through exploratory factor analysis, a structure comprising five subscales was derived from the self-regulation questionnaire, accounting for 41.6% of the total variance. Confirmatory factor analysis was subsequently employed to assess model fit, revealing that the model exhibited a satisfactory fit (χ^2= 841,66, df=394, p=.00, χ^2/df=2,13). The conformity index values were found as follows: RMSEA = .060, RMR = .054, NFI = .90, NNFI = .94, CFI = .95, IFI = .95, RFI = .90, AGFI = .85, and GFI = .90. The analysis conducted to

determine the reliability level of the scale yielded a Cronbach's alpha value of α = .91, and the test-retest reliability was found to be at a level of .90. In this study, the reliability coefficient of the scale was established as α = .90.

Data analysis

The data analysis was conducted using the SPSS statistical software. Cases with erroneous and significantly missing codes in the applied scales were excluded from the dataset. The normality and linearity of the data were examined through kurtosis coefficients and skewness coefficients, as well as scatter plots. As the skewness and kurtosis values approach zero, the data tend to follow a normal distribution (George and Mallery, 2019). Thus, it was determined that the data exhibited a normal distribution. The descriptive statistics are given in Table 1.

Table 1. Descriptive statistics.

	N	Mean	SD	Skewness	Kurtosis
Self-regulation	506	111.06	15.749	-.417	.308
Mindfulness	506	59.16	10.856	.044	-.130
Cognitive flexibility	506	76.99	11.099	-.727	.336

Descriptive statistics were employed in the analysis, along with the Pearson Product-Moment Correlation, for investigating the correlational relationships between variables. Multiple Linear Regression analyses were also utilized to examine predictive relationships among variables. Multiple Linear Regression analysis is employed when there are at least three variables that are presumed to be related. One variable is considered the dependent variable (the one to be predicted), while the others are included as independent variables (predictors) in the analysis. This process mathematically explicates the relationship between the predictor and dependent variables (Seçer, 2013). The "enter" (standard) method was used as the regression technique. In the enter method, all variables are included in the equation without considering whether they significantly contribute to the explained variance in the dependent variable (Büyüköztürk, 2010). The standard multiple regression method is appropriate when the goal is solely to assess relationships between variables and to answer the fundamental question of multiple correlations (Tabachnick and Fidell, 2015). An important consideration in multiple regression analyses is outliers. Multiple regression analyses are sensitive to outliers (Seçer, 2013). Mahalanobis Distance Values were calculated to detect outliers, and data from five individuals were excluded from the dataset due to the identification of outliers in this procedure.

Before conducting the regression analysis, preliminary assumptions were examined. In this context, the presence of multicollinearity was assessed by examining the Durbin-Watson statistic, which yielded a value of 1.95, indicating no significant multicollinearity issues. Considering that the Durbin-Watson value falls within the range of 1 to 3 (Seçer, 2013), it can be inferred that there are no significant multicollinearity issues. Secondly, the "tolerance" and "VIF" values were examined. The tolerance value should be far from zero, and the VIF value should be less than 10 (Pallant, 2017; Büyüköztürk, 2010). In this case, the tolerance is .89, and the VIF is 1.21, indicating that the obtained values are within the recommended range and that the dataset meets the necessary conditions for regression analysis.

FINDINGS

Correlation analysis

The correlation analysis was conducted to examine whether there is a significant relationship between variables. The analysis findings are presented in Table 2.

Table 2. Correlation among variables.

Variables	1	2	3
Cognitive flexibility	1		
Mindfulness	.33*	1	
Self-regulation	.59*	.51*	1

*p < .01

Upon examining Table 2, it can be observed that all three variables exhibit moderately positive and significant relationships with each other. In the subsequent step, multiple linear regression analysis was conducted to determine whether cognitive flexibility and self-regulation have a predictive effect on mindful awareness and self-regulation.

Regression analysis

Multiple linear regression analysis was conducted to ascertain whether cognitive flexibility and mindful awareness are significant predictors of self-regulation among university students. The findings of this analysis are presented in Table 3.

Table 3. Regression results using self-regulation as the criterion.

	β	Standard Error	Beta	t	Sig.	95% CI		sr	sr^2
						LB	UB		
Constant	28.912	4.010		7.209	<.001*	21.033	36.792		
Cognitive flexibility	.677	.049	.477	13.756	<.001*	.581	.774	.45	.20
Mindfulness	.507	.050	.350	10.076	<.001*	.408	.606	.33	.11

$R = .68$, $R^2 = .46$, $F = 214.034$, $*p < .01$
Note: (sr = semi partial correlation, sr^2 = semi-partial correlation squared)

Upon examining Table 3, it is evident that cognitive flexibility and mindfulness positively and significantly predict self-regulation among university students ($R = .68$, $R^2 = .46$, $F = 214,034$, $p < .01$). When examining the regression coefficients, it can be observed that the variables in the model (cognitive flexibility and mindfulness) explain 46% of the variance in self-regulation. This value holds significant importance.

When examining the predictor variables individually, it can be observed that the predictive power of cognitive flexibility (Beta = .48) in predicting self-regulation is greater than that of mindfulness (Beta = .35). This indicates that cognitive flexibility contributes more to the model. However, when looking at the significance levels, it can be observed that both variables are significant predictors of self-regulation ($p < .001$).

The square of the semi-partial correlation coefficient value in the findings indicates how much contribution that variable makes to the total R^2. In other words, this value shows what proportion of the variance in the dependent variable is explained by this variable and how much R^2 would decrease if this variable were not included in the model (Pallant, 2017). According to this, the semi-partial correlation value found for cognitive flexibility is .45, and its square is calculated as .20. Therefore, cognitive flexibility alone explains about 20% of the total variance in self-regulation. For mindfulness, the semi-partial correlation coefficient is .33, and when squared, it yields a value of .11 and this finding also demonstrates that mindfulness can account for approximately 11% of the variance in self-regulation on its own.

DISCUSSION AND CONCLUSION

This study conducted on university students examined the relationships between cognitive flexibility, mindfulness, and self-regulation. These three concepts are acknowledged in the literature as significant functions of the human mind and are emphasized for their importance in adaptation processes. While literature reveals various studies investigating these variables paired with different factors, only one study has been identified that simultaneously examines these concepts (Cognitive Flexibility, Mindfulness, and Self-Regulation) within the same research context (Doğan Laçin and Turp, 2022).

In this study, a moderate and significant relationship was found between cognitive flexibility and self-regulation. In addition, cognitive flexibility was identified as a significant predictor of self-regulation, explaining a substantial portion of the variance in self-regulation. This finding aligns with the outcomes of other studies that address self-regulation and cognitive flexibility. For instance, Isen (2000) discusses the relationship between positive affect and self-regulation, highlighting how positive affect supports motivation and cognitive flexibility, which in turn facilitates effective self-regulation. Walwanis and Ponto (2019) acknowledge that the structures supporting self-regulation are precursors to cognitive flexibility. For example, it is reasonable to assume that an individual with a strong belief in their ability to accomplish a task or high self-efficacy will exhibit greater cognitive flexibility when performing that task. Self-regulation inherently intersects with cognitive flexibility due to its goal-oriented nature. Self-regulation involves replacing habitual responses with goal-directed responses. If the current responses deviate from the goal, they are discontinued, and alternative responses are adopted. This not only requires cognitive flexibility but also contributes to the development of cognitive flexibility (Munakata et al., 2012). In their study, Ghosh and Halder (2020) found a significant relationship between another dimension of self-regulation, emotional regulation, and cognitive flexibility. They observed that a majority of young adults use the cognitive reappraisal process while engaging in emotional regulation. This indicates that these processes are interconnected and often co-occur in individuals' adaptive responses. McClelland and Cameron (2004) conveyed that research based on cognitive perspectives indicates that all components of executive function, such as attention, cognitive flexibility, working memory, and inhibitory control, contribute to successful self-regulation. It is also noted that attention-based flexibility serves as a mediator for early emotion regulation and school achievement in children. There is no literature evidence suggesting a lack of relationship or a negative relationship between cognitive flexibility and self-regulation.

In the current study, a moderate and significant positive relationship was found between mindfulness and self-regulation, and mindfulness was identified as a significant predictor of self-regulation. This finding aligns with similar results present in the literature. In two separate studies (Kabat-Zinn, 1982; Kabat-Zinn et al., 1985), researchers applied a mindfulness-based

meditation program to patients with chronic pain to educate them on self-regulation. They suggested that such a program could serve as an effective foundation for a behavioral program focused on self-regulation. Shapiro and Schwartz (2000) emphasize that self-regulation is based on feedback loops that can be improved through attention, and therefore, all self-regulation techniques include the enhancement of attention. Mindfulness also contributes to this goal of self-regulation. On the other hand, Feldman et al. (2007) found in their scale development and testing studies related to mindfulness that mindfulness is associated with problem-solving situations involving emotion regulation and cognitive flexibility. Very recently, Boockman and Yu (2023) conducted a literature review on mindfulness-based self-regulation interventions in children. They reported that the positive impact of mindfulness on self-regulation is particularly significant in children requiring additional support. Mindfulness-based practices have been highlighted to promote the development of self-regulation in both children and their caregivers. Similar research highlighting the positive relationship between mindfulness and self-regulation can be found in the literature (Shapiro et al., 2006; Masicampo and Baumeister, 2007; Friese and Hofmann, 2016; Kaunhoven and Dorjee, 2017; Leyland et al., 2019; Bröning and Brandt, 2022; Djernis et al., 2023; Arahuete and Pinazo, 2022; Ojell et al., 2023).

With the support of the above information, it can be stated as a result of the results of this study that cognitive flexibility and mindfulness are significant predictors of self-regulation, both individually and together. In the literature, there are also studies indicating that self-regulation acts as a mediator between successful identity development and well-being (Hofer et al., 2011), that children with low levels of self-regulation are at a greater risk of child abuse (Kim et al., 2012), that self-regulation-based therapy interventions support significant increases in psychological well-being, sense of autonomy, and self-acceptance levels (Mikaeili and Brahmand, 2013), that it is effective in reducing risky behaviors and has a protective quality (Quinn and Fromme, 2010) and that it plays a role in increasing academic achievement and motivational beliefs (Önemli and Yöndem, 2011; Tanrıseven and Dilmaç, 2013) and many other areas. Given this broad spectrum of self-regulation, considering the relationship between mindfulness, cognitive flexibility, and self-regulation in future studies related to self-regulation would likely enhance the effectiveness of these studies. Moreover, incorporating these variables in individual and group interventions aimed at enhancing self-regulation would further support our belief that these factors play a crucial role in such interventions.

This study has several limitations. Firstly, the study is limited to university students only. However, despite the increasing knowledge about the development of self-regulation, particularly at early ages, the processes and critical components are not yet fully clarified (McClelland and Tominey, 2011). Therefore, exploring the relationships between variables like self-regulation, cognitive flexibility, and mindfulness in the early stages could be beneficial. Another limitation is that the relationships in this study have been examined in a general context rather than within specific contexts. For a more detailed examination of self-regulation and its supporting factors, it is worth considering relationships in specific situations. For instance, the relationships and their effects discussed here could be further explored in situations like social media addiction, gambling addiction, or coping with traumatic experiences.

REFERENCES

Arahuete, L., and Pinazo, D. (2022). The effect of mindfulness training on the self-regulation of socio-moral thoughts. *Psychological Reports, 0*(0) doi: 10.1177/00332941221146702

Ay, İ. (2013). Öz düzenleme ölçeği kısa formunun Türk kültürüne uyarlanması: Geçerlik ve güvenirlik çalışması. Sözel bildiri. İstanbul 2013 Dünya Psikolojik Danışma ve Rehberlik Kongresi. İstanbul: Türkiye

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10,* 125-143. doi:10.1093/clipsy.bpg015

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., and Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27-45.

Baumeister, R. F. (2005). The cultural animal: Human nature, meaning, and social life. New York: Oxford University Press.

Bilgin, M. (2009). Developing a cognitive flexibility scale: Validity and reliability studies. *Social Behavior and Personality, 37*(3), 343-354.

Bockmann, J. O., and Yu, S. Y. (2023). Using mindfulness-based interventions to support self-regulation in young children: A review of the literature. *Early Childhood Education Journal, 51,* 693–703 doi: 10.1007/s10643-022-01333-2

Bonanno, G. A., and Burton, C. L. (2013). Regulatory flexibility: An individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science, 8*(6), https://doi.org/10.1177/1745691613504116

Bröning, S., and Brandt, M. (2022). Mindful parenting: Mindfulness in the parent-child relationship. *Zeitschrift fur Kinder- und Jugendpsychiatrie und Psychotherapie, 50*(5), 395-406 doi: 10.1024/1422-4917/a000853

Bürgler, S., Hoyle, R. H., and Hennecke, M. (2021). Flexibility in using self-regulatory strategies to manage self-control conflicts: The role of metacognitive knowledge, strategy repertoire, and feedback monitoring. *European Journal of Personality, 35*(6), 861–880. https://doi.org/10.1177/0890207021992907

Büyüköztürk, Ş. (2009). Bilimsel araştırma yöntemleri. Ankara: Pegem A.

Büyüköztürk, Ş. (2010). Sosyal Bilimler için veri analizi el kitabı. Ankara: Pegem Akademi

Büyüköztürk, Ş., Akgün, Ö. E., Karadeniz, Ş., Demirel, F., and Çakmak E. K. (2014). Bilimsel araştırma yöntemleri. Ankara: Pegem Akademi.

De Berardis, D., Fornaro, M., Orsolini, L., Ventriglio, A., Vellante, F., and Di Giannantonio, M. (2020) Emotional dysregulation in adolescents: Implications for the development of severe psychiatric disorders, substance abuse, and suicidal ideation and behaviors. *Brain Sciences, 10*(9), 591.

Djernis, D., Lundsgaard, C.M., Ronn-Smidt, H., and Dahlgaard J. (2023). Nature-based mindfulness: A qualitative study of the experience of support for self-regulation. *Healthcare, 11*(6), 905 doi: 10.3390/healthcare11060905

Febbraro, G. A. R., and Clum, G. A. (2007). Self-regulation theory and self-help therapies. In P. L. Watkins ve G. A. Clum (Eds.), Handbook of self-help therapies. (pp. 59-76). New York: Routledge.

Feldman, G., Hayes, A., Kumar, S., Greeson, J., and Lauranceau, J. P. (2007). Mindfulness and emotion regulation: The development and initial validation of the cognitive and affective mindfulness scale-revised (CAMS-R). *Journal of Psychopathology and Behavioral*

Assessment, 29, 177-190, doi: 10.1007/s10862-006-9035-8
Friese, M., and Hofmann, W. (2016). State mindfulness, self-regulation, and emotional experience in everyday life. *Motivation Science, 2*(1), 1-14 doi: 10.1037/mot0000027
George, D., and Mallery, P. (2019). IBM SPSS statistics 25 step by step: A simple guide and reference (15th ed.). New York, Routledge.
Ghosh, S., and Halder, S. (2020). Emotional regulation and cognitive flexibility in young adults. *Journal of Psychosocial Research, 15*(2), 609-617.
Grossmann, P., Niemann, Ludger., Schmidt, S., and Walach, H. (2004) Mindfulness-based stress reduction, and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57,* 35-43.
Gündüz, B. (2013). Bağlanma stilleri, akılcı olmayan inançlar ve psikolojik belirtilerin bilişsel esnekliği yordamadaki katkıları. *Kuram ve Uygulamada Eğitim Bilimleri, 13*(4), 2071-2085. doi: 10.12738/estp.2013.4.1702
Hofer, J., Busch, H., and Kartner, J. (2011). Self-regulation and well-being: The influence of identity and motives. *European Journal of Personality, 25,* 211-224.
Huguet, A., Izaguirre Eguren, J., Miguel-Ruiz, D., Vall Vallés, X., and Alda, J. A. (2019). Deficient emotional self-regulation in children with attention deficit hyperactivity disorder: Mindfulness as a useful treatment modality. *Journal of Developmental and Behavioral Pediatrics, 40*(6), 425-431. https://doi.org/10.1097/DBP.0000000000000682
Isen, A. M. (2000). Some perspectives on positive affect and self-regulation. *Psychological Injury, 11*(3), 184-187.
Izhar, L. I., Babiker, A., Rizki, E. E., Lu, C. K., and Abdul Rahman, M. (2022). Emotion self-regulation in neurotic students: A pilot mindfulness-based intervention to assess its effectiveness through brain signals and behavioral data. Sensors, *22*(7), 2703. http://dx.doi.org/10.3390/s22072703
Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4,* 33-47.
Kabat-Zinn, J. (1994). Wherever you go there you are. New York: Hyperion.
Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. Clinical Psychology: *Science and Practice, 10,* 144-156. doi:10.1093/clipsy.bpg016
Kabat-Zinn, J., Lipworth, L., and Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine, 8*(2), 163-190.
Karasar, N. (2014). Bilimsel araştırma yöntemi: Kavramlar, ilkeler teknikler. Ankara: Nobel Yayıncılık
Kaunhoven, R. J., and Dorjee, D. (2017). How does mindfulness modulate self-regulation in pre-adolescent children? An integrative neurocognitive review. *Neuroscience & Biobehavioral Reviews, 74,*163-184 doi: 10.1016/j.neubiorev.2017.01.007
Kim, J., Haskett, M. E., Longo, G. S., and Nice, R. (2012). Longitudinal study of self-regulation, positive parenting, and adjustment problems among physically abused children. *Child Abuse & Neglect, 36*(2), 95-107. doi:10.1016/j.chiabu.2011.09.016.
Leyland, A., Rowse, G., and Emerson, L. M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion, 19*(1): 108-122 doi: 10.1037/emo0000425
Mace, C. (2008). Mindfulness and mental health: Therapy, theory, and science. East Sussex: Routledge
Marcotte, J., and Levesque, G. (2018). Anxiety and well-being among students in a psychoeducation program: The mediating role of identity. *Journal of College Student Development, 59*(1), 90–104. https://doi.org/10.1353/csd.2018.0006
Martin, M. M., and Anderson, C. M. (1998). The cognitive flexibility scale: Three validity studies. *Communication Reports, 11,* 1-9.
Martin, T.R., Flett, G. L., Hewitt, P. L., Krames, L., and Szanto, G. (1996). Personality correlates of depression and health symptoms: A test of a self-regulation model. *Journal of Research in Personality, 30*(2), 264-277.
Masicampo, E. J., and Baumeister, R. F. (2007). Relating mindfulness and self-regulatory processes. *An International Journal of the Advancement of Psychological Theory, 18*(4), 255-258 doi: 10.1080/10478400701598363
McClelland, M. M., and Tominey, S. L. (2011) Introduction to the special issue on self-regulation in early childhood. *Early Education and Development, 22*(3), 355-359.
McKay, M., Lev, A., and Skeen, M. (2012) Acceptance and commitment therapy for interpresonal problems: Using mindfulness, acceptance and schema awareness to change interpersonel behaviors. Oakland: New Harbinger
Mikaeili, N., and Barahmand, U. (2013). Training in self-regulation enhances psychological well-being of distressed couples. *Procedia – Social and Behavioral Sciences, 84,* 66-69.
Miller, W. R., and Brown, J. M. (1991). Self-regulation as a conceptual basis for the prevention and treatment of addictive behaviours. In N. Heather, W. R. Miller and J. Greeley (Eds.). Self-Control and The Addictive Behaviours (pp. 3-79). Sydney: Maxwell Macmillan.
Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H. L., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., and Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of The National Academy of Sciences, 108*(7): 2693-2698. doi: 10.1073/pnas.1010076108
Moilanen, K. L. (2007). The adolescent self-regulatory inventory: The development and validation of a questionnaire of short-term and long-term self-regulation. *Journal of Youth and Adolescence, 36,* 835–848.
Montroy, J. J., Bowles, R. P., Skibbe, L. E., McClelland, M. M., and Morrison, F. J. (2016). The development of self-regulation across early childhood. *Developmental Psychology, 52*(11), 1744–1762.
Munakata, Y., Snyder, H. R., and Chatham, C. H. (2015). Developing cognitive control: Three key transitions. Current Directions in Psychological Science, 21(2), 71–77. doi: 10.1177/0963721412436807
Ojell, H., Palohuhta, M., and Ferreira, J. M. (2023). A qualitative microanalysis of the immediate behavioural effects of mindfulness practices on students' self-regulation and attention. Trends in Psychology. doi: 10.1007/s43076-023-00263-1
Opalinski, A. S., and Martinez, L. A. (2021). Mindfulness and self-regulation in a summer camp setting: An EBP project. Journal of Pediatric Nursing, 57, 73-78. https://doi.org/10.1016/j.pedn.2020.10.023
Önemli, M., and Yöndem, Z. D. (2012). The effect of psychoeducational group training depending on self-regulation on students' motivational strategies ends academic achievement. *Educational Sciences: Theory and Practice, 12*(1), 67-73.
Özyeşil, Z., Arslan, C., Kesici, Ş., and Deniz, M. E. (2011). Bilinçli farkındalık ölçeğini Türkçeye uyarlama çalışması. *Eğitim ve Bilim, 36*(160), 224-235.
Pallant, J. (2017). SPSS kullanma kılavuzu: SPSS ile adım adım veri analizi. (S. Balcı, Çev.). Ankara: Anı
Qualtrics (2023, August 14). Sample size calculator. Retrieved August 30, 2023, from https://www.qualtrics.com/blog/calculating-sample-size/
Quinn, P. D., and Fromme, K. (2010). Self-regulation as a protective factor against risky drinking and sexual behavior. *Psychology of Addictive Behaviors, 24*(3), 376-385.
Ramel, W., Goldin, P. R., Carmona, P. E., and McQuaid, J. R. (2004). The effects of mindfulness meditation on cognitive processes and affect in patients with past depression. *Cognitive Therapy and Research, 28*(4), 433-455.
Robson, D. A., Allen, M. S., and Howard, S. J. (2020). Self-regulation in childhood as a predictor of future outcomes: A meta-analytic review. *Psychological Bulletin, 146*(4), 324–354. doi: 10.1037/bul0000227
Roemer, L., and Orsillo, S. M. (2003) Mindfulness: A promising intervention strategy in need of further study. *Clinical Psychology: Science and Practice, 10,* 172-178. doi:10.1093/clipsy.bpg020
Rueda, M. R., Moyano, S., and Rico-Picó, J. (2023). Attention: The grounds of self-regulated cognition. *WIREs Cognitive Science*, *14*(1), e1582. https://doi.org/10.1002/wcs.1582
Seçer, İ. (2013). SPSS ve Lisrel ile pratik veri Analizi. Ankara: Anı
Shapiro, S. L., Carlson, L. E., Astin, J. A., and Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373-386 doi: 10.1002/jclp.20237
Shapiro, S. L., and Schwartz, G. E. R. (2000). Intentional systemic mindfulness: An integrative model for self-regulation and health. *Advances in Mind-Body Medicine, 16*(2), 128-134.
Spiro, R. J., Coulson, R. L., Feltovich, P. J., and Anderson, D. K.

(1988). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In R. B. Ruddell, M. R. Ruddell, & H. Singer (Eds.), Theoretical models and processes of reading (pp. 602–615). International Reading Association.

Spiro, R. J., Collins, B. P., Thota, J. J., and Feltovich, P. J. (2003). Cognitive flexibility theory: Hypermedia for complex learning, adaptive knowledge application, and experience acceleration. *Educational Technology, 43*(5), 5-10.

Stevenson, J.C., Millings, A., and Emerson, L. (2019). Psychological well-being and coping: The predictive value of adult attachment, dispositional mindfulness, and emotion regulation. *Mindfulness, 10,* 256–271. Doi: 10.1007/s12671-018-0970-8

Strait, J. E., Strait, G. G., McClain, M. B., Casillas, L., Streich, K., Harper, K., and Gomez, J. (2020). Classroom mindfulness education effects on meditation frequency, stress, and self-regulation. *Teaching of Psychology, 47*(2), 162–168. https://doi.org/10.1177/0098628320901386

Tabachnick, B., and Fidell, L. (2015). Çok değişkenli istatistiklerin kullanımı. Mustafa Baloğlu (Ed.) Ankara: Nobel.

Tang, Y. Y., Hölzel, B. and Posner, M. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience, 16,* 213–225. https://doi.org/10.1038/nrn3916

Tanrıseven, I., and Dilmaç, B. (2013). Orta öğretim öğrencilerinin insani değerleri, motivasyonel inançları ve öz düzenleme stratejileri arasındaki yordayıcı ilişkiler. *Kuram ve Uygulamada Eğitim Bilimleri, 13*(1), 21-36.

Vohs, K. D., and Baumeister, R. F. (2004). Understanding self-regulation: An introduction. In R. F. Baumeister and K. D. Vohs (Eds.). Handbook of self-regulation: Research, theory, and applications (pp. 1–9). New York: Guilford.

Walwanis, M. M., and Ponto, S. J. (2019). Clarifying cognitive flexibility from a self-regulatory perspective. In: Schmorrow, D., Fidopiastis, C. (Eds.). Augmented cognition. HCII 2019. Lecture Notes in Computer Science, vol 11580. Springer, Cham. Doi: 10.1007/978-3-030-22419-6_45

Wenzel, M., Bürgler, S., Rowland, Z., and Hennecke, M. (2023). Self-control dynamics in daily life: The importance of variability between self-regulatory strategies and strategy differentiation. European Journal of Personality, *37*(1), 33–56. https://doi.org/10.1177/08902070211043023

Citation: Ay, İ (2023). Exploring the relationship between cognitive flexibility and mindfulness with self-regulation in university students. African Educational Research Journal, 11(3): 460-467.