Research Paper

The Effect of Training Based on Metacognition and Emotion Regulation on Health Behavior Self-management of Overweight Middle-aged People

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ABSTRACT

Objective: The present study was conducted to find the effectiveness of training in metacognition and emotion regulation on the health behavior self-management of middle-aged overweight people and investigate the difference in the effectiveness of training based on metacognition and emotion regulation.

Methods: This research was a semi-experimental study with pre-test, post-test, and follow-up and two intervention groups and one control group. The participants were people referring to weight loss clinics in Tehran. Convenience sampling was done by inviting on social networks. The total number of the research sample was 57 people who were placed in two experimental groups of training based on metacognition (18 people), emotion regulation (19 people), and a control group (20 people). All three groups were first pre-tested for self-management of health behavior. Then, the two experimental groups received the desired intervention; metacognition training and emotion regulation, and then, all three groups were subjected to a post-test using Walker and Pender's lifestyle questionnaire, and the results of the two experimental groups and the control group were compared.

Results: The results showed that metacognition ($F_{(2, 34)}$=98.987, P<0.001, effect size=0.853) and emotion regulation ($F_{(2, 36)}$=118.450, P<0.001, effect size=0.868) were effective in health behavior self-management and increasing health behaviors in general. There was no significant difference between their effectiveness (P>0.211).

Conclusion: There are many theories to explain the principles used in health behavior and self-management to perform health behavior and promote and educate it. This research dealt with this category from the perspective of some of the principles of the third wave of cognitive behavioral therapy, and its results can be used in the formulation of health promotion training programs in healthcare systems. This research aimed to explain some of the individual and psychological aspects of health behavior. Specifically, the results of this research can be used in the prevention and treatment of overweight in institutions engaged in this field.

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Highlights

• Training based on metacognition and emotion regulation on health behavior self-management of overweight middle-aged people has been effective.

• Third-wave theories of cognitive-behavioral therapies should play a more important role in the basic theories of health behavior.

• Promoting healthy lifestyles is possible through improvement skills in the management of thoughts and emotions.

Plain Language Summary

Considering the importance of maintaining survival and the instinct of life which is the main driver in humans, avoiding disease and death, or in other words; Health is one of the topics that humans have been paying attention to since the beginning of time, and recommendations for health and maintaining health can be found in the oldest cultures and religions. Therefore, it may not be an exaggeration to say that health and performing behaviors to maintain health, in its basic sense, may be as old as the human species. But health and disease are far away from their initial definitions at the present time. According to the definition of the World Health Organization (WHO), wellness is not only the absence of disease or other defects in the body, but "the absence of any psychological, social, economic, or physical health problems for any member of society." In theories of health behavior, thinking (attitude and mental criteria) and emotion are common and one of the basic principles, or implicitly and in the concept of many theories of health behavior, so attitude and mental and cognitive criteria are the main factors of doing or quitting is a healthy behavior. Health-promoting behaviors have positive effects on the quality of life, so that people with healthy behaviors and a healthy lifestyle will have less illness and disability, and this can prevent and even treat physical and mental problems of people. Finding the factors that cause failure or success in the individual's self-management to perform health behaviors can be considered in developing comprehensive health promotion programs. This research aims to explain some of the individual and psychological aspects of health behavior. Specifically, the results of this research can be used in the prevention and treatment of overweight in institutions engaged in this field. The results of this research show that teaching thought and emotion management skills can help people create a healthy lifestyle.

1. Introduction

In theories of health behavior, thinking (attitude and mental criteria), emotion, and decision-making are common and one of the basic principles of health behavior theories. Therefore, attitude and mental and cognitive criteria are the main factors in performing or abandoning a healthy behavior (Schwarzer, 2008). Consequently, one of the issues that are emphasized in all models and theories is that in order to change behavior, cognition must be changed, and in other words, modification of the content of thinking is essential, which seems obvious due to the formation of these theories in the atmosphere of the second generation of cognitive behavioral therapies. According to the assumptions of the third-wave cognitive behavioral therapies, such as the assumption that the main source of psychological damage is the style and the way a person faces thinking and emotion, this question is raised to make decision to perform a health behavior and continue with it: Are these assumptions of the third-wave cognitive behavioral therapy effective?

According to many researchers, the current theories that explain health behavior have many strengths and weaknesses. For example, Sharma (Sharma, 2015) is one of the researchers who worked in this field. According to him, these theories and models do not lead to the maintenance of the behavior and do not have constant predictive power. They are too comprehensive and impractical, but not economical, and often describe behavior (Barati & Abbasi, 2017). The term, metacognition, was first proposed by Flavell (Flavell, 1976). He considered metacognition knowledge about cognition. The beliefs that people have about their thinking are called metacognition. The reflection of humans on their mental processes, and thinking about thinking is called metacognition. Metacognition has been regarded as a means of manipulating and organizing cognitive processes (Abbabaf, 2008; Seyed Mohammadi, 2018). In general, metacognitive therapy is based on this fundamental principle that psychological disorder persists due to the effects of thinking style, i.e. cognitive-attentional syndrome in emotional experiences and knowledge(s)

(Wells, 2015). This model offers several methods that focus on putting aside the cognitive syndrome of attention, modifying metacognitive beliefs, shaping a different way of experiencing, and relating to internal events (Wells & Sembi, 2014). It is a process, in which people adjust their emotions consciously and unconsciously in order to best respond to the needs and changes of their environment (Gross, 1998). Emotion regulation is defined as the process of initiating, maintaining, adjusting, or changing the intensity or persistence of a person's internal emotion. Also, emotion regulation is related to social, psychological, and physical processes to achieve one's goals. Six methods (strategies) of emotion regulation are reinterpretation, acceptance, problem-solving, avoidance, rumination, and emotion controlling (suppressing). The first three methods are effective and the second three methods are ineffective and lead to psychological harm (Mohammadi et al., 2015). Emotion regulation training is considered a basic element in most of the new cognitive behavioral therapies known as the third-generation (Mohammadi et al., 2015). Emotion regulation and well-being are two interrelated concepts from different aspects. These two concepts are triggered by similar brain regions that are involved in interactive behavior with others. In addition, these two affect optimal and non-optimal performance, psychopathology, social isolation, and physical symptoms (Nykliček et al., 2011). The relationship between variables, such as metacognition or emotion regulation with a health behavior or the effect of an intervention on a disease related to an unhealthy lifestyle, such as overweight, has been assessed (Allen &Woolfolk, 2010; Morawetz et al., 2020; Mucha et al., 2020). In this research, the management of health behavior, or in other words, a set of health behaviors, was discussed.

Addressing the issue of health behavior from the point of view and with the presuppositions of other approaches plays an important role in promoting health as well as managing the treatment of chronic diseases and increasing the ability of a person to maintain and improve health (Mirzapour et al., 2021). Therefore, finding factors that cause failure or success in self-management can be considered in developing comprehensive health promotion programs.

Today, one of the most critical trends and plans of healthcare systems, health education, can increase health literacy to encourage people to perform healthy behavior and self-management in three stages: Prevention, treatment, and prevention of recurrence in both chronic and acute diseases. Similarly, in the recent COVID-19 epidemic, the most effective human weapon against the spread of this disease was the daily behavioral changes of the people. There are many theories to explain the principles used in health behavior and self-management to perform health behaviors and promote and educate them. This research deals with this category from the perspective of some principles of the third-wave cognitive behavioral therapy. Its results can be used in developing health promotion training programs in healthcare systems. The general aim of the research was to compare the effect of metacognition training and emotion regulation on the self-management of health behavior of overweight middle-aged people.. Based on the main hypothesis of this research, training based on metacognition and emotion regulation is effective in the self-management of health behavior in overweight middle-aged people. The difference between this research and similar research is that in addition to examining the effectiveness of two approaches of the third-generation cognitive behavioral therapies, it also compares the effectiveness of these two methods, and they can create a new model in health behavior theories.

2. Materials and Methods

This research was a semi-experimental study of pretest post-test and follow-up types with intervention and control groups.

Sampling was done using the convenience sampling method by inviting people to five weight loss clinics. The participants were people referring to weight loss clinics in Tehran. The process of sample selection grouping and intervention was carried out from November 2021 to February 2022 in Tehran. The initial stage of sampling was in person and the intervention was done online due to the COVID-19 epidemic in eight sessions and each session lasted for one hour and a half. The inclusion criteria were: 1- The age range was between 45 and 65 years old (middle age range) according to Erikson's theory (Seyed Mohammadi, 2018). 2- Body mass index (BMI) was between 25 and 29 kg/m^2 (overweight) (Sanderson, 2018). 3- The minimum level of education was the graduation from the secondary school.

Exclusion criteria were: 1- Medical history of visiting a neurologist and taking neuropsychiatric drugs, 2- A history of taking corticosteroids, 3- A history of drug and stimulant abuse or dependence on sleeping pills or alcohol dependence, 4- A history of childhood obesity before ten years old, 5- Overweight caused by physical diseases, such as diabetes, hypothyroidism, Cushing's syndrome, growth hormone disorder (nanism), and polycystic ovary syndrome.

The number of samples: The sample size for each intervention and control group was considered to be 20 people. Due to the uncertainty of the sample variance, according to Dr. Delavar's recommendation in his book (Delavar, 2019) (the topic of sample size), which mentions the sample size of at least 15 people in the experimental research, the sample size for each intervention and control group was considered to be 20 people. Two people in the metacognition group and one in the emotion regulation group were excluded from the study (one of them due to unwillingness to continue the sessions and two due to illness and absence of more than two sessions). The total number of the research sample was 57 people who were placed in two experimental groups receiving metacognition (18 people) or emotion regulation (19 people), and a control group (20 people).

The groups in the study were tested in three phases: Pre-test, post-test, and follow-up. For all three groups, first, a pre-test of self-management of health behavior was performed.

Walker and Pender's health-promoting lifestyle questionnaire (Walker et al., 1987) measures health-promoting behaviors in six dimensions: Nutrition, exercise, health responsibility, stress management, interpersonal support, and self-actualization and questions show positive actions and perceptions in order to increase health and well-being. The validity and reliability of this questionnaire, which has been used in many types of research in the world and Iran, is acceptable. The Cronbach's α for the whole scale is 0.922; Cronbach's α for the subscales range from 0.702 to 0.904 (Walker et al., 1987). The validity and reliability of the Persian version of this questionnaire were investigated in a research (Mohammadi Zeidi et al., 2011). In this study, the Cronbach's α coefficient for the whole instrument was 0.82 and for subscales was from 0.64 to 0.91. All items had acceptable correlations (greater than 0.34).

Then, the intended intervention, which was metacognition training and emotion regulation, was performed, and in the end, the three groups were subjected to the post-test of health behavior self-management. Finally, the results of the experimental groups and the control group were compared two by two. The intervention was conducted online and the summary of the intervention in the meetings is mentioned in Table 1 and Table 2.

3. Results

First hypothesis: Training based on metacognition is effective in health behavior self-management of overweight middle-aged people.

Second hypothesis: Education based on emotion regulation is effective in self-management of health behavior among overweight middle-aged people.

Repeated-measures analysis of variance (ANOVA) was used to test these hypotheses and the scores of the tests were compared in three stages: Pre-test, post-test, and follow-up. Before conducting the main tests, descriptive indicators and presuppositions of these tests were checked.

Descriptive findings of the hypotheses

Table 3 shows the mean and standard deviation of the self-management variable in the experimental groups in the pre-test, post-test, and follow-up stages.

Table 3 shows that the mean score of self-management of health behavior increased in the post-test and follow-up phase compared to the pre-test phase.

Assumptions of the hypotheses analysis

A) Normality of data distribution: Shapiro-Wilk test was used to check the normality of data distribution. The Shapiro-Wilk values related to the self-management in both groups in all three stages of pre-test, post-test, and follow-up were insignificant at the 0.05 level. This shows the normal distribution of data in all three stages.

B) Presumption of sphericity: Mochli's test was used to check this presumption. The result of this test showed that there was a presumption of sphericity in the data in the meta-cognition ($P=0.766$, $x^2=0.533$) and emotion regulation ($P=0.159$, $x^2=3.68$) groups.

Table 4 shows the results of repeated-measures ANOVA for the self-management.

Based on the results obtained from repeated-measures ANOVA, there was a significant difference in the mean score of self-management of health behavior in the pre-test, post-test, and follow-up in the experimental groups. The value of Eta-squared shows that about 85% of the variance of the self-management was explained by metacognition-based training and shows that about 87% of the variance of the self-management was explained by education based on emotion regulation. To determine this significant difference in which stage, the Bonferroni

Table 1. Metacognitive intervention: Outlines and goals in metacognitive intervention sessions

Session	Goal	Content
1	Introduction	Introducing people and the therapist, group rules, treatment contract, formulation and goals, introducing the model and preparation
2	Mindfulness	Mindfulness, definition and practice, postponement of worry, ATT technique
3	Modifying negative meta-cognitive beliefs	Modifying negative metacognitive beliefs about uncontrollability and the danger of stuck thinking as a means of achieving changes
4	Modifying positive meta-cognitive beliefs	Modifying an inappropriate coping strategy in response to unwanted thoughts or feelings
5	Cognitive defusion	Cognitive defusion using techniques, such as free association and various metaphors
6	Refocusing situational attention	Changing the maladaptive attention strategy and modifying the attention strategy in dealing with attentional cognitive syndrome
7	Meta-emotion	Changing the strategy of dealing with negative emotions
8	Summarizing and developing new designs	Summarizing the review of the contents of presenting new plans for thought and emotion processing

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post hoc test was used with type 1 error correction. The results of the pairwise comparison of the stages of the research are reported in Table 5.

Table 5 indicates that the difference in the mean score of self-management of health behavior in the pre-test stage compared to the post-test and pre-test stage and the follow-up was statistically significant. But there was no significant difference between the post-test and the follow-up stages. This shows that the results obtained during the follow-up stage were stable.

Table 2. Emotion regulation intervention: Outlines and goals in emotion regulation intervention sessions

Session	Goal	Content	Description of the Session
1	Introduction	Introducing	Introducing the group members with each other and the researcher, expressing the framework and rules of participation in the group, expressing the main and sub-goals of the group and members' discussion about personal goals, expressing the logic and steps of the intervention
2	Recognition of emotion	Providing emotional education	Recognition of emotion and its types and facial, physical, cognitive, and motivational dimensions of emotion, situations that provoke emotion (triggers of emotion), the effects of appropriate and inappropriate regulation of emotion over time
3	Change position (choose position)	Creating a change in an exciting situation	Training how to regulate emotion at the beginning of the process by choosing a situation that starts excitement
4	Change position (correct position)	Creating a change in the situation arousing emotions	Training how to regulate emotion at the beginning of the emotion triggering process by modifying the situation that triggers emotion
5	Attention and establishment of attention	Mindfulness	Training awareness to deal with avoidance and rumination and mental preoccupation
6	Cognitive modifying	Reappraise	Training cognitive reappraise of the situation and modification of cognition and cognitive errors of acceptance and avoidance of denial
7	Change and modify the answer	Training to modify and change the method of emotion suppression	Training the emotion inhibition strategy and examining its emotional consequences, replacing appropriate methods, such as exposure, relaxation, and reverse action, acceptance, and committed action
8	Summary and evaluation	Evaluation and prevention of relapse and return	Summarizing and reviewing the summary of the contents, application of the contents in normal life, and re-evaluation

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Table 3. Descriptive Indicators of the self-management by the stages of the research

Groups	Mean±SD		
	Pre-test	Post-test	Follow-up
Metacognition group	128.0556±6.54821	154.055±6.16892	152.833±8.55604
Emotion regulation group	125.1579±8.40809	150.842±4.4507	149.684±5.83145

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Table 4. The results of repeated-measures analysis of variance to investigate the difference in self-management of health behavior scores in three stages

Groups	Source	Sum of Squares	Degree of Freedom	Mean Square	Value	P	Eta-squared
Meta-cognition	The effect of time	7748.593	2	3874.296	98.987	0.000	0.853
	Error	1330.741	34	39.139			
Emotion regulation	The effect of time	7996.211	2	3998.105	118.450	0.000	0.868
	Error	1215.123	36	33.753			

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4. Discussion

The results showed that the mean difference in the health behavior self-management scores in the pre-test than in the post-test and in the pre-test than in the follow-up in both metacognition and emotion regulation training groups were statistically significant. But there was no significant difference between the post-test and the follow-up. Based on this result, metacognition and emotion regulation training is effective in improving health behavior.

The result about metacognition is in agreement with previous results (Castro Muñoz et al., 2021; Lenzo et al., 2020; Nameni et al., 2017; Palmieri et al., 2021; Cinar & Schou, 2014) and the result about emotion regulation training is in agreement with that of other studies (Miller et al., 2018; Morawetz et al., 2020; Pachón-Basallo et al., 2021; Steward et al., 2019; Gomez & Perez, 2020; Isasi et al., 2013; Ferrer & Mendez, 2018; Babaei et al., 2021). To explain the results obtained about metacognitive training, it can be said that according to the theory of self-regulation of executive function (S-REF), metacognitive training affects self-regulation through negative relationship with cognitive attention syndrome (CAS) and self-regulation has a positive relationship with self-efficacy (Kaplan, 2008; Salari Far & Mazaheri, 2010; Cera et al., 2013; Pour vakhshoori et al., 2011). The self-regulation structure enables people to develop their goal orientation in the learning process and provides oppor-

Table 5. Bonferroni test to compare self-management mean scores

Variables	Groups	Stage	Mean±SE	P	Lower Limit	Upper Limit
Self-management	Meta-cognition	Pre-test	-26.000±1.887*	0.000	-31.011	-20.989
		Post-test	-24.778±2.172*	0.000	-30.543	-19.012
		Follow-up	1.222±2.184	1.000	-4.575	7.020
Self-management	Emotion regulation	Pre-test	-25.684±2.207*	0.000	-31.509	-19.859
		Post-test	-24.526±1.905*	0.000	-29.553	-19.500
		Follow-up	1.158±1.470	1.000	-2.720	5.036

*The difference between the value in pre test, post test and follow up.

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tunities for them to actively evaluate and monitor their thought processes. This can increase self-efficacy, which plays an essential role in influencing the adaptation, initiation, and maintenance of health behaviors as well as curbing unhealthy practices (Abdulkarimi et al., 2016; Samadi et al., 2019). The relationship between emotion regulation and health behaviors can be examined from two aspects: Addictive behaviors and self-efficacy. Addictive unhealthy behaviors are actually an inefficient method of emotion regulation, which is called avoidance. When a person uses effective methods of emotion regulation, he will not need using the avoidance method; thus, performing these behaviors will decrease (Steward et al., 2019). On the other hand, emotion regulation increases self-efficacy. Proper emotion regulation makes a person use better coping methods, such as problem-solving in stressful cases. Also, emotion regulation improves a person's social behavior because being receptive toward others and being extroversion requires reducing negative feelings and mental ruminations in social communication. Therefore, by receiving positive feedback from problem-solving and appropriate social behavior, a person will have a higher self-efficacy and will be more successful in starting and continuing healthy behaviors. Regarding the effectiveness of these two methods (Gutiérrez-Doña et al., 2009; Javidan et al., 2018), there was no significant difference between their effectiveness. In explaining the reason for this similarity, the researcher searched up to 40 pages in the Google engine and did not find any similar research, and therefore, he put forward hypotheses, such as:

1- Although the used tool to assess health behavior self-management has sufficient validity, has no sufficient sensitivity to measure the difference in the groups; therefore, there were differences in the both intervention groups (metacognition and emotion regulation groups), but this difference was lower than the sensitivity of the measurement tool and both groups showed the same results. 2- Another more probable hypothesis is that both intervention methods, i.e. metacognition and emotion regulation, influence health behavior through another variable; for example, self-efficacy. Therefore, both intervention methods caused a change in another variable, which led to the improvement of health behavior. and this assumption can be another research field. 3- Two methods were equally effective.

5. Conclusion

Factors or obstacles against behavior change are one of the most fundamental psychological issues with a specific hypothesis to be explained by all psychological approaches and trends. Behaviors related to health and lifestyles are no exception to this rule.

In health behavior theories, various viewpoints and theories are expressed in explaining the cause of existence and the formation or change of behavior, but the change and modification of thinking is one of the issues that are emphasized in all models and theories in order to change behavior. It is caused by the formation of these theories in the atmosphere of the second wave of cognitive and behavioral therapies. With the formation of the third-wave cognitive-behavioral therapies, concepts, such as acceptance, attention, awareness, and observation of emotion and non-avoidance expressed in the form of different approaches and techniques, including metacognition and emotion regulation, play an important role in improving cognition and behavior modification. Therefore it seems that the concepts of the third-wave theories of cognitive-behavioral therapies should play a more important role in the basic theories of health behavior and this type of view may lead to the formation of new models and theories in health psychology.

Limitations

1- One of the major limitations of this study is its cross-sectional nature, although a 3-month follow-up study was also conducted, long-term studies are needed to check the stability of the intervention over a longer period. 2- The limitation of the causal explanation of correlational studies is also one of the limitations of this research. 3- The tool used in this research was based on self-report, and this is one of the limitations of this research that needs to be noted.

Suggestions

1- The effect of other approaches of the third-wave cognitive behavioral therapies on the promotion of health behaviors should be evaluated and investigated.

2- Health behaviors were investigated with a general title and a set of several behavioral fields, such as sports, nutrition, etc.; it is suggested that each behavioral field be researched alone.

3- The results of this research can be used in the preparation of protocols for the prevention and treatment of overweight in relevant institutions.

Ethical Considerations

Compliance with ethical guidelines

The present study was confirmed by the Ethics Committee of Islamic Azad University, Tehran Medical Sciences (Code: IR.IAU.TMU.REC.1400.228).

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Authors' contributions

Conceptualization, methodology and supervision: Narges Babakhani and Peyman Hassani Abharian; Writing the original draft, data collection and data analysis: Mehdi Mehraban Eshtehardi; Review & editing: Mehdi Mehraban Eshtehardi and Narges Babakhani.

Conflict of interest

The authors declared no conflict of interest.

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References

Abbabaf, Z. (2008). [Comparing the cognitive and metacognitive strategies of middle school students by ability level, field of study and gender and offering suggestions in the field of curriculum (Persian)]. *Educational Innovations*, 7(25), 119-150. [Link]

Allen, L. A., & Woolfolk, R. L. (2010). Cognitive behavioral therapy for somatoform disorders. T*he Psychiatric Clinics of North America, 33*(3), 579–593. [DOI:10.1016/j.psc.2010.04.014] [PMID]

Abdolkarimy, M., Zareipour, M., Mahmoodi, H., Dashti, S., Faryabi R., & Movahed E. (2017). [Health promoting behaviors and their relationship with self-efficacy of health workers (Persian)]. *Iran Journal of Nursing, 30* (105), 68-79. [DOI:10.29252/ijn.30.105.68]

Babaei, S., Asgharnejad Farid, A. A., Fathali Lavasani, F., & Birashk B. (2021). A comparative study on emotional regulation in males with internet addiction, food addiction, opioid dependence and normal peers (Persian). *Iranian Journal of Psychiatry and Clinical Psychology, 26*(4), 432-447. [Link]

Barati, M., & Abbasi, H. (2017). [Multi-theory model for changing health behavior: Evolutionary process and strengths and weak points (Persian)]. *Journal of Education and Community Health, 6*(1),1-2. [DOI:10.29252/jech.6.1.1]

Castro Muñoz, J., Hernández-Pozo, M., & Barahona Torres, I. (2021). Metacognition and Self-determination, Impulsivity and Emotional intelligence, and its relation with wellbeing and health indicators in young adults. *Interacciones, 7,* e216. [Link]

Cera, R., Mancini, M., & Antonietti, A. (2013). Relationships between metacognition, self-efficacy and self-regulation in learning. *Journal of Educational, Cultural and Psychological Studies (ECPS Journal), 7*(7), 115-141. [DOI:10.7358/ecps-2013-007-cera]

Cinar, A. B., & Schou, L. (2014). The role of self-efficacy in health coaching and health education for patients with type 2 diabetes. *International Dental Journal, 64*(3), 155-163. [PMID] [PMCID]

Delavar, A. (2007). [*Research method in psychology and educational sciences* (Persian). Tehran: Virayesh. [Link]

Ferrer, R. A., & Mendes, W. B. (2018). Emotion, health decision making, and health behaviour. *Psychology & Health, 33*(1), 1–16. [DOI:10.1080/08870446.2017.1385787] [PMID]

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. B. Resnick (Ed.), *The nature of intelligence* (pp. 231-236). New Jersey:Lawrence Erlbaum. [Link]

Gómez-Acosta, A., & Londoño Pérez, C. (2020). Emotion regulation and healthy behaviors of the body energy balance in adults: A review of evidence. *Acta Colombiana de Psicología, 23*(2), 349-365. [DOI:10.14718/acp.2020.23.2.14]

Gross J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*(1), 224-237. [DOI:10.1037//0022-3514.74.1.224] [PMID]

Gutiérrez-Doña, B., Lippke, S., Renner, B., Kwon, S., & Schwarzer, R. (2009). Self-efficacy and planning predict dietary behaviors in Costa Rican and South Korean women: Two moderated mediation analyses. *Applied Psychology: Health and Well-Being, 1*(1), 91-104. [DOI:10.1111/j.1758-0854.2008.01001.x.]

Isasi, C. R., Ostrovsky, N. W., & Wills, T. A. (2013). The association of emotion regulation with lifestyle behaviors in inner-city adolescents. *Eating Behaviors, 14*(4), 518–521. [DOI:10.1016/j.eatbeh.2013.07.009] [PMID] [PMCID]

Javidan, S., Hossein Khanzadeh, A. A., & Abolghasemi, A. (2018). Effectiveness of meta-cognitive skills training on self-handicapping and self-efficacy of students. I*ranian Rehabilitation Journal, 16*(1), 69-76. [Link]

Kaplan, A. (2008). Clarifying metacognition, self-regulation, and self-regulated learning: What's the purpose? *Educational Psychology Review,* 20, 477-484. [Link]

Lenzo, V., Sardella, A., Martino, G., & Quattropani, M. C. (2020). A systematic review of metacognitive beliefs in chronic medical conditions. *Frontiers in Psychology, 10,* 2875. [DOI:10.3389/fpsyg.2019.02875] [PMID] [PMCID]

Miller, A. L., Gearhardt, A. N., Fredericks, E. M., Katz, B., Shapiro, L. F., & Holden, K., et al.(2018). Targeting self-regulation to promote health behaviors in children. *Behaviour Research and Therapy, 101,* 71–81. [DOI:10.1016/j.brat.2017.09.008] [PMID] [PMCID]

Mirzapour, P., Zangeneh Motlagh, F., SeyedAlinaghi, S., & Mehraeen, E. (2022). Comparison of the effectiveness of group training in a positive approach and acceptance and commitment treatment on psychological well-being and resilience in people with HIV. *EBNESINA*, 24(3), 36-43. [DOI:10.22034/24.3.36]

Mohammadi, A., Zargar, F., Omidi, A., Mehrabi, A., & Akbari, M. (2015). *[An introduction to the third generation of cognitive behavioral therapy* (Persian)]. Tehran: Arjmand. [Link]

Mohammadi Zeidi I, Pakpour Hajiagha A, Mohammadi Zeidi B. (2011). [Reliability and validity of Persian version of the health-promoting lifestyle profile (Persian). J*ournal of Mazandaran University of Medical Sciences, 20*(1), 102-113. [Link]

Morawetz, C., Steyrl, D., Berboth, S., Heekeren, H. R., & Bode, S. (2020). Emotion regulation modulates dietary decision-making via activity in the prefrontal-striatal valuation system. *Cerebral Cortex, 30*(11), 5731-5749. [DOI:10.1093/cercor/bhaa147] [PMID] [PMCID]

Mucha, M., Wiśniewska, M., & Nęcka, E. (2020). Time perspective and self-control: Metacognitive management of time is important for efficient self-regulation of behavior. *Current Issues in Personality Psychology, 8*(2), 83-91. [Link]

Nameni, E, Shirdel, M., & Jahangiri, A. (2017). [The study of effectiveness metacognitive techniques education on life style of married women nurses in Bojnoord (Persian)]. J*ournal of North Khorasan University of Medical Sciences, 9*(1),135-146. [Link]

Nykliček, I., Vingerhoets, A. D., & Zeelenberg M. (2011). *Emotion regulation and well-being*. Springer: Berlin. [DOI:10.1007/978-1-4419-6953-8]

Pachón-Basallo, M., de la Fuente, J., & Gonzáles-Torres, M. C. (2021). Regulation/Non-Regulation/Dys-Regulation of health behavior, psychological reactance, and health of university undergraduate students. *International Journal of Environmental Research and Public Health, 18*(7), 3793. [PMID] [PMCID]

Palmieri, S., Gentile, N., Da Ros, A., & Spada, M. M. (2021). Profiling metacognition in binge eating disorder. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 39,* es163–171. [Link]

Pour vakhshoori, N., Pasha. A., Ghanbari, A., & Atrkar Roshan, Z. (2011). [Relationship between self-efficacy and health behaviors of faculty members of Guilan University of Medical Science (Persian)]. *Iran Journal of Nursing, 24*(70), 39-48. [Link]

Salarifar, M. H., & Mazaheri, M. A. (2011). [The relationship of metacognition and metaphor with self-regulation (Persian)]. *Advances in Cognitive Science, 12*(4), 60-68. [Link]

Samadi, S., Mousavi, S., Akbari, B., & Rezaei, S. (2019). [The effectiveness of self-efficacy training on self-regulation and health behaviors of procrastinating students (Persian)]. *Biannual Cognitive Strategies in Learning, 8*(14), 111-137. [Link]

Sanderson, C. A. (2018). *Health psychology: Understanding the mind-body connection*. California: SAGE Publications. [Link]

Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology, 57*(1), 1-29. [DOI:10.1111/j.1464-0597.2007.00325.x]

Seyed Mohammadi, Y. (2018). [*Developmental psychology from conception to childhood* (Persian)]. Tehran: Arasbaran Publishing.

Sharma, M. (2015) Multi-Theory Model (MTM) for health behavior changes. *WebmedCentral Behaviour, 6*(9),WMC004982. [Link]

Steward, T., Picó-Pérez, M., Mestre-Bach, G., Martínez-Zalacaín, I., Suñol, M., & Jiménez-Murcia, S., et al. (2019). A multimodal MRI study of the neural mechanisms of emotion regulation impairment in women with obesity. *Translational Psychiatry, 9*(1), 194. [DOI:10.1038/s41398-019-0533-3.] [PMID] [PMCID]

Walker, S. N., Sechrist, K. R., & Pender, N. J. (1987). The health-promoting lifestyle profile: Development and psychometric characteristics. *Nursing Research, 36*(2), 76–81. [DOI:10.1097/00006199-198703000-00002] [PMID]

Wells A, Sembi S, (2014). Meta cognitive therapy for PTSD: A preliminary investigation of a new brief treatment. Journal of Behavior Therapy and Experimental Psychiatry, 35(4), 307-18. 15530845. [DOI:10.1016/j.jbtep.2004.07.001] [PMID]

Wells, A. (2015). *Meta-cognitive therapy: A practical guide, Ch.9: Major depressive disorder*. New York: Guilford Press.

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