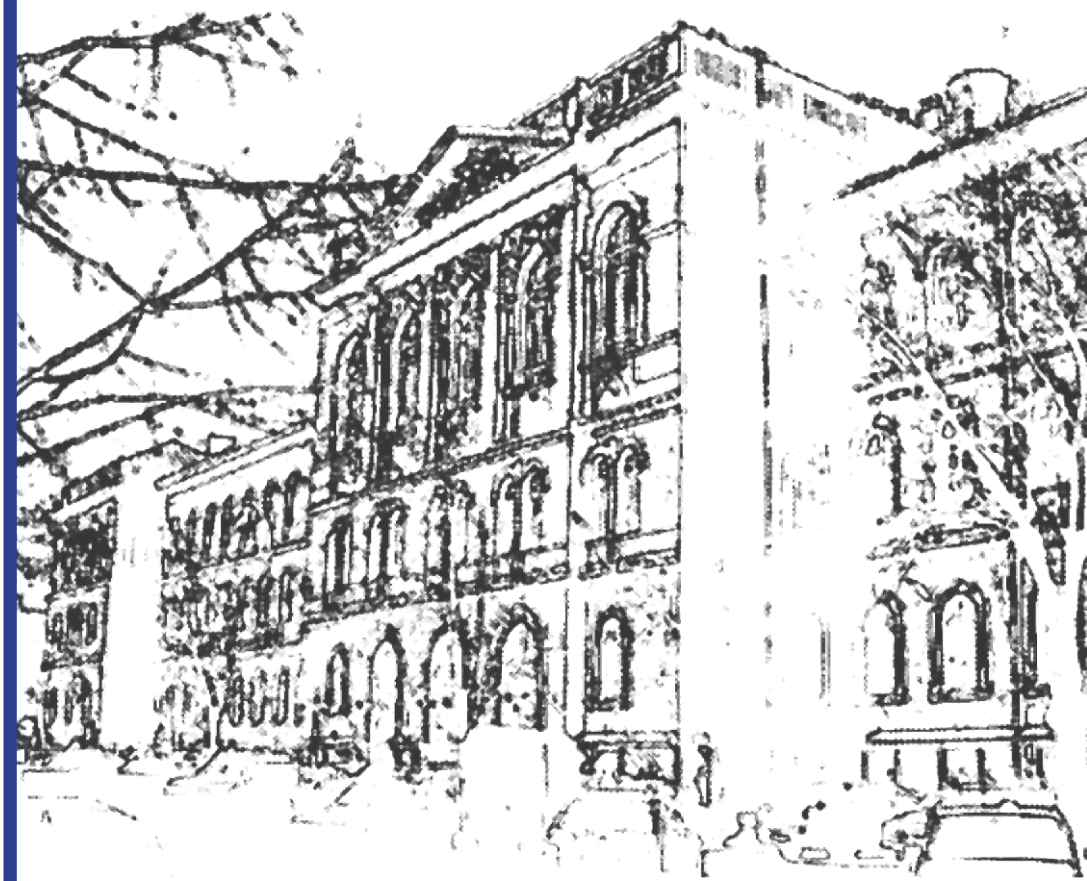
1

March 2025

Volume XXV, Number 1

The Official Journal of the
International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health
(IIAS of PAMH)

JOURNAL OF EVIDENCE-BASED PSYCHOTHERAPIES



Presa Universitară Clujeană

Journal of Evidence-Based Psychotherapies is the successor of the Journal of Cognitive and Behavioral Psychotherapies (2001-2013) and is published biannually (in March and September) in one volume per year by the International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health. The journal is devoted to the advancement of the clinical theory and practice of evidence-based psychotherapies (EBP) (e.g., evidence-based psychological assessments, evidence-based psychological treatments). The journal publishes original papers dealing with EBP and psychology, psychiatry, the medical and mental specialties, and allied areas of science. Submissions include (1) articles referring to clinical and experimental studies, discussions of theory, and systematic reviews for inclusion in Article Section, (2) articles referring to clinical discussions/developments for inclusion in the Clinical Forum Section, and (3) commentaries, letters to the editor, reviews and abstracts of books, tapes, and films, salient findings in EBP, and other information relevant to the journal's goal for inclusion in the Development and Resources Section. Finally, the journal seeks to publish special issues devoted to topics of particular interest, suggestions for which are welcomed by the Editor.
Indexed in: (1) Abstracted: Thomson ISI Web of Science/SSCI; SCOPUS; PsycINFO; and International Bibliography of Social Science; **(2) Full text**: EBSCO, ERIH+, and ProQuest

JOURNAL OF EVIDENCE-BASED PSYCHOTHERAPIES

VOLUME 25 MARCH 2025 NUMBER 1

CONTENTS

ARTICLES SECTION

The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health (IIAS of PAMH) is a research Institute of the Babes-Bolyai University (BBU), located in Cluj-Napoca, Romania. Babes-Bolyai University is one of the oldest, most prestigious, and influential academic settings in Romania and in the Eastern-Central Europe (http://www.ubbcluj.ro). It has been almost four centuries since the beginnings of this university of Cluj-Napoca. The first project to set up a higher education institution in Cluj-Napoca was recorded in 1565, and in 1581 it was set up an academic college, organized and run by Jesuits. Since then, Babes-Bolyai University has become a modern institution which acquired a remarkable fame by its long-time achievements at national and international level. The Institute will invite as affiliates/partners prestigious organizations involved in the development of psychotherapy and applied mental health interventions. IIAS of PAMH aims to promote advanced study and scholarship in applied mental health by research.

Specific information and more detailed information about IIAS of PAMH may be obtained by visiting our website at: http://www.psychotherapy.ro or by emailing us to internationalinstitute@psychology.ro

ISSN: 2360 – **0853**
ISSN-L: 2360 – **0853**

Universitatea Babeş-Bolyai
Presa Universitară Clujeană
Director: Codruţa Săcelean
Str. B.P. Hasdeu nr. 51
400371 Cluj-Napoca, România
Tel./Fax: (+40)-264-597.401
E-mail: editura@ubbcluj.ro
http://www.editura.ubbcluj.ro

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 1-28.

10.24193/jebp.2025.1.1

THE EFFECT OF A COGNITIVE-BEHAVIORAL THERAPY-BASED E-PSYCHOLOGICAL SUPPORT PROGRAM FOR HEALTHCARE PROFESSIONALS DURING THE COVID-19 PANDEMIC: A RANDOMIZED CONTROLLED TRIAL

Fulya Türk[1], Aykut Kul[2], Zeynep Hamamcı[3], Mehmet Zihni Sungur[4], Şengül Kocamer Şahin[5], Gülçin Elboğa[6]*

[1] Yildiz Technical University, Faculty of Education, Department of Guidance and Psychological Counseling. (fulya.turk@yildiz. edu.tr) Orcid: 0000-0003-1896-8418
[2] Gaziantep University, Faculty of Education, Department of Guidance and Psychological Counseling. (aykutkul92@gmail.com) Orcid: 0000-0002-2851-2222
[3] University of Beykoz, Faculty of Social Sciences, Department of Psychology. (zhamamci@gmail.com) Orcid: 0000-0002-3678-9387
[4] Kent University, Faculty of Economics, Administrative and Social Sciences, Department of Psychology, İstanbul, Turkey (mzihnisungur@kent.edu.tr) Orcid: 0000-0002-0766-485X
[5] Health Sciences University Adana Faculty of Medicine Mental Health and Diseases (snglkcmr@hotmail.com) Orcid: 0000 0002 5371 3907
[6] Gaziantep University, Faculty of Medicine, Department of Psychiatry, Gaziantep, Turkey (gelboga@gantep.edu.tr), Orcid: 0000-0003-3903-1835

Abstract

The global COVID-19 pandemic has exerted profound physical and psychological tolls on healthcare professionals, underscoring the urgent need for their mental health support. The objectives of this research are twofold: first, to develop an e-psychological support program based on Cognitive-Behavioral Therapy tailored specifically for healthcare professionals during the COVID-19 pandemic; second, to assess the program's effectiveness in reducing secondary traumatic stress, depression, anxiety, and stress levels, as well as improving healthcare professionals' perception of coping with trauma. Designed as a randomized controlled trial, the study was conducted with 71 healthcare workers employed in a hospital in Gaziantep, Turkey. The developed e-psychological support program consists of six modules: stress

* Correspondence concerning this article should be addressed sent to Fulya Türk- Yıldız Technical University, Faculty of Education, Department of Guidance and Psychological Counseling, Davutpaşa Kampüsü Gençosman Mah. Davutpaşa Cad. No:120 34165 Güngören/İstanbul/ Türkiye
Orcid: 0000-0003-1896-8418
Tel: +90 (212) 383 48 11
Email: fulya.turk@yildiz.edu.tr

model, self-monitoring skills, coping with anxiety, behavioral activation skills, and cognitive restructuring (two modules). The results showing a significant decrease in anxiety, depression, stress and secondary traumatic levels in the intervention group compared to the control group are encouraging. This suggests that the CBT-based e-psychological support program has the potential to have a positive impact on the mental well-being of healthcare professionals. Also, the improvement in healthcare professionals' perception of coping with trauma is an important outcome.CBT has a strong evidence base for treating mental health issues, and adapting it for the specific needs of healthcare workers during a crisis like the pandemic is a promising approach. The development of online interventions for healthcare professionals is valuable not only for the current pandemic but also for future crisis situations. These programs can serve as a template for addressing mental health needs during other global health emergencies.

Keywords: Cognitive Behavioral Therapy (CBT), e-psychological support, healthcare professionals, secondary trauma, anxiety.

The COVID-19 pandemic was declared by the World Health Organization (WHO) on March 11th, 2020, due to its rapid spread (World Health Organization, 2020a). Health-care workers have borne the brunt of this crisis, facing both physical and psychological challenges (World Health Organization, 2020b). Studies have shown that healthcare professionals battling COVID-19 report experiencing intense stress and anxiety (Mar-valdi et al., 2021; Pappa et al., 2020) and exhibit symptoms such as depression, anxiety, burnout, and hopelessness (Lai et al., 2020; Xiang et al., 2020).

Working in high-risk environments during the pandemic, healthcare professionals have struggled to care for critically ill patients, often working long hours under increasing workloads (Deng & Peng, 2020; Kang et al., 2020; Lai et al., 2020; Shechter et al., 2020). They have experienced physical fatigue, isolation from loved ones, and the dis-comfort of wearing protective equipment. Additionally, they have faced constant infection risk due to contact with highly infected individuals.

It seems important to know the intensity of the pandemic in Türkiye at the time this research was conducted. December 2020 is the period when the COVID-19 pandemic reached its second peak in Türkiye. The number of individuals infected with COVID-19 was unknown since the daily numbers of cases were not announced by the Ministry of Health of the Republic of Türkiye between the dates of October 2020 and November 2020. During this period, the Ministry only announced the number of patients who showed serious symptoms and were hospitalized daily as a

result of the COVID-19 diagnosis. In October 2020, the average number of deaths per day was 66, and the average number of patients per day was 1829. In November 2020, the average number of deaths per day is 110, and the average number of patients per day is 4183. In December 2020, the average number of deaths per day is 230, the average number of patients per day is 4612, and the average number of cases per day is 30804 (https://covid19.saglik.gov.tr).

During this period when the pandemic was intense, the Ministry of Health prohibited healthcare professionals from resigning and using their right to take a leave. During this period, none of the healthcare professionals participating in the study were vaccinated, because the vaccination process had not started in Türkiye, yet.

Healthcare professionals (HCP) face the psychological burden of aiding individuals exposed to trauma, which encompasses events causing mental and physical harm. This includes direct exposure (primary trauma) and indirect exposure through witnessing or knowledge (secondary trauma) (Figley, 2013). Secondary trauma's negative effects are akin to primary exposure (Bride et al., 2004). During the pandemic, HCPs working with traumatized individuals endure intense secondary traumatic stress (Lu et al., 2020; Orru et al., 2021; Vagni et al., 2020).

The COVID-19 crisis disproportionately affects frontline caregivers like nurses and doctors, leading to higher secondary trauma and stress levels (Bao et al., 2020; Li et al., 2020; Vitali, 2021; Zhang et al., 2020). Urgent global action is crucial to mitigate the acute stresses faced by these professionals and support their mental health (Shah et al., 2020; Vitali & Casolaro, 2021). Minimizing stress reactions from secondary trauma in treating professionals during the pandemic is vital, requiring immediate therapeutic interventions. Positive coping methods such as social support and problem-solving predict lower stress levels (Lai et al., 2020; Maiorano et al., 2020).

The ability to cope with trauma is perceived as a flexible structure encompassing both “trauma-focus” and “forward-focus” coping processes (Bonanno et al., 2011). While trauma-focused coping is necessary, a forward-focused approach is also vital for gaining a positive perspective and coping flexibility. Evaluating cognitive and coping flexibilities through both trauma and forward focus is crucial. A flexible coping perception can enhance coping skills, especially in dealing with secondary trauma and its associated stress, anxiety, and depressive symptoms. Cognitive-behavioral therapy (CBT) is a widely recommended approach for coping with trauma perception (Ehlers et al., 2005; Hofmann et al., 2012).

CBT, a short-term and cost-effective psychotherapeutic approach, is grounded in scientific principles such as learning theories. It is effective in treating various mental disorders by teaching problem-solving methods and skills (Beck, 2020; David et al., 2018). Research supports the efficacy of CBT in treating

depression, anxiety disorders, and PTSD (Cuijpers et al., 2013; Carpenter et al., 2018; Barrera et al., 2013). Amid the COVID-19 pandemic, intervention methods belonging to CBT, known for their short-term, solution-oriented nature, are recommended (Benhamou & Piedra, 2020; Shah, 2020; Shi & Hall, 2020). Utilizing the cognitive-behavioral approach can effectively reduce stress, anxiety, and depression levels among those affected by the pandemic (Li et al., 2020; Sugiyama, Kaseki, & Kishino, 2023).

Interventions for COVID-19-affected individuals, including healthcare professionals facing time constraints, are recommended to be accessible online or via telephone/computer-assisted applications (Reay et al., 2020; Shi & Hall, 2020; Xiang et al., 2020). This facilitates rapid assistance to a larger number of professionals, potentially alleviating psychological symptoms (Shechter et al., 2020). Healthcare workers show interest in online support (Shechter et al., 2020). Cognitive-Behavioral Therapy, with its structured nature, seamlessly integrates into online platforms, offering wider application and proven effectiveness in trauma treatment (Sijbrandij et al., 2016).

During the COVID-19 pandemic, there are limited studies based on Cognitive Behavioral Therapy (CBT) aimed at reducing stress symptoms among healthcare workers. Upon examination of these studies, it is observed that they were developed almost simultaneously in different countries and their initial results were published (Bureau et al., 2021; Jovarauskaite et al., 2021; López-del-Hoyo et al., 2022; Serrano-Ripoll et al., 2021; Weiner et al., 2020). In this study, the effects of the e-psychological support intervention developed during the peak of the pandemic in Türkiye are investigated concerning healthcare workers' levels of secondary traumatic stress, depression, anxiety, and stress, as well as their coping perceptions in dealing with trauma.

The objectives of this research are to develop an E-Psychological Support Program based on Cognitive-Behavioral Therapy, which is specific to healthcare professionals and compatible with computer-assisted and smartphone technologies, and to test its effectiveness.

Method

Design

In the present study, a Cognitive-Behavioral Therapy Based E-Psychological Support Program specific to healthcare professionals was developed, and its effectiveness was tested. In the study, a 2x2 split-plot, mixed experimental

design with pretest-posttest, intervention and control groups were used (Büyüköztürk, 2016).

The independent variable of the study is the Cognitive-Behavioral Therapy Based E-Psychological Support Program, which was developed by the researchers. The dependent variables are the secondary trauma levels, the perception levels of coping with trauma, depression, anxiety, and stress levels.

Participants

Criteria of inclusion in the research group are as follows:

1) Working as a healthcare professional at Gaziantep University, Şahinbey Training and Research Hospital,

2) Having access to the Internet and telephone/computer,

3) Having scored above the cut-off point for at least one of the depression, anxiety, or stress subscales of the Depression Anxiety Stress Scale (DASS-21); having a score of one standard deviation above the mean on the Secondary Traumatic Stress Scale (STSS).

4) Volunteering to participate in the study.

Criteria of exclusion from the research are as follows:

1) Presence of any organic, bipolar, or psychotic disorder, substance abuse, or risk of suicide

3) Receiving psychological intervention or using psychiatric medication at the time of inclusion

In the study, a power analysis was performed first to determine the size of the research group. The analysis was performed in G*power version 3.1, and the minimum required number of participants in each group was determined to be 36 for the NRF2 measurement of 0.8±1.28 units to be statistically significant between the groups (α=0.05, 1-β=0.90).

The Secondary Traumatic Stress Scale (STSS), the Perceived Ability to Cope with Trauma Scale (PACT), and the Depression Anxiety Stress Scale (DASS-21) were sent to all healthcare professionals working at Gaziantep University, Şahinbey Training and Research Hospital. All three scales were sent via e-mail to all 2545 healthcare professionals working in the hospital, and a total of 529 individuals filled in the scales. 48.9% of these 529 individuals were women, their average age was 33.33 years. In addition, 50.1% of these people were doctors, 16.8% were nurses, and 33.1% were other healthcare professionals. Based on the inclusion and exclusion criteria, 42 individuals were randomly assigned to the intervention group and 36 individuals to the control group in order to prevent dropping below the critical value of 36 individuals in case of finding 78 individuals meeting the criteria and a

loss of subjects in the intervention group. 5 out of 42 people in the intervention group did not complete the application and thus were excluded from the study. One participant in the intervention group and one participant in the control group were excluded from the analysis since they did not complete the post-test application. By the way, the intervention group was determined as 36 individuals and the control group as 35 individuals.

While 52.8% of the participants in the intervention group were women, this rate was 28.5% in the control group. The mean age of the participants in the intervention group was 34.05 years, while the mean age of the participants in the control group was 32.89. There was no significant difference between the intervention group and control group in terms of age, gender, educational level, and marital status. While 3 (8.4%) individuals in the intervention group were infected with the COVID-19, 2 (5.8%) individuals in the control group were infected with the COVID-19. The sociodemographic characteristics of healthcare professionals in the intervention and control groups are presented in Table 1.

Table 1. Sociodemographic characteristics

	CBTBE-SP			
	Intervention Group		Control Group	
	N	%	*N*	%
Gender				
Male	17	47.2	25	71.4
Female	19	52.8	10	28.5
Profession				
Medical Doctor	19	52.7	13	37.1
Nurses	8	22.2	13	37.1
Other HCPs	9	25.0	9	25.7
Age	34.05±7.7		32.89±7	
Marital Status				
Married	21	58.3	21	60.0
Single	15	41.6	14	40.0
Educational Level				
Secondary school	1	2.7	1	2.8
High School	2	5.5	3	8.5
University	33	91.6	31	88.5
Duration of experience				
Less than 1 year	3	8.3	3	8.5
1-3 years	2	5.5	5	14.2
3-5 years	3	8.3	4	11.4
5-10 years	9	25.0	8	22.8
Above 10 years	19	52.7	15	42.8
Mean working hours in a day	X=10.54±3.6		X=12.24±5.7	
0-7 hours	2	5.5	3	8.5
8-12 hours	29	80.5	20	57.1

	CBTBE-SP			
	Intervention Group		Control Group	
13-16 hours	3	8.3	6	17.1
Above 17 hours	2	5.5	6	17.1
COVID-19 infection				
Present	3	8.4	2	5.8
Absent	33	91.6	33	94.2
Death of a relative (Parents, siblings, children) because of COVID-19				
Present	10	27	4	11.4
Absent	26	73	31	88.5

Outcome Measures

Personal Information Form: The present form including demographic information of the participants was developed by the researchers. It includes information such as age, gender, education level, and marital status, working hours, presence of COVID-19 infection and death of a relative because of COVID-19.

Secondary Traumatic Stress Scale (STSS): The scale was developed by Bride et al. (2004) and was adapted into Turkish by Yildirim et al. (2018). It is a 17-item, five-point Likert-type data collection tool. The scale has three subscales: emotional violation, avoidance, and arousal. The score that can be obtained from the scale varies between 17 and 85 with high scores indicating high levels of exposure to secondary trauma. The internal consistency coefficients of the original scale were 0.94 for emotional violation, 0.83 for avoidance, 0.89 for arousal subscales and 0.85 for the total scale. The Cronbach's alpha reliability coefficient value for the total scale was found as 0.96 within the scope of the present study.

Perceived Ability to Cope with Trauma Scale (PACT): It is a 7-point Likert-type scale developed by Bonanno et al. (2011) to evaluate the perception of coping with traumatic life. It consists of 20 items and 2 subscales (Bonanno et al., 2011). These subscales are "Forward-Focus" and "Trauma-Focus". The score that can be obtained from the scale ranges between 20 and 140. High scores on the scale indicate that the perceived ability to cope with trauma is high. The Cronbach's alpha internal consistency coefficients of the scale were found to be 0.91 for the "Forward Focus" subscale, and 0.79 for the "Trauma Focus" subscale. The scale and was adapted into Turkish by Arı and Soysal (2019). The Cronbach's alpha reliability coefficient for the forward focus was found to be 0.91, and 0. 84 for the trauma focus subscale within the scope of the present study.

Depression Anxiety Stress Scale (DASS-21): The scale was developed by Lovibond and Lovibond (1995). Psychometric properties of the Turkish version of the DASS-21 in normal and clinical samples were conducted by Sarıçam (2018).

This scale is a 4-point Likert-type scale consisting of 21 questions measuring "dimensions of depression, stress, and anxiety". A score of 5 points or more from the subscale of depression, 4 points or more from anxiety, and 8 points or more from stress indicates that the patient has the related problem. The internal consistency coefficients of the scale in the clinical sample were calculated as 0.87 for the subscale of depression, 0.85 for the subscale of anxiety, and 0.81 for the subscale of stress. Test-retest correlation coefficients in the normal sample were calculated as r = 0.68 for the subscale of depression, r = 0.66 for the subscale of anxiety, and r = 0.61 for the subscale of stress. As a result of the reliability analysis conducted within the scope of the present study, Cronbach's alpha coefficients were calculated as 0.85 for the subscale of anxiety, 0.90 for the subscale of depression, and 0.90 for the subscale of stress.

In their study evaluating the clinical significance of treatment outcomes using the DASS-21, Ronk et al., (2013) found out that it was effective in the clinical evaluation of inpatients and outpatients as well as in identifying functional and non-functional ones. For this reason, in order to be able to demonstrate the effectiveness of the intervention, the cut-off scores of DASS-21 were considered as criteria, and it was preferred that it showed higher symptoms in the least area. In addition, the fact that the secondary traumatic stress levels of healthcare professionals are one standard deviation above the mean was used as a criterion to determine the effectiveness of the intervention in terms of showing that these symptoms were more intense.

Structured Clinical Interview for DSM-5: After determining 78 individuals according to the inclusion and exclusion criteria, the Structured Clinical Interview for DSM-5 Disorders was conducted by the second author of the study. The objectives of this interview were to understand possible overlooked psychopathologies within the framework of inclusion and exclusion criteria, recognize and exclude traumas outside of the Covid-19 pandemic, in case of violation of exclusion criteria, to identify psychiatric disorders, and detect suicidal tendencies, individuals were informed and excluded from the study. The Turkish adaptation of the Structured Clinical Interview for DSM-5 Disorder interview was conducted by Elbir et al. (2019). In the Turkish adaptation study, the diagnostic agreement and accuracy among the raters were calculated with the Cohen kappa coefficient. According to the results obtained, the kappa values were statistically significant and the Turkish version was found suitable for the clinical practice and use (Elbir et al., 2019).

The Intervention

Cognitive-Behavioral Therapy Based E-Psychological Support Program (CBTBE-SP): The Cognitive-Behavioral Therapy Based E-Psychological Support Program has been developed based on studies that have been shown to be effective in randomized controlled trials (Moberg et al., 2019; Possemato et al., 2016; Roepke et al., 2015; Titov et al., 2009). Based on these programs, modules of a CBT-based program have been developed. When examining the content of these programs, it is evident that they include fundamental knowledge and skills such as CBT and psychoeducation related to symptoms, emotion awareness, self-assessment, symptom management, cognitive restructuring, behavioral activation, recognizing positive and negative beliefs, modifying core beliefs, meditation/relaxation exercises, health behaviors (sleep, caffeine consumption, and exercise), and information about relapse prevention.

The Cognitive Behavioral Therapy Based E-Psychological Support Program (CBTBE-SP) was designed with 6 modules using the secondary trauma-focused cognitive-behavioral therapy based on psycho-education and mobile application. The program is completely structured on the basis of the needs, characteristics, and experiences of HCPs. Thus, at the first stage of the program development process, 26 HCPs (7 doctors, 8 nurses, 11 other healthcare professionals) were asked three open-ended questions and their thoughts on the COVID-19 pandemic were determined. The dysfunctional thoughts were determined by applying content analysis to the obtained data. All of these dysfunctional thoughts have been used in examples, practices, and activities within modules. The dysfunctional thoughts were detected by carrying out content analysis on the obtained data. These thoughts are as follows:

1. I am very worried about transmitting the disease and infecting my relatives or loved ones with the virus.
2. I am afraid that bad things are going to happen to me and my loved ones if the virus infects me.
3. No matter how many precautions I take, as a healthcare professional, the risk of infected with the disease is very high.
4. It is uncertain when the pandemic is going to end, which makes me very scared, what if the second wave comes?
5. The virus is not going to infect me only if I take too many precautions.
6. Even if the chance is one in ten million, the virus is going to come and find me.

7. It seems to me that this virus is much more dangerous than I thought.
8. If I have a fever, headache, and muscle pain, it means that I am definitely infected with the virus.
9. The virus is going to affect my life irreversibly and my life is not going to be the same again.

Separate versions of the application have been developed for Android and iOS. There is an admin panel in the program. Hence, researchers could see if each participant has completed the module and could examine the completed module. The program allowed healthcare professionals to enter the system and participate in the application whenever they wanted.

The Program's Content

Module 1: Stress model: Participants understood their stress responses, the physical, emotional, behavioral, and cognitive effects of stress, the methods they have used to cope with stress until now, other healthy ways to cope with stress, and acquire information on body awareness exercises.

Module 2: Self-monitoring skills: The participants learned the CBT perspective to make their own case conceptualizations, and to view their problems from five different (situation, emotions, thoughts, behaviors, physical reactions) perspectives.

Module 3: Coping with anxiety: The participants learned behavioral skills to cope with their anxiety as healthcare professionals, and they learned the methods of coping with anxiety.

Module 4: Behavioral activation skills: Participants learned to increase behavioral activation, activities they enjoyed and found worthy of doing.

Modules 5-6: Cognitive restructuring skills: In these two modules, participants learned to recognize their thoughts in general and on the pandemic, learned about the benefits and negative impacts of thoughts, found evidence that did and did not support their thoughts, in addition to learning about ways to question a thought, and how to develop alternative thoughts. Since dysfunctional thoughts were discussed in detail, the cognitive restructuring module was structured as two modules. The modules of the Cognitive-Behavioral Therapy-Based Psychological Support Program applied to the intervention group are given in Table 2.

Table 2. The Cognitive Behavioral Therapy-Based E-Psychological Support Program's modules

1st Module: Stress Model	Understanding the stress model, Being able to recognize the physical, emotional, behavioral and cognitive effects of stress Being able to recognize the ways they have used to cope with stress Learning other healthy coping ways to cope with stress Recognizing the importance of body awareness exercises Being able to practice body awareness exercises Assessment and summary of the module
2nd Module: Self-Monitoring Skills	Being able to recognize the relationship between thought, emotion, and behavior (ABC model) Ability to apply the ABC model from examples specific to healthcare professionals To be able to see the effects of thoughts on daily life Being able to notice thoughts and mistakes in thoughts Recognizing the necessity of questioning to thoughts Assessment and summary of the module
3rd Module: Coping with Anxiety	To be able to recognize behavioral skills to cope with anxiety during the pandemic period, Being able to practice changing the focus of attention, which is an important technique for coping with anxiety, Ability to use coping cards when anxious, To be able to apply the breathing exercise, To be able to apply the relaxation exercise, Assessment and summary of the module
4th Module: Behavioral Activation Skills	Realizing what can be done to take action, Making an activity plan To be able to implement the activity plan To be able to apply mindfulness exercise Creating goals in line with his/her values Assessment and summary of the module
5th Module: Cognitive Restructuring	Being able to recognize dysfunctional thoughts related to the pandemic Identifying the benefits and harms of dysfunctional thoughts Finding evidence that supports and does not support dysfunctional thinking Learning how to question a thought Ability to develop alternative thoughts Flexible and multi-choice thinking Assessment and summary of the module
6th Module: Cognitive Restructuring	Being able to recognize dysfunctional thoughts related to the pandemic Identifying the benefits and harms of dysfunctional thoughts Finding evidence that supports and does not support dysfunctional thinking Learning how to question a thought Ability to develop alternative thoughts Flexible and multi-choice thinking Assessment all modules.

Procedure

The present study's groups consisted of healthcare professionals working at Gaziantep University, Şahinbey Training and Research Hospital, providing healthcare services for the COVID-19 pandemic, and volunteering to participate in the research. The participants were randomly assigned to the intervention and control groups. There are two reasons for choosing this hospital: Gaziantep University, Şahinbey Training and Research Hospital is one of the largest hospitals in the region. For this reason, it is one of the hospitals where cases have been frequently accepted and treated due to the COVID-19 pandemic. Secondly, cases that are difficult to care for and have a high probability of death are treated in this hospital. Gaziantep University, Şahinbey Training and Research and Hospital employs a total of 2545 individuals, including 595 doctors (97 professor doctors, 26 associate professor doctors, 71 assistant professor doctors, and 401 assistant doctors), 450 nurses, and 1500 other healthcare professionals.

The researchers sent data collection tools to 2545 healthcare professionals in the hospital via e-mails and messages during the participant selection process. A total of 529 HCPs participated in the online data collection program. The data collection tools were applied to 529 HCPs in a hospital between the dates of September 9th, 2020 and September 28th, 2020. Of the 529 participants, 68 were excluded directly due to missing scales or information. 461 participants filled the assessment tools completely. Accordingly, within the inclusion criteria, 85 individuals with moderate or higher anxiety, depression, or stress levels according to the analysis of the DASS 21 (Anxiety score above 7 or stress score above 14 or depression score above 9), accompanied by secondary trauma stress scale above +1 standard deviation were selected. The Structured Clinical Interview for DSM-5 was carried out on 85 participants who met the criteria by the second author of the study. In this interview, the fifth author evaluated the participants in terms of DSM-5 criteria. The SCID was used to evaluate participants' psychiatric or psychological disorders other than anxiety, stress, or depression. 7 individuals were excluded because of the use of psychiatric medication, although they did not express this in the personal information form. Finally, 78 participants were assigned to the intervention and control groups. Simple randomization was utilized in the study, using a random number table. Blinding was used in the research for the participants, the data collection tools, and the experts who carried out the data analysis. Although the participants in the intervention group were not given the information that they were in the intervention group, it can be stated that there exists a risk in terms of blinding since they personally used a mobile application. Since the authors of the study personally followed the e-psychological support application, blinding could not be done. It has been stated that blinding the evaluators who analyze the output and perform the analysis in non-drug studies is effective in reducing the bias in the effect size (Hróbjartsson et al., 2013). A total of 42 individuals were randomly

assigned to the intervention group and 36 individuals to the control group in order to avoid decreasing below the critical value of 36 in the case of loss of subjects from the intervention group. Accordingly, the intervention and control groups were comprised of 36 and 35 individuals respectively (Figure 1).

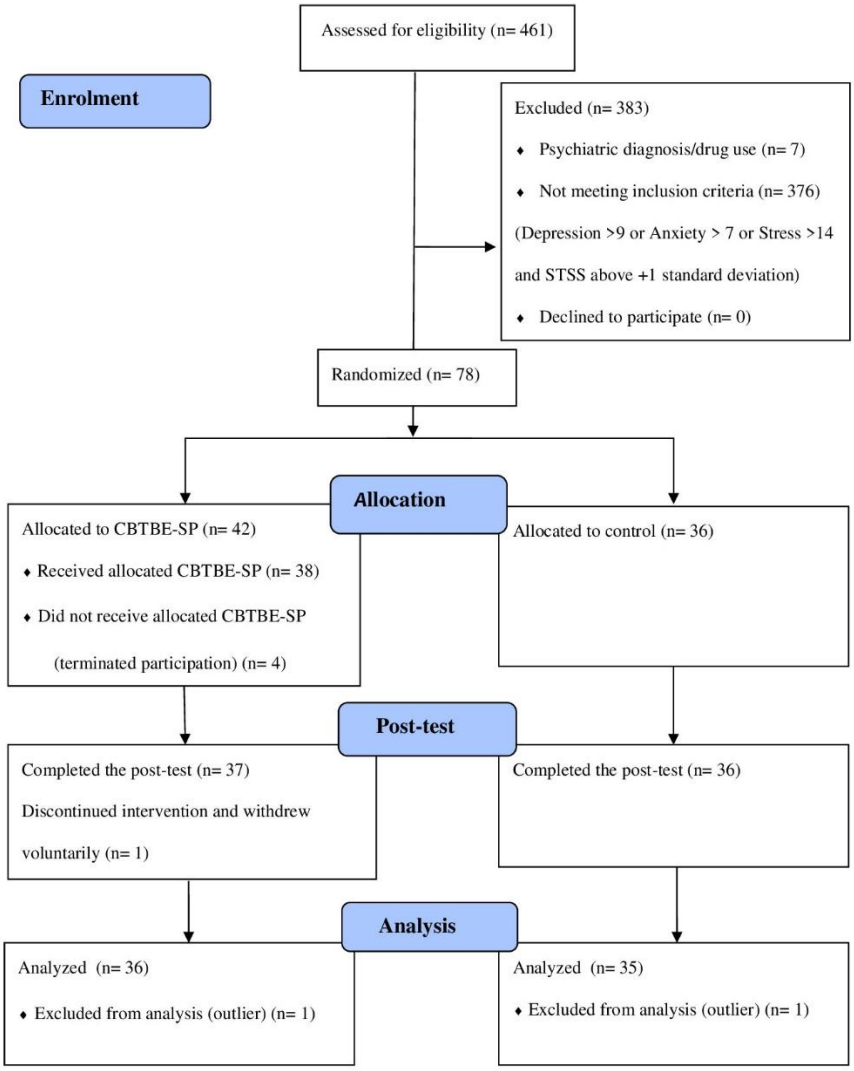


Figure 1. Study flowchart and design

The Secondary Traumatic Stress Scale (STSS), the Perceived Ability to Cope with Trauma Scale (PACT), and the Depression Anxiety Stress Scale (DASS-21) were used for collecting the data before and after the application of CBTBE-SP. An intervention and a control group were included in the study. The CBTBE-SP was applied to the intervention group for a period of 6 weeks with no interventions made to the control group during this process. The implementation of the program was carried out between the dates of October 30th, 2020 and December 1st, 2020. Healthcare professionals were requested to complete one module within a week. Warning and reminder messages were sent to the participants who did not complete the module.

Following the application to the intervention group, the data collection tools were re-applied to the intervention and control groups immediately following the first application. Post-test implementations were carried out between the dates of December 5th and December 20th, 2020. Healthcare professionals in the control group would be on the waiting list and implementation started for this group as well following the CBTBE-SP.

Data Analysis

The 2*2 (group*time) Repeated Measures ANOVA test was used to compare the scale scores obtained at different measurement times according to intervention groups. In the present study, a per-protocol analysis was performed, and those who did not complete the study, showed significant incompatibility with the protocol, had filled the scale incompletely or incorrectly or had extreme values by marking all items as 1 or 5, and who did not meet the inclusion criteria were not included in the final analysis. Bonferroni test, one of the multiple comparison tests (post-hoc tests), was used to determine the statistical difference between the different measurement times. Before the analysis, the assumptions such as normality and homogeneity of the variances were tested, and it was determined that the assumptions were met. The analyzes were carried out using SPSS 22.0 and STATISTICA programs. A significance level of $p < 0.05$ was chosen. The effect size was also calculated in the present study.

Results

The pre-test and post-test mean scores and standard deviations of the participants in the CBTBE-SP intervention and control groups obtained from all scales are presented in Table 3.

Table 3. Pre-test and post-test mean scores and standard deviations obtained from the participants in the intervention and control groups from all scales

			Pre-test	Post-test				
Scales	Groups	*N*	$\overline{X}$± *SD*	$\overline{X}$± *SD*	Source of Variance	*F*	*p*	*η p2*
STSS Total	Intervention	36	64.30± 6.20	41.88± 17.01	Time	78.718	.000	.55
	Control	35	68.00± 8.33	56.14± 17.38	Time*Group	7.472	.008	.98
STSS-Avoidance	Intervention	36	26.75± 3.20	17.86± 6.98	Time	62.570	.000	.47
	Control	35	28.31± 4.07	23.45± 7.25	Time*Group	5.383	.023	.07
STSS-Arousal	Intervention	36	20.47± 2.59	13.11± 5.48	Time	71.071	.000	.50
	Control	35	21.40± 2.88	17.57± 5.88	Time*Group	7.083	.010	.09
STSS-Intrusion	Intervention	36	17.11± 3.12	10.91± 5.35	Time	59.445	.000	.46
	Control	35	18.25± 3.91	15.11± 5.53	Time*Group	6.349	.014	.08
DASS-21 Total	Intervention	36	40.75± 8.85	23.72± 14.42	Time	48.093	.000	.41
	Control	35	43.17± 10.09	34.94± 15.31	Time*Group	5.838	.018	.07
DASS-21 Anxiety	Intervention	36	10.77± 4.32	5.63± 4.53	Time	33.378	.000	.32
	Control	35	12.34± 4.06	10.14± 5.42	Time*Group	5.353	.024	.07
DASS-21 Stress	Intervention	36	15.16± 2.90	9.61± 5.36	Time	37.486	.000	.35
	Control	35	15.31± 4.26	12.60± 5.27	Time*Group	4.425	.039	.06
DASS-21 Depression	Intervention	36	14.80± 4.02	8.47± 6.19	Time	46.002	.000	.40
	Control	35	15.51± 4.16	12.20± 5.67	Time*Group	4.505	.037	.06
PACT Total	Intervention	36	86.83± 15.45	93.13± 20.10	Time	.575	.451	.00
	Control	35	92.54± 25.41	81.62± 26.20	Time*Group	8.028	.006	.10
PACT Forward Focus	Intervention	36	38.41± 8.65	37.97± 8.98	Time	6.137	.016	.08
	Control	35	40.02± 8.30	33.65± 10.36	Time*Group	4.641	.035	.06
PACT Trauma Focus	Intervention	36	48.41± 15.06	55.16± 16.60	Time	.269	.605	.00
	Control	35	52.51± 19.37	47.97± 18.79	Time*Group	7.052	.010	.09

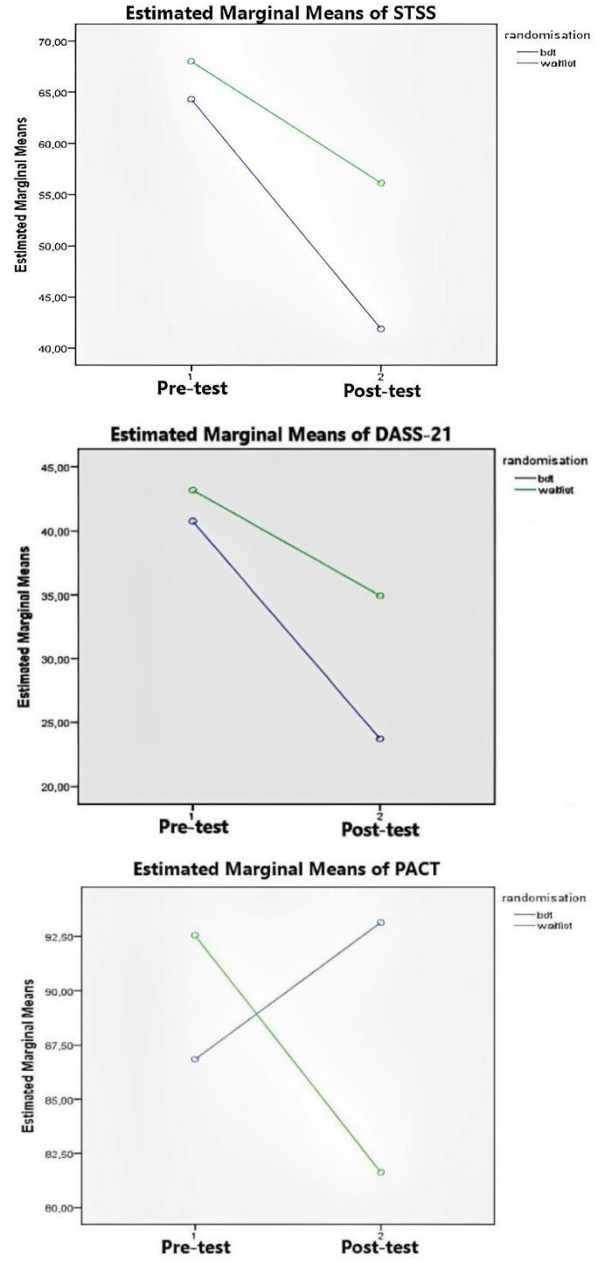


Figure 2. The change in the STSS, DASS-21 and PACT mean scores of the participants in the CBTPE-SP intervention and control groups

The means and standard deviations of both measurement times as well as the pre-post comparison for the Secondary Traumatic Stress Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the STSS and its subscales post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. In addition, The group*measurement interaction effects showed that the decrease in secondary traumatic stress scores of the individuals in the experimental group was significantly higher than the individuals in the control group ($F_{(1, 69)}$=7.472 p<0.05, n^2= 0.09). These results are also included in Figure 2.

The means and standard deviations of both measurement times as well as the pre-post comparison for the the Depression Anxiety Stress Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the DASS-21 and its subscales post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. It was found that the group*measurement interaction effects of the DASS-21 total score decrease of the individuals in the experimental group was significant compared to the control group ($F_{(1, 69)}$=5.838, p<0.05, n^2= 0.07. These results are also presented in Figure 2.

The means and standard deviations of both measurement times as well as the pre-post comparison for the the Perceived Ability to Cope with Trauma Scale are presented in Table 3. When Table 3 is examined, it has been seen that there is a statistically significant difference between the PACT post-test mean scores of the healthcare professionals in the CBTBE-SP intervention and control groups. While the mean scores of the perception levels of coping with trauma of the individuals in the experimental group increased significantly, the mean scores of the individuals in the control group decreased significantly as a result of the group*measurement interaction effects ($F_{(1, 69)}$=7.472 p<0.05, n^2= 0.09). These results are also presented in Figure 2.

Discussion

The COVID-19 pandemic has taken a toll on global physical and mental health, emphasizing the need to safeguard frontline healthcare workers. Long-term studies are essential to comprehend its effects fully. This research aims to create an e-psychological support program based on Cognitive-Behavioral Therapy tailored to healthcare professionals during the pandemic, testing its efficacy on secondary traumatic stress, depression, anxiety, and trauma coping perceptions.

In the study, anxiety, stress, and depression levels of the healthcare professionals in the control group also decreased. However, the decrease in anxiety,

stress, and depression levels observed in the intervention group was higher when compared to the control group. Factors contributing to the decrease in anxiety, stress, and depression levels of the healthcare professionals in the control group include the elimination of information deficiencies and reduction of information pollution at the beginning of the pandemic, the provision of protective equipment (De Kock et al., 2021; Yin & Zeng, 2020), distribution of treatment guidelines (Cai et al., 2020), start of vaccine application for healthcare professionals during the program implementation, reduced uncertainty due to this situation (Cai et al., 2020), establishment of teamwork, institutional and social supports (De Kock et al., 2021; Sun et al., 2020; Xiao et al., 2020), and according to the information obtained during the application, the fact that most of the healthcare professionals have infected with COVID-19 has contributed to the decrease in their anxiety, stress, and depression levels. Another reason can be expressed by the results of two longitudinal studies. Accordingly, there are also studies suggesting that the depression and anxiety levels of healthcare professionals have been high during the pandemic period and have decreased over time (Sun et al., 2020; Xu et al., 2020). There are very few studies in related publications to compare the results of the present study. When the programs developed during the pandemic are examined, it can be stated that the research processes continue and the first results aim to increase the psychological well-being of health workers and reduce the levels of stress, anxiety, and depression. (Bureau et al., 2021; Jovarauskaite et al., 2021; López-del-Hoyo et al., 2022; Serrano-Ripoll et al., 2021; Weiner et al., 2020). In one of these studies, Wahlund et al. (2020) found that the online intervention, which was developed based on a cognitive-behavioral approach for individuals affected by the COVID-19 pandemic, led to a positive improvement in reducing the anxiety levels of individuals, similar to the results of the present study. In meta-analysis studies showing the effectiveness of CBT in the treatment of depression and anxiety, it has been presented to be a highly effective intervention (Cuijpers et al., 2013; Cuijpers et al., 2014; Cuijpers et al., 2016; Li et al., 2018; Wersebe et al., 2013). The effectiveness of the intervention program based on CBT as an evidence-based therapy method has proven to be an effective support program according to the relevant literature. In addition, it has been considered that it would be important for future studies that all examples, practices, and structures in the intervention program developed in the present study are specific to healthcare professionals and the COVID-19 pandemic.

In this study, the CBT-based e-psychological support program (CBTBE-SP) was effective in reducing secondary traumatic stress levels among healthcare workers in the intervention group. While secondary traumatic stress levels decreased in the control group, the reduction was significantly higher in the intervention group. Although no comparative study exists in the literature regarding the effects of online therapy programs on secondary traumatic stress, cognitive therapies' effectiveness in treating post-traumatic stress disorder (PTSD) is well-documented (Barrera et al.,

2013; Men-des et al., 2008; Shi & Hall, 2020). The observed decrease in secondary traumatic stress levels in the intervention group, compared to the control group, may be attributed to improved coping skills, depersonalization of severely ill COVID-19 patients, effectiveness of new treatments, and decreased mortality rates due to COVID-19. However, research on the effects of CBT on secondary traumatic stress is limited, necessitating further investigation (Graham, 2012). This study may serve as a guide for future research on secondary traumatic stress. Despite the inevitability of healthcare professionals being exposed to secondary trauma during the pandemic, offering CBT-based e-psychological support programs tailored to healthcare professionals can effectively mitigate its effects.

A notable finding of this study is the significant increase in healthcare professionals' perceptions of coping with trauma following receipt of e-psychological support, compared to the control group, with a notably high impact. No literature was found analyzing the effects of online therapy programs on coping with trauma perception. The perceived ability to cope with trauma scale assesses coping flexibility through trauma-focus and forward-focus factors (Bonanno et al., 2011). Those utilizing trauma-focus coping may reduce activities post-trauma, while forward-focus copers maintain normal activities and create goals to overcome distress. Flexibly employing coping strategies is associated with better trauma adaptation (Park et al., 2015). Forward-focus coping, not trauma-focus, is linked to lower depressive symptoms (Rodin et al., 2017), aligning with the study's findings of improved forward-focus coping perception among healthcare professionals. CBT, though not directly targeting coping flexibility, promotes cognitive flexibility by challenging dysfunctional thoughts (Soltani et al., 2013; Kahrizi et al., 2011). Online interventions teaching stress coping techniques and cognitive interventions addressing anxiety-inducing thoughts may enhance trauma coping perception.

There is a possibility that healthcare professionals could have caught COVID-19 due to the pandemic during the research process, and this situation could not be considered as a control variable. Within the scope of the research, the status of having COVID-19 in the groups before and after the intervention was examined, as having gone through COVID-19 may affect the results of the analysis. The status of having had the COVID-19 was analyzed with the Chi-square test. The chi-square analysis of whether the healthcare professionals in the intervention and control groups differed according to the COVID-19 infection status before and after the intervention has indicated that they have not presented statistically significant differences according to the pre-intervention COVID-19 infection status and post-intervention COVID-19 infection status.

The study acknowledges the potential impact of COVID-19 infection on participants, yet found no significant differences in infection rates between intervention and control groups. However, the research, limited to 71 healthcare professionals (HCPs) at one hospital, couldn't monitor long-term effects of the

program due to project duration. Factors like personal losses or patient overload may affect HCPs' mental health, not fully explored. Rapid COVID-19 developments and unanalyzed primary trauma levels pose limitations. Conducted in Gaziantep, a metropolitan city possibly with lower HCP pressure compared to other Turkish cities, further affecting generalizability. Monitoring during data collection wasn't feasible, hindering long-term analysis. Despite efforts to assess COVID-19 impact, broader contextual factors influencing mental health outcomes remain unexplored.

In conclusion, the Cognitive-Behavioral Therapy-based E-Psychological Support Program, compatible with computers and smartphones, appears effective in reducing depression, stress, anxiety, and secondary traumatic stress among healthcare professionals, enhancing their coping with trauma. Literature suggests such online therapy programs for healthcare professionals are in development and trial phases, highlighting the pioneering role of this study. It may serve as a guide for future research. Global adoption of similar practices in health policies is crucial, especially for potential future crises, promoting mental health. Online interventions offer accessible alternatives for busy healthcare professionals constrained by work schedules and social distancing rules, potentially bridging gaps in mental health support.

Author's note

Data Availability: The dataset that supports the findings of the current study is available from the corresponding author upon reasonable request.

Conflict of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest with the respect to the research, authorship, and/or publication of this article.

Funding: This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK 1001/120K412).

Ethical Approval: Ethical and application permissions of the project were obtained prior to the implementation. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee, and with the 1964 Helsinki Declaration, and its later amendments or comparable ethical standards. Approval was granted by the Clinical Research Ethics Committee of Gaziantep University (Decision Number: 2020/203). This was followed by obtaining the application permission from Gaziantep University, Sahinbey Training and Research Hospital's Chief Physician (Number: 91786782/020/26742).

Informed Consent: Informed consent was obtained from all participants included in the study.

References

Arı, E., & Soysal, C. G. (2019). Perceived Ability to Cope with Trauma Scale (PACT): The Turkish adaptation, validity and reliability study, *Journal of Clinical Psychology Research, 3*(1), 17-25. https://doi.org/10.5455/kpd.260244380606 2019m000007

Bao, Y., Sun, Y., Meng, S., Shi, J., & Lu, L. (2020). 2019-CoV epidemic: address mental health care to empower society. *The Lancet, 395*(10224), e37-e38. https://doi.org/10.1016/S0140-6736(20)30309-3

Barrera, T. L., Mott, J. M., Hofstein, R. F., & Teng, E. J. (2013). A meta-analytic review of exposure in group cognitive behavioral therapy for posttraumatic stress disorder. *Clinical psychology review, 33*(1), 24-32. https://doi.org/10.1016/j.cpr.2012.09.005

Beck, J. S. (2020). *Cognitive behavior therapy: Basics and beyond*. Guilford Publications.

Benhamou, K., & Piedra, A. (2020). CBT-informed interventions for essential workers during the COVID-19 pandemic. *Journal of contemporary psychotherapy, 50*(4), 275-283. https://doi.org/10.1007/s10879-020-09467-3

Bonanno, G. A., Pat-Horenczyk, R., & Noll, J. (2011). Coping flexibility and trauma: The Perceived Ability to Cope With Trauma (PACT) scale. *Psychological Trauma: Theory, Research, Practice, and Policy, 3*(2), 117. https://doi.org/10.1037/a0020921

Bride, B. E., Robinson, M. M., Yegidis, B., & Figley, C. R. (2004). Development and validation of the secondary traumatic stress scale. *Research on Social Work Practice, 14*(1), 27-35. https://doi.org/10.1177/1049731503254106

Bureau, R., Bemmouna, D., Faria, C. G. F., Goethals, A. A. C., Douhet, F., Mengin, A. C., ... & Weiner, L. (2021). My health too: investigating the feasibility and the acceptability of an internet-based cognitive-behavioral therapy program developed for healthcare workers. *Frontiers in Psychology, 12*, 760678. https://doi.org/10.3389/fpsyg.2021.760678

Büyüköztürk, Ş. (2016). *Sosyal Bilimler İçin Veri Analizi El Kitabı: İstatistik, Araştırma Deseni, SPSS Uygulamaları ve Yorum*. Pegem Akademi Pub.

Cai, H., Tu, B., Ma, J., Chen, L., Fu, L., Jiang, Y., & Zhuang, Q. (2020). Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research, 26*, e924171-1. https://doi.org/10.12659/ MSM.924171

Carpenter, J. K., Andrews, L. A., Witcraft, S. M., Powers, M. B., Smits, J. A., & Hofmann, S. G. (2018). Cognitive behavioral therapy for anxiety and related disorders: A meta-analysis of randomized placebo-controlled trials. *Depression and anxiety*, *35*(6), 502-514. https://doi.org/10.1002%2Fda.22728

Cuijpers, P., Berking, M., Andersson, G., Quigley, L., Kleiboer, A., & Dobson, K. S. (2013). A meta-analysis of cognitive-behavioural therapy for adult depression, alone and in comparison with other treatments. *The Canadian Journal of Psychiatry*, *58*(7), 376-385. https://doi.org/10.1177/070674371305800702

Cuijpers, P., Cristea, I. A., Karyotaki, E., Reijnders, M., & Huibers, M. J. (2016). How effective are cognitive behavior therapies for major depression and anxiety disorders? A meta-analytic update of the evidence. *World Psychiatry*, *15*(3), 245-258. https://doi.org/10.1002/wps.20346

Cuijpers, P., Sijbrandij, M., Koole, S., Huibers, M., Berking, M., & Andersson, G. (2014). Psychological treatment of generalized anxiety disorder: a meta-analysis. *Clinical Psychology Review*, *34*(2), 130-140. https://doi.org/10.1016/j.cpr.2014.01.002

David, D., Cristea, I., & Hofmann, S. G. (2018). Why cognitive behavioral therapy is the current gold standard of psychotherapy. *Frontiers in psychiatry*, *9*, 4. https://doi.org/10.3389/fpsyt.2018.00004

De Kock, J. H., Latham, H. A., Leslie, S. J., Grindle, M., Munoz, S. A., Ellis, L., Polson, R. & O'Malley, C. M. (2021). A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health*, *21*(1), 1-18. https://doi.org/10.1186/s12889-020-10070-3

Deng, S.-Q., & Peng, H.-J. (2020). Characteristics of and public health responses to the coronavirus disease 2019 outbreak in China. *Journal of Clinical Medicine*, *9*(2), 575. https://doi.org/10.3390/jcm9020575

Ehlers, A., Clark, D. M., Hackmann, A., McManus, F., & Fennell, M. (2005). Cognitive therapy for post-traumatic stress disorder: development and evaluation. *Behaviour Research and Therapy*, *43*(4), 413-431. https://doi.org/10.1017/S1754470X2000015X

Elbir, M., Topbaş, Ö. A., Bayad, S., Kocabaş, T., Topak, O. Z., Çetin, Ş., Özdel, O., Ateşçi F., & Aydemir, Ö. (2019). Adaptation and reliability of the structured clinical interview for DSM-5-disorders-clinician version (SCID-5/CV) to the Turkish language. *Turkish Journal of Psychiatry, 30*(1), 51. https://doi.org/10.5080/u23431

Figley, C. R. (2013). *Compassion fatigue: Coping with secondary traumatic stress disorder in those who treat the traumatized*: Routledge.

Graham, J. (2012). Cognitive behavioural therapy for occupational trauma: a systematic literature review exploring the effects of occupational trauma and

the existing CBT support pathways and interventions for staff working within mental healthcare including allied professions. *The Cognitive Behaviour Therapist*, *5*(1), 24-45. https://doi.org/10.1017/S1754470X12000025

Hofmann, S. G., & Smits, J. A. (2008). Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. *Journal of clinical psychiatry*, *69*(4), 621. https://doi.org/10.4088%2Fjcp.v69n0415

Hofmann, S. G., Asnaani, A., Vonk, I. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research*, *36*(5), 427-440. https://doi.org/10.1007%2Fs10608-012-9476-1

Hróbjartsson, A., Thomsen, A. S. S., Emanuelsson, F., Tendal, B., Hilden, J., Boutron, I., Ravaud, P., & Brorson, S. (2013). Observer bias in randomized clinical trials with measurement scale outcomes: a systematic review of trials with both blinded and nonblinded assessors. *CMAJ, 185*(4), E201-E211. https://doi.org/10.1503 /cmaj.120744

Jovarauskaite, L., Dumarkaite, A., Truskauskaite-Kuneviciene, I., Jovaisiene, I., Andersson, G., & Kazlauskas, E. (2021). Internet-based stress recovery intervention FOREST for healthcare staff amid COVID-19 pandemic: study protocol for a randomized controlled trial. *Trials*, *22*(1), 559. https://doi.org/10.1186/s13063-021-05512-1

Kahrizi, H., Aghayusefi, A., & Mirhashemi, M. (2011). Effect of cognitive-group-therapy on decrease prisoner depression. *Thought and Behavior*, 6, 21-30. https://doi.org/10.4236/psych.2015.614174

Kang, L., Ma, S., Chen, M., Yang, J., Wang, Y., Li, R., Yao, L., Bai, H., Cai, Z., Yang, B.X., Hu, S., Zhang, K., Wang, G., Ma, C., & Liu, Z. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain, Behavior, and Immunity*, *87*, 11-17. https://doi.org/10.1016/j.bbi.2020.03.028

Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Cheng, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open, 3*(3). https://doi.org/10.1001/jamanetworkopen.2020.3976

Li, J. M., Zhang, Y., Su, W. J., Liu, L. L., Gong, H., Peng, W., & Jiang, C. L. (2018). Cognitive behavioral therapy for treatment-resistant depression: A systematic review and meta-analysis. *Psychiatry Research, 268*, 243-250. https://doi.org/10.1016/j.psychres.2018.07.020

Li, J., Li, X., Jiang, J., Xu, X., Wu, J., Xu, Y., Lin, X., Hall, J., Xu, H., Xu, J., & Xu, X. (2020). The Effect of Cognitive Behavioral Therapy on Depression,

Anxiety, and Stress in Patients With COVID-19: A Randomized Controlled Trial. *Frontiers in Psychiatry, 11*. https://doi.org/10.3389/fpsyt.2020.580827

López-del-Hoyo, Y., Fernández-Martínez, S., Pérez-Aranda, A., Barceló-Soler, A., Guzman-Parra, J., Varela-Moreno, E., Campos, D., Monreal-Bartolomé, A., Beltrán-Ruiz, M., Moreno-Küstner, B., Mayoral-Cleries, F., & García-Campayo, J. (2022). Effectiveness and implementation of an online intervention (MINDxYOU) for reducing stress and promote mental health among healthcare workers in Spain: a study protocol for a stepped-wedge cluster randomized trial. BMC nursing, 21(1), 308. https://doi.org/10.1186/s12912-022-01089-5

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335-343. https://doi.org/10.1016/0005-7967(94)00075-u.

Lu, W., Wang, H., Lin, Y., & Li, L. (2020). Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Research, 288*, 112936. https://doi.org/10.1016/j.psychres.2020.112936

Maiorano, T., Vagni, M., Giostra, V., & Pajardi, D. (2020). COVID-19: Risk Factors and Protective Role of Resilience and Coping Strategies for Emergency Stress and Secondary Trauma in Medical Staff and Emergency Workers—An Online-Based Inquiry. *Sustainability, 12*(21), 9004. https://doi.org/10.3390/su12219004

Marvaldi, M., Mallet, J., Dubertret, C., Moro, M. R., & Guessoum, S. B. (2021). Anxiety, depression, trauma-related, and sleep disorders among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews, 126*, 252-264. https://doi.org/10.1016/j.neubiorev.2021.03.024

Mendes, D. D., Mello, M. F., Ventura, P., de Medeiros Passarela, C., & de Jesus Mari, J. (2008). A systematic review on the effectiveness of cognitive behavioral therapy for posttraumatic stress disorder. *The International Journal of Psychiatry in Medicine*, *38*(3), 241-259.

Moberg, C., Niles, A., & Beermann, D. (2019). Guided self-help works: randomized waitlist controlled trial of Pacifica, a mobile app integrating cognitive behavioral therapy and mindfulness for stress, anxiety, and depression. *Journal of Medical Internet Research*, *21*(6), e12556. https://doi.org/10.2196/12556

Orru, G., Marzetti, F., Conversano, C., Vagheggini, G., Miccoli, M., Ciacchini, R., ... & Gemignani, A. (2021). Secondary traumatic stress and burnout in healthcare workers during COVID-19 outbreak. *International Journal of Environmental Research and Public Health*, *18*(1), 337. https://doi.org/10.3390/ijerph18010337

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, behavior, and immunity*, *88*, 901-907. https://doi.org/10.1016/j.bbi.2020.05.026

Park, M., Chang, E. R., & You, S. (2015). Protective role of coping flexibility in PTSD and depressive symptoms following trauma. *Personality and Individual Differences*, 82, 102-106. https://doi.org/10.1016/j.paid.2015.03.007

Pfeiffer, P. N., Heisler, M., Piette, J. D., Rogers, M. A., & Valenstein, M. (2011). Efficacy of peer support interventions for depression: a meta-analysis. *General hospital psychiatry*, *33*(1), 29-36. https://doi.org/10.1016%2Fj.genhosppsych.2010.10.002

Possemato, K., Kuhn, E., Johnson, E., Hoffman, J. E., Owen, J. E., Kanuri, N., ... & Brooks, E. (2016). Using PTSD Coach in primary care with and without clinician support: a pilot randomized controlled trial. *General Hospital Psychiatry*, *38*, 94-98. http://dx.doi.org/10.1016/j.genhosppsych.2015.09.005

Reay, R. E., Looi, J. C., & Keightley, P. (2020). Telehealth mental health services during COVID-19: summary of evidence and clinical practice. *Australasian Psychiatry*, *28*(5), 514-516. https://doi.org/10.1177/1039856220943032

Rodin, R., Bonanno, G. A., Knuckey, S., Satterthwaite, M. L., Hart, R., Joscelyne, A., ... & Brown, A. D. (2017). Coping flexibility predicts post-traumatic stress disorder and depression in human rights advocates. *International Journal of Mental Health*, *46*(4), 327-338. https://doi.org/10.1080/00207411.2017.1345047

Roepke, A. M., Jaffee, S. R., Riffle, O. M., McGonigal, J., Broome, R., & Maxwell, B. (2015). Randomized controlled trial of SuperBetter, a smartphone-based/internet-based self-help tool to reduce depressive symptoms. *Games for Health Journal*, *4*(3), 235-246. https://doi.org/10.1089/g4h.2014.0046

Ronk, F. R., Korman, J. R., Hooke, G. R., & Page, A. C. (2013). Assessing clinical significance of treatment outcomes using the DASS-21. *Psychological assessment*, *25*(4), 1103. https://doi.org/10.1037/a0033100

Sarıçam, H. (2018). The psychometric properties of Turkish version of Depression Anxiety Stress Scale-21 (DASS-21) in health control and clinical samples. *Journal of Cognitive Behavioral Psychotherapy and Research*, *7*(1), 19-30. https://doi.org/10.5455/JCBPR.274847

Serrano-Ripoll, M. J., Ricci-Cabello, I., Jiménez, R., Zamanillo-Campos, R., Yañez-Juan, A. M., Bennasar-Veny, M., ... & Fiol-deRoque, M. A. (2021). Effect of a mobile-based intervention on mental health in frontline healthcare workers against COVID-19: Protocol for a randomized controlled trial. *Journal of Advanced Nursing*, *77*(6), 2898-2907. https://doi.org/10.1111/jan.14813

Shah, K., Kamrai, D., Mekala, H., Mann, B., Desai, K., & Patel, R. S. (2020). Focus on mental health during the coronavirus (COVID-19) pandemic: applying learnings from the past outbreaks. *Cureus*, *12*(3). Article e7405. https://doi.org/10.7759/cureus.7405

Shechter, A., Diaz, F., Moise, N., Anstey, D. E., Ye, S., Agarwal, S., ... & Abdalla, M. (2020). Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *General Hospital Psychiatry*, *66*, 1-8. https://doi.org/10.1016/j.genhosppsych.2020.06.007

Shi, W., & Hall, B. J. (2020). What can we do for people exposed to multiple traumatic events during the coronavirus pandemic? *Asian Journal of Psychiatry, 51*. https://doi.org/10.1016/j.ajp.2020.102065

Sijbrandij, M., Kunovski, I., & Cuijpers, P. (2016). Effectiveness of internet-delivered cognitive behavioral therapy for posttraumatic stress disorder: A systematic review and meta-analysis. *Depression and Anxiety*, *33*(9), 783–791. https://doi.org/10.1002/da.22533

Soltani, E., Shareh, H., Bahrainian, A., & Farmani, A. (2013). The mediating role of cognitive flexibility in correlation of coping styles and resilience with depression. *Pajoohandeh Journal*, 18, 88-96.

Sugiyama, C., Koseki, S., & Kishino, R. (2023). Examining the Effectiveness of a Coping Skills Intervention for Anxiety for Junior High School Students amid the COVID-19 Pandemic. *Journal of Evidence-Based Psychotherapies*, *22*(1), 3-14. https://doi.org/10.24193/jebp.2023.1.1

Sun, N., Wei, L., Shi, S., Jiao, D., Song, R., Ma, L., Wang, H., Wang, C., Wang, Z., You, Y., Liu, S. & Wang, H. (2020). A qualitative study on the psychological experience of caregivers of COVID-19 patients. *American Journal of Infection Control*, *48*(6), 592-598. https://doi.org/10.1016/j.ajic.2020.03.018

Titov, N., Andrews, G., Robinson, E., Schwencke, G., Johnston, L., Solley, K., & Choi, I. (2009). Clinician-assisted Internet-based treatment is effective for generalized anxiety disorder: randomized controlled trial. *Australian & New Zealand Journal of Psychiatry*, *43*(10), 905-912. https://doi.org/10.1080/00048670903179269

Türkiye Cumhuriyeti Sağlık Bakanlığı (2023). COVID_19 Bilgilendirme platformu. https://covid19.saglik.gov.tr

Vagni, M., Maiorano, T., Giostra, V., & Pajardi, D. (2020). Coping with COVID-19: emergency stress, secondary trauma and self-efficacy in healthcare and emergency workers in Italy. *Frontiers in psychology*, *11*, 2294. https://doi.org/10.3389/fpsyg.2020.566912

Vitale, E. (2021). Anxiety, depression and insomnia conditions in Italian nurses during the first and the second waves of the COVID-19 pandemic. *Journal of Evidence-Based Psychotherapies*, *21*(1). 69-82.

Vitale, E., & Casolaro, S. (2021). Anxiety, burnout and depression levels according to sex and years of work experience in Italian nurses engaged in the care of COVID-19 patients. *Journal of Evidence-Based Psychotherapies*, *21*(1). 83-96.

Wahlund, T., Mataix-Cols, D., Lauri, K. O., de Schipper, E., Ljótsson, B., Aspvall, K., & Andersson, E. (2020). Brief online cognitive behavioural intervention for dysfunctional worry related to the COVID-19 pandemic: A randomised controlled trial. *Psychotherapy and Psychosomatics*, 1-9. https://doi.org/10.1159/000512843

Weiner, L., Berna, F., Nourry, N., Severac, F., Vidailhet, P., & Mengin, A. C. (2020). Efficacy of an online cognitive behavioral therapy program developed for healthcare workers during the COVID-19 pandemic: the REduction of STress (REST) study protocol for a randomized controlled trial. *Trials*, *21*, 1-10. https://doi.org/10.1186/s13063-020-04772-7

Wersebe, H., Sijbrandij, M., & Cuijpers, P. (2013). Psychological group-treatments of social anxiety disorder: a meta-analysis. *PloS One*, *8*(11), e79034. https://doi.org/10.1371/journal.pone.0079034

World Health Organization. (2020a). *WHO announces COVID-19 outbreak a pandemic, World Health Organization.* http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-COVID-19/news/news/2020/3/who-announces-COVID-19-outbreak-a-pandemic. Retrieved May 5, 2020 form https://www.who.int/europe/emergencies/situations/covid-19

World Health Organization. (2020b). *Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020* (No. WHO/2019-nCoV/MentalHealth/2020.1). Retrieved September 7, 2020 from https://www.who.int/publications/i/item/WHO-2019-nCoV-MentalHealth-2020.1

Xiang, Y. T., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T., & Ng, C. H. (2020). Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The lancet psychiatry*, *7*(3), 228-229. https://doi.org/10.1016/S2215-0366(20)30046-8

Xiao, H., Zhang, Y., Kong, D., Li, S., & Yang, N. (2020). The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, *26*, e923549-1. https://doi.org/10.12659%2FMSM.923549

Xu, J., Xu, Q. H., Wang, C. M., & Wang, J. (2020). Psychological status of surgical staff during the COVID-19 outbreak. *Psychiatry Research*, *288*, 112955. https://doi.org/10.1016%2Fj.psychres.2020.112955

Yildirim, G., Kidak, L. B., & Yurdabakan, I. (2018). Secondary traumatic stress scale: An adaptation study/Ikincil travmatik stres olcegi: Bir uyarlama

calismasi. *Anadolu Psikiyatri Dergisi*, *19*(1), 45-52. https://doi.org/10.5455/apd.247563

Yin, X., & Zeng, L. (2020). A study on the psychological needs of nurses caring for patients with coronavirus disease 2019 from the perspective of the existence, relatedness, and growth theory. *International Journal of Nursing Sciences*, *7*(2), 157-160. https://doi.org/10.1016/j.ijnss.2020.04.002

Zhang, W. R., Wang, K., Yin, L., Zhao, W. F., Xue, Q., Peng, M., Min, B., Tian, Q., Leng, H., Du, J., Chang, H., Yang, Y., Li, W., Shangguan, F., Yan, T., Dong, H., Han, Y., Wang, Y.Cosci, F., & Wang, H. X. (2020). Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychotherapy and psychosomatics*, 89(4), 242-250. https://doi.org/10.1159/000507639

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 29-44.

10.24193/jebp.2025.1.2

COMPARISONS OF TARGETED TREATMENT FOR MENTAL DISORDERS BASED ON NETWORK ANALYSIS OVER NON-TARGETED TREATMENT IN ADOLESCENTS

Kechuang Zhang[1], Shubin Si[1,2], Mengbi Yang[1], Min Xi[3], Weixia Zhang[4]*

[1] Department of Industrial Engineering, Northwestern Polytechnical University, Xi'an, China.
[2] Key Laboratory of Industrial Engineering and Intelligent Manufacturing, Ministry of Industry and Information Technology, Xi'an, China.
[3] Hospital of Northwestern Polytechnical University, Northwestern Polytechnical University, Xi'an, China.
[4] Department of Physical Education, Northwestern Polytechnical University, Xi'an, China.

Abstract

Network analysis was widely used to identify core symptoms, with the aim of providing targets for intervention. Whether targeted treatment based on core symptoms identified by network analysis is superior to the non-targeted treatment remains unknown. We utilize simulation to contrast their effects on the symptom network of mental health. In the simulation, intentional and random attacks represent targeted and non-targeted treatments, respectively. The simulation test was conducted by attacking the symptom network using both random attacks and intentional attacks targeting central nodes, as defined by centrality measures. The results showed that the natural connectivity of the network degraded faster in intentional attacks than in random ones. Additionally, abnormal individuals have higher natural connectivity values than normal individuals. The findings indicated that compare to non-targeted treatment methods, centrality based targeted treatment focusing on core symptoms disrupted the connections between symptoms more quickly, generating better treatment effects.

Keywords: invulnerability simulation, mental health, network analysis, symptom network, targeted treatment.

[*] Correspondence concerning this article should be addressed to Dr. Weixia Zhang, Department of Physical Education, Northwestern Polytechnical University, 127 W. Youyi Road, Xi'an, 710072, China.
Tel: 0086-29-88493539; Fax: 0086-29-88493539
Email: zhangweixia@nwpu.edu.cn

Adolescence, a pivotal phase in human development, encompasses profound and rapid cognitive and emotional growth. Adolescent mental health is in a state of crisis, with a high prevalence of mental disorders such as depression (Noyes et al., 2022), anxiety (Lofthouse et al., 2023), and bipolar disorder (Ortiz-Orendain et al., 2023). The diverse mental disorders frequently co-occur. Among individuals diagnosed with depression, 67% currently also had an anxiety disorder, and 75% had a lifetime history of comorbid anxiety disorder. Among those with a current anxiety disorder, 63% also had a current depressive disorder, and 81% had experienced a depressive disorder at some point in their lives (Lamers et al., 2011). These disorders not only interact with each other (Mustață, 2021) but are also influenced by various factors, forming a complex psychological system. The intricate nature of this system, with its multifaceted dimensions, poses significant challenges to the conventional reductionist approaches traditionally employed in the study of psychological well-being (Blanchard & Heeren, 2020).

Network analysis has emerged as a promising method for investigating complex psychological systems and has been widely utilized in the field of psychiatry. In network analysis, symptoms are conceptualized as nodes, and the connections between these nodes serve as edges. By calculating the topographical characteristics of these intricately connected networks, researchers have gained profound insights into the structural composition and pathological mechanisms of mental disorders (Bringmann et al., 2013; Van Borkulo et al., 2015). Specifically, psychological states can be evaluated through network connectivity. Connectivity indicates the degree of association among different psychological symptoms, higher connectivity implies a stronger correlation between symptoms. One study revealed higher connectivity within the psychological networks of patients suffering from persistent major depression at baseline compared to those in remission (Van Borkulo et al., 2015). Changes in network connectivity have a stable relationship with individual states. Symptom networks with higher connectivity exhibit a sharper transition from a normal state to a depressive one (Cramer et al., 2016; Fried et al., 2017). Additionally, increased connectivity among emotions indicates a transition from a normal state to major depression (Van De Leemput et al., 2014).

In addition to connectivity, network centrality is also extensively utilized, particularly in identifying core symptoms. By calculating network centrality, self-hatred and loneliness have been identified as core symptoms of adolescent depression (Mullarkey et al., 2019). Centrality is a prevalently used parameter in psychiatric studies, valued for its utility in targeted treatment in clinical settings. Centrality helps researchers and clinicians focus on the most important nodes within network, thereby enhancing the effectiveness of intervention strategies (Bringmann

et al., 2019; Sobański et al., 2023). Despite its extensive use in psychological networks, the validity of centrality has been challenged. Researchers question the applicability of central nodes, as the effectiveness of utilizing network core symptoms to guide treatment remains inconclusive (Contreras et al., 2019). Conflicting conclusions regarding network centrality have emerged from similar datasets (Bringmann et al., 2016), and there are variations in the identification of core nodes (Borsboom et al., 2017; Forbes et al., 2017). Therefore, there is an urgent need for evidence comparing the effectiveness of network-based targeted treatment with non-targeted treatment.

The most direct evidence may be obtained by comparing the effects of different interventions. Considering the time and other resources invested in interventions, simulation offers an alternative approach. Simulation, which involves using models—whether physical or mathematical—to replicate experiments and research instead of using actual systems, is a well-established practice in fields such as energy (Chen et al., 2023) and medicine (Rudolph et al., 2021). In the domain of psychological network research, this method has been employed to explore transitions between depressive states (Cramer et al., 2016). Simulation-based research offers effective methodologies for exploring psychological networks and facilitates a thorough analysis of the interactions between network structure and psychological well-being.

To determine the relative efficacy of network-based targeted treatment versus non-targeted treatment, this study constructed symptom-based networks and compared their connectivity under different treatment conditions using simulations. Treatment of psychological networks can be likened to attacks on a simulated system. In the network analysis, attack refers to a perturbation to the system, achieved by removing nodes or edges from the network. The impact of an attack on a network can be either positive or negative. For instance, in urban networks, the removal of transportation hubs may cause the urban system to fail, whereas in a large criminal organization network, the entire network can collapse by arresting key individuals (Holme et al., 2002). In this study, consistent with the aforementioned explanation, an attack on psychological networks involved removing a node, which represents the elimination of all connections among a symptom and other symptoms through treatment. Consequently, the connectivity of the psychological network would decrease, which is beneficial for treating mental disorders. Given that psychological networks are susceptible to external influences or attacks (Hallquist et al., 2021; Hayes et al., 2015), we utilized two types of attacks to represent the different treatments. Intentional attacks, which involved the removal of the most

important nodes we chose, represented targeted treatment. Correspondingly, random attacks represented non-targeted treatment. The treatment effect was evaluated by calculating network connectivity following node attacks. The network invulnerability test, originally developed in computer science and network analysis, has proven useful in examining the vulnerability and resilience of structures such as the internet and social networks (Albert et al., 2000). This study utilized the network invulnerability test to measure the network's connectivity under various attacks.

Method

Participants and Measurement

The data were obtained from the National Population Health Sciences Data Center with permission. A total of 9,072 participants were included in this study, all of whom underwent the Symptom Checklist 90 (SCL-90) assessment. All data was collected voluntarily, anonymously and confidentially. The data collection has been approved by the Ethics Committee of Shandong University (20180517) as stated (Dong et al., 2020). The SCL-90 is a widely utilized psychological assessment tool designed to measure a broad range of psychological symptoms. The SCL-90 consists of 90 items that assess ten primary symptom dimensions, including somatization, obsessive-compulsive behavior, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism, among others.

Based on the SCL-90 scores, participants were divided into three groups in our study. The first group consisted of normal participants (N = 5,438, M_{age} = 16.08, SD = 1.29), with total scores of SCL-90 below 160. The second group consisted of suspected patients (N = 2,513, M_{age} = 16.23, SD = 1.16), with total scores between 160 and 200. The third group consisted of psychological abnormalities (N = 1,121, M_{age} = 16.21, SD = 1.16) characterized by total scores exceeding 200 or scores higher than 3 in any dimension.

Data Analysis

The network for each group was constructed following methodologies outlined in previous studies (Mullarkey et al., 2019), with items in the SCL-90 serving as nodes and partial correlations as edges (Epskamp et al., 2012). To eliminate artificial connections, the least absolute shrinkage and selection operator (LASSO) was employed. The construction and subsequent calculation of centrality

were conducted using the R packages qgraph (Epskamp et al., 2012) and bootnet (Epskamp et al., 2018). Network Comparison Test (NCT) was used to assess group centrality (EI) (Van Borkulo et al., 2023).

To identify targets in the simulation of targeted treatment, we quantified the significance of each node in the network using the expected influence (EI). This measure is more suitable for networks that contain both positive and negative edges compared to the traditional centrality index (McNally, 2016; Robinaugh et al., 2016). Nodes with higher EI were deemed more important in the network. The network invulnerability test evaluates a network's ability to maintain connectivity when nodes are compromised. The process involves exposing network nodes to predetermined attack strategies and conducting simulation experiments to observe changes in connectivity following each attack. To quantify the stability and connectivity of the inferred networks, we employed a reliable and sensitive measure—natural connectivity (Jun et al., 2010).

This study performs network attacks focusing on the abnormal group to simulate treatment. In random attacks, each node or edge in the network was targeted with equal probability. The outcome was the network's average natural connectivity after surviving 6,000 random attacks. For intentional attacks, two distinct strategies were employed, a similar to previous study (Holme et al., 2002). The first strategy involved selecting nodes in the initial network based on their EI values in descending order. It gradually removed nodes, starting with the one with the highest EI. This attack strategy utilized the initial EI distribution and is therefore referred to as the IEI (initial expected influence) attack in this study. The second strategy, employed a recalculated EI distribution at each step of node removal, is referred to as the REI (recalculated expected influence) attack.

Results

Network Structure

In the symptom network of the abnormal group, 936 out of the 4005 possible edges (23.4%) were non-zero, indicating intense interconnectedness between symptoms. The network exhibited an average degree of 20.8 and a clustering coefficient of 0.36, indicating the likelihood that a node’s neighbors are also interconnected. The structure of the network for the abnormal group was illustrated in Figure 1.

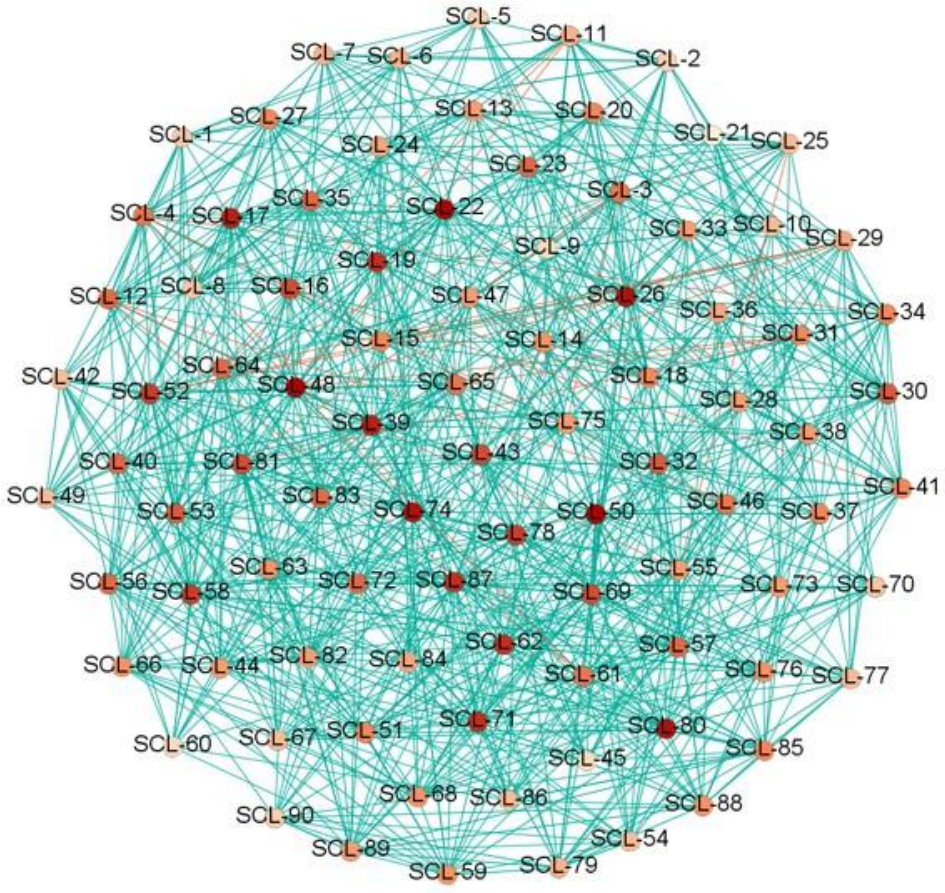


Figure 1. Network structure for the abnormal group. Darker colour indicates higher degree of nodes, green edges represent positive associations and red edges represent negative relations.

Descriptive results for the means and SDs for the three groups on the nodes with the highest EI, and the statistically significant differences between each of the group were presented in Table 1-3. In Tables 1, 2, and 3, the fourth and fifth columns represented the significance of the differences in node EI values between the current group and the other two groups. A *p*-value less than 0.05 indicated a significant difference in node EI values. Significant differences between groups were marked in the table as follows: "$^{+}$" denoted a significant difference between the normal and suspected groups, "*" indicated a significant difference between the normal and abnormal groups, and "$^{\Delta}$" signified a significant difference between the suspected and abnormal groups.

Table 1. Top 10 nodes based on EI for abnormal group and group differences

Node	Mean	*SD*	*P*-value compared with		Description	Dimension
			Normal	Suspected		
SCL-79*	1.20	0.05	<0.01	0.16	Feelings of worthlessness	Depression
SCL-23*	1.19	0.05	<0.01	0.09	Suddenly scared for no reason	Anxiety
SCL-72*	1.19	0.05	<0.01	0.37	Spells of terror or panic	Anxiety
SCL-78*	1.18	0.05	<0.01	0.16	Feeling so restless you couldn't sit still	Anxiety
SCL-81*	1.16	0.06	<0.01	0.63	Shouting or throwing things	Anger-hostility
SCL-52*	1.16	0.06	<0.01	0.49	Numbness or tingling in parts of your body	Somatization
SCL-71*	1.15	0.06	<0.01	0.37	Feeling everything is an effort	Depression
SCL-58*	1.14	0.06	<0.01	0.37	Heavy feelings in your arms or legs	Somatization
SCL-33	1.14	0.06	0.07	0.37	Feeling fearful	Anxiety
SCL-30	1.12	0.06	0.78	0.97	Feeling blue	Depression

Table 2. Top 10 nodes based on EI for suspected group and group differences

Node	Mean	*SD*	*P*-value compared with		Description	Dimension
			Normal	Abnormal		
SCL-78+	1.29	0.04	<0.01	0.16	Feeling so restless you couldn't sit still	Anxiety
SCL-72+	1.27	0.05	<0.01	0.37	Spells of terror or panic	Anxiety
SCL-33+	1.22	0.05	<0.01	0.37	Feeling fearful	Anxiety
SCL-58+	1.20	0.05	<0.01	0.37	Heavy feelings in your arms or legs	Somatization
SCL-89+Δ	1.18	0.04	<0.01	0.01	Feelings of guilt	Additional Items
SCL-30	1.14	0.05	0.53	0.97	Feeling blue	Depression
SCL-22+	1.12	0.05	<0.01	0.58	Feeling of being trapped or caught	Depression
SCL-81+	1.12	0.05	<0.01	0.63	Shouting or throwing things	Anger-hostility
SCL-79+	1.10	0.05	<0.01	0.16	Feelings of worthlessness	Depression

Node	Mean	*SD*	*P*-value compared with		Description	Dimension
			Normal	Abnormal		
SCL-56^{+}	1.09	0.05	0.04	0.16	Feeling weak in parts of your body	Somatization

Table 3. Top 10 nodes based on EI for normal group and group differences

Node	*EI*	*SD*	*P*-value compared with		Description	Dimension
			Suspected	Abnormal		
SCL-61^{+*}	1.31	0.04	<0.01	<0.01	Feeling uneasy when people are watching or talking about you	Interpersonal Sensibility
SCL-46^{+*}	1.25	0.04	<0.01	<0.01	Difficulty making decisions	Obsessive-compulsive
SCL-29^{+*}	1.23	0.04	<0.01	<0.01	Feeling lonely	Depression
SCL-11^{+*}	1.22	0.03	<0.01	<0.01	Feeling easily annoyed or irritated	Anger-hostility
SCL-9^{+*}	1.22	0.03	<0.01	<0.01	Trouble remembering things	Obsessive-compulsive
SCL-57^{+*}	1.19	0.04	<0.01	<0.01	Feeling tense or keyed up	Anxiety
SCL-55^{+*}	1.19	0.04	<0.01	<0.01	Trouble concentrating	Obsessive-compulsive
SCL-28^{+*}	1.13	0.04	<0.01	<0.01	Feeling blocked in getting things done	Obsessive-compulsive
SCL-41^{+*}	1.13	0.04	<0.01	<0.01	Feeling inferior to others	Interpersonal Sensibility
SCL-3^{+*}	1.13	0.04	<0.01	<0.01	Unwanted thoughts, words, or ideas that won't leave your mind	Obsessive-compulsive

As can be seen from Table 1, in the group of psychological anomalies, SCL-79 exhibited the highest expected influence value, followed by SCL-23, SCL-72, and SCL-78, indicating that these symptoms were the most influential within the network. In contrast, symptoms such as SCL-60 and SCL-21 demonstrated a marginal impact within the network. Most of the top ten nodes were associated with the anxiety, depression, and somatization dimensions, indicating that these three dimensions were the most influential within the overall symptom network model. Interestingly, six of the top ten nodes in the abnormal group were the same as those in the suspected group, whereas none overlapped with the normal group was found.

Results from NCT revealed that the difference in EI values between network nodes in the abnormal group and the normal group is the most pronounced, with significant differences observed in nearly all of the top 10 nodes. In contrast, the difference between the suspected group and the abnormal group was smaller, with almost no significant differences among the top 10 nodes.

Invulnerability

To evaluate the effects of various attack strategies, the invulnerability test was performed. The results revealed distinct pattern from the three types of attacks within the abnormal group (Figure 2). The initial values of the three curves denote the network connectivity of the abnormal group. Figure 2 clearly indicated that abnormal group had higher values than the suspected group, which in turn had higher values than the normal group. As the number of removed nodes increased from 0 to 64, natural connectivity decreased across all simulated treatments, indicating that the network's connectivity was sensitive to disturbance. During the IEI attack, the network's natural connectivity deteriorated more rapidly than during the random attack. Meanwhile, the values of natural connectivity in the REI attack deteriorated more rapidly than in the IEI attack.

During the REI attack, natural connectivity declined over time, approaching zero, significantly lower than in the other two attacks. This indicates a substantial disruption in the network connectivity and a significant loss of interconnections between nodes. Consequently, the network no longer met the essential criteria for optimal operation and could not sustain its original functionality.

It is important to note that the objective was not to completely dismantle the network. Given that a total breakdown of the network represented a state of psychological abnormality, the aim of the treatment was not to fully dismantle the network structure, i.e., to achieve near-zero natural connectivity. The treatment aimed to reduce network connectivity to levels comparable to those of the normal population, as illustrated in Figure 2.

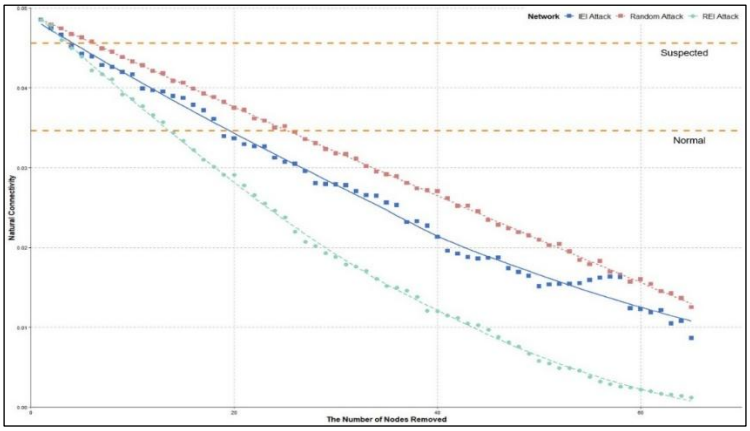


Figure 2. The natural connectivity of symptom networks under different attacks. The upper and lower orange lines parallel to the x-axis depict the natural connectivity of the suspected and normal, respectively.

To validate our findings, the same analysis was performed using the network constructed from the ten dimensions of the SCL-90. Consistent with the previous results, the intentional attack exhibited a more pronounced decreasing trend in natural connectivity compared to the random attack, as shown in Figure 3.

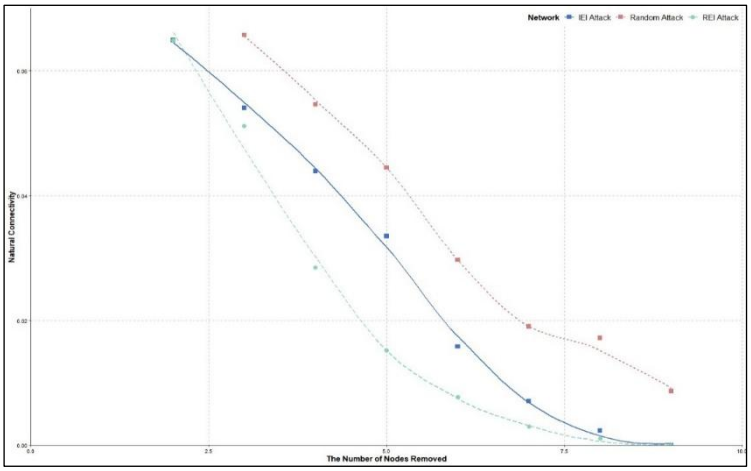


Figure 3. The natural connectivity of dimension networks under different attacks

Discussion

To the best of our knowledge, this is the first study to directly compare the outcomes of targeted and non-targeted treatments using simulations based on network analysis. In the invulnerability test, the random attack represented non-targeted treatment, whereas the IEI and REI attacks represented targeted treatment. The results revealed distinct patterns of invulnerability evolution in the abnormal group under the three attack conditions. The intentional attacks resulted in a faster decline in network connectivity overall, suggesting a more effective method for disrupting connections between symptoms and improving treatment outcomes. The connectivity value of the network after the REI attack was lower than that after the IEI attack. Our findings clearly demonstrate the superiority of treatment approaches that target network centrality over non-targeted treatments. Network centrality is a viable strategy for identifying potential targets in effective treatments.

The primary finding of this study was that intentional attacks targeting central nodes induced a more rapid decrease in network connectivity compared to random attacks. Larger connectivity indicated worse psychological states (Cramer et al., 2016; Fried et al., 2017; Van Borkulo et al., 2016), the intentional and random

attacks represented targeted and non-targeted treatments, respectively. These results suggested that targeted treatment based on central nodes was more effective than non-targeted treatment in addressing mental disorders. Despite ongoing controversy regarding the potential of centrality in determining intervention targets (Bringmann et al., 2016, 2019; Borsboom et al., 2017; Forbes et al., 2017), our results indirectly support the notion that high-centrality symptoms are suitable targets for clinical intervention.

In accordance with the findings of this study, the top eight symptoms listed in Table 1 warrant substantial attention in clinical treatment, as they exhibit higher values of EI for the abnormal group and differ significantly from the normal group. Among these, "Feelings of worthlessness" should be prioritized due to its highest EI value. Research has shown that addressing "feelings of worthlessness" in clinical settings can significantly enhance mental health outcomes. For example, in reminiscence therapy, strengthening self-worth and self-acceptance in young adults with moderate depressive symptoms could generate positive experiences and alleviate depression (Hallford et al., 2018).

Another significant finding arises from the comparison between the REI and IEI attack. IEI was considered a targeted treatment based on the initial assessment of each symptom's importance, treating according to initial evaluations. In contrast, REI was considered a targeted treatment that reassessed the importance of the patient's symptoms before each treatment session, thereby treating according to ongoing assessments. As connectivity decreased more rapidly in the REI attack than in the IEI attack, consistent with the findings of Holme's study (2002), it can be concluded that reassessment-based treatment is more effective than treatment based solely on initial results. Furthermore, our results indicate that psychological assessment plays a crucial role in clinical decision-making. Regular assessment of the patient at consistent intervals during the treatment episode can provide invaluable feedback (Lambert, 2010). Assessments of the patient's mental health prior to each session and tailoring the treatment plan accordingly are strongly recommended.

Overall, the results demonstrated a hierarchical trend in connectivity evolution: individuals with psychological abnormalities > individuals with suspected psychological abnormalities > normal individuals. This pattern suggests a nuanced link between mental health and network connectivity, consistent with findings from previous network research (Cramer et al., 2016; Fried et al., 2017; Van Borkulo et al., 2016). Unlike previous studies that compared only two groups (Van Borkolu et al., 2016; Van De Leemput et al., 2014), our study further validated the relationship between network connectivity values and mental health by including a suspected group and utilizing a larger sample. Moreover, results from NCT of differences in EI suggested that the network structure of the suspected group has undergone significant changes compared to the normal group and closely resembles that of the abnormal group, reflecting shifts in the mental health status of the suspected group. Therefore, consistent with a previous study (Yang et al., 2024), we also suggested

that the suspected group should be treated differently from the normal and abnormal groups.

This study has several limitations. First, the simulation process assumed a maximum destruction probability of 100% for symptom nodes. Given that certain symptoms are persistent and pose significant challenges for complete eradication, achieving a 100% destruction probability for these nodes may be unrealistic. Second, the simulation process overlooks the dynamic nature of the network. Although this study assumed a static network, it is crucial to recognize that clinical treatment is an ongoing process. The network may evolve as treatment progresses. Future research should delve deeper into exploring these two aspects.

In conclusion, lower values of network connectivity were consistently observed under intentional attacks compared to random attacks. This study validated the viability of network centrality in identifying treatment targets. Regularly updating assessments is recommended to accurately calculate the most representative centrality. This study not only provides theoretical support for targeted treatment of psychological abnormalities but also offers valuable insights for future research and clinical practice.

Authors' Notes

Study conception and design: Weixia Zhang, Kechuang Zhang, Shubin Si, Min Xi.

Data analysis and interpretation of results: Kechuang Zhang, Shubin Si, Mengbi Yang; draft manuscript preparation: Kechuang Zhang, Weixia Zhang, Min Xi.

Funding information: Shaanxi Provincial Natural Science Foundation [Grant No.2023JCQN0258]; Regular Research Projects of Shaanxi Provincial Sports Bureau [Grant No.20240293]. Psychological Health Research Fund Project of the Shaanxi Provincial Committee for the Care of the Next Generation / Northwestern Polytechnical University [Grant No. GXJM202412].

All authors reviewed the results and approved the final version of the manuscript.

Conflict of interest: We have no conflict of interest to disclose.

References

Albert, R., Jeong, H., & Barabási, A.-L. (2000). Error and attack tolerance of complex networks. *Nature*, *406*(6794), 378–382. https://doi.org/10.1038/35019019

Blanchard, M. A., & Heeren, A. (2020). Why we should move from reductionism and embrace a network approach to parental burnout. *New Directions for Child*

and Adolescent Development, *2020*(174), 159–168. https://doi.org/10.1002/cad.20377

Borsboom, D., Fried, E. I., Epskamp, S., Waldorp, L. J., van Borkulo, C. D., van der Maas, H. L. J., & Cramer, A. O. J. (2017). False alarm? A comprehensive reanalysis of "Evidence that psychopathology symptom networks have limited replicability" by Forbes, Wright, Markon, and Krueger (2017). *Journal of Abnormal Psychology*, *126*(7), 989–999. https://doi.org/10.1037/abn0000306

Bringmann, L. F., Elmer, T., Epskamp, S., Krause, R. W., Schoch, D., Wichers, M., Wigman, J. T. W., & Snippe, E. (2019). What do centrality measures measure in psychological networks? *Journal of Abnormal Psychology*, *128*(8), 892–903. https://doi.org/10.1037/abn0000446

Bringmann, L. F., Pe, M. L., Vissers, N., Ceulemans, E., Borsboom, D., Vanpaemel, W., Tuerlinckx, F., & Kuppens, P. (2016). Assessing temporal emotion dynamics using networks. *Assessment*, *23*(4), 425–435. https://doi.org/10.1177/1073191116645909

Bringmann, L. F., Vissers, N., Wichers, M., Geschwind, N., Kuppens, P., Peeters, F., Borsboom, D., & Tuerlinckx, F. (2013). A network approach to psychopathology: New insights into clinical longitudinal data. *PLoS ONE*, *8*(4), e60188. https://doi.org/10.1371/journal.pone.0060188

Chen, H., Zhang, T., Hua, Y., Gao, Q., Han, Z., Xu, Y., Yang, K., Xu, X., Liu, X., & Wang, S. (2023). Simulation and comparative study of the effect of the electrical connection between the battery electrodes on the battery thermal behavior. *Journal of Energy Storage*, *72*, 108409. https://doi.org/10.1016/j.est.2023.108409

Contreras, A., Nieto, I., Valiente, C., Espinosa, R., & Vazquez, C. (2019). The study of psychopathology from the network analysis perspective: A systematic review. *Psychotherapy and Psychosomatics*, *88*(2), 71–83. https://doi.org/10.1159/000497425

Cramer, A. O. J., Van Borkulo, C. D., Giltay, E. J., Van Der Maas, H. L. J., Kendler, K. S., Scheffer, M., & Borsboom, D. (2016). Major depression as a complex dynamic system. *PLOS ONE*, *11*(12), e0167490. https://doi.org/10.1371/journal.pone.0167490

Dong, X., Ding, M., Chen, W., Liu, Z., & Yi, X. (2020). Relationship between smoking, physical activity, screen time, and quality of life among adolescents. *International Journal of Environmental Research and Public Health*, *17*(21), 8043. https://doi.org/10.3390/ijerph17218043

Epskamp, S., Borsboom, D., & Fried, E. I. (2018). Estimating psychological networks and their accuracy: A tutorial paper. *Behavior Research Methods*, *50*(1), 195–212. https://doi.org/10.3758/s13428-017-0862-1

Epskamp, S., Cramer, A. O. J., Waldorp, L. J., Schmittmann, V. D., & Borsboom, D. (2012). qgraph: Network visualizations of relationships in psychometric

data. *Journal of Statistical Software*, *48*, 1–18. https://doi.org/10.18637/jss.v048.i04

Forbes, M. K., Wright, A. G. C., Markon, K. E., & Krueger, R. F. (2017). Evidence that psychopathology symptom networks have limited replicability. *Journal of Abnormal Psychology*, *126*(7), 969–988. https://doi.org/10.1037/abn0000276

Fried, E. I., Van Borkulo, C. D., Cramer, A. O. J., Boschloo, L., Schoevers, R. A., & Borsboom, D. (2017). Mental disorders as networks of problems: A review of recent insights. *Social Psychiatry and Psychiatric Epidemiology*, *52*(1), 1–10. https://doi.org/10.1007/s00127-016-1319-z

Hallford, D. J., Mellor, D., & Burgat, M. E. (2019). A Qualitative Study of Young Adults Experience With a Reminiscence-Based Therapy for Depressive Symptoms. *Emerging Adulthood*, *7*(4), 279–290. https://doi.org/10.1177/2167696818769175

Hallquist, M. N., Wright, A. G. C., & Molenaar, P. C. M. (2021). Problems with centrality measures in psychopathology symptom networks: Why network psychometrics cannot escape psychometric theory. *Multivariate Behavioral Research*, *56*(2), 199–223. https://doi.org/10.1080/00273171.2019.1640103

Hayes, A. M., Yasinski, C., Ben Barnes, J., & Bockting, C. L. H. (2015). Network destabilization and transition in depression: New methods for studying the dynamics of therapeutic change. *Clinical Psychology Review*, *41*, 27–39. https://doi.org/10.1016/j.cpr.2015.06.007

Holme, P., Kim, B. J., Yoon, C. N., & Han, S. K. (2002). Attack vulnerability of complex networks. *Physical Review E*, *65*(5), 056109. https://doi.org/10.1103/PhysRevE.65.056109

Jun, W., Barahona, M., Yue-Jin, T., & Hong-Zhong, D. (2010). Natural connectivity of complex networks. *Chinese Physics Letters*, *27*(7), 078902. https://doi.org/10.1088/0256-307X/27/7/078902

Lambert, M. J. (2010). *Prevention of treatment failure: The use of measuring, monitoring, and feedback in clinical practice.* American Psychological Association. https://doi.org/10.1037/12141-000

Lamers, F., van Oppen, P., Comijs, H. C., Smit, J. H., Spinhoven, P., van Balkom, A. J. L. M., Nolen, W. A., Zitman, F. G., Beekman, A. T. F., & Penninx, B. W. J. H. (2011). Comorbidity patterns of anxiety and depressive disorders in a large cohort study: The Netherlands Study of Depression and Anxiety (NESDA). *The Journal of Clinical Psychiatry*, *72*(3), 341–348. https://doi.org/10.4088/JCP.10m06176blu

Lofthouse, M. K., Waite, P., & Černis, E. (2023). Developing an understanding of the relationship between anxiety and dissociation in adolescence. *Psychiatry Research*, *324*, 115219. https://doi.org/10.1016/j.psychres.2023.115219

McNally, R. J. (2016). Can network analysis transform psychopathology? *Behaviour Research and Therapy*, *86*, 95–104. https://doi.org/10.1016/j.brat.2016.06.006

Miljkovic, E., Ridjic, D., & Salkic, S. (2024). Stress coping skills and strategies as antidote to mental health for adult male migrants – open space for CBT interventions. *Journal of Evidence-Based Psychotherapies*, *24*(1), 3-20. https://doi.org/10.24193/jebp.2024.1.1

Mullarkey, M. C., Marchetti, I., & Beevers, C. G. (2019). Using network analysis to identify central symptoms of adolescent depression. *Journal of Clinical Child & Adolescent Psychology*, *48*(4), 656–668. https://doi.org/10.1080/15374416.2018.1437735

Mustață, A. E. (2021). The relationships between coping mechanisms, depression, anxiety and sleep disorders in cardiovascular patients. *Journal of Evidence-Based Psychotherapies*, 21(1), 37–56. https://doi.org/10.24193/jebp.2021.1.3

Noyes, B. K., Munoz, D. P., Khalid-Khan, S., Brietzke, E., & Booij, L. (2022). Is subthreshold depression in adolescence clinically relevant? *Journal of Affective Disorders*, *309*, 123–130. https://doi.org/10.1016/j.jad.2022.04.067

Ortiz-Orendain, J., Gardea-Resendez, M., Castiello-de Obeso, S., Golebiowski, R., Coombes, B., Gruhlke, P. M., Michel, I., Bostwick, J. M., Morgan, R. J., Ozerdem, A., Frye, M. A., & McKean, A. J. (2023). Antecedents to first episode psychosis and mania: Comparing the initial prodromes of schizophrenia and bipolar disorder in a retrospective population cohort. *Journal of Affective Disorders*, *340*, 25–32. https://doi.org/10.1016/j.jad.2023.07.106

Robinaugh, D. J., Millner, A. J., & McNally, R. J. (2016). Identifying highly influential nodes in the complicated grief network. *Journal of abnormal psychology*, *125*(6), 747–757. https://doi.org/10.1037/abn0000181

Rudolph, J. E., Fox, M. P., & Naimi, A. I. (2021). Simulation as a tool for teaching and learning epidemiologic methods. *American Journal of Epidemiology*, *190*(5), 900–907. https://doi.org/10.1093/aje/kwaa232

Sobański, J. A., Klasa, K., Dembińska, E., Mielimąka, M., Citkowska-Kisielewska, A., Jęda, P., & Rutkowski, K. (2023). Central psychological symptoms from a network analysis of patients with anxiety, somatoform or personality disorders before psychotherapy. *Journal of Affective Disorders*, *339*, 1–21. https://doi.org/10.1016/j.jad.2023.06.040

Van Borkulo, C. D., van Bork, R., Boschloo, L., Kossakowski, J. J., Tio, P., Schoevers, R. A., Borsboom, D., & Waldorp, L. J. (2023). Comparing network structures on three aspects: A permutation test. *Psychological Methods*, *28*(6), 1273–1285. https://doi.org/10.1037/met0000476

Van Borkulo, C., Boschloo, L., Borsboom, D., Penninx, B. W. J. H., Waldorp, L. J., & Schoevers, R. A. (2015). Association of symptom network structure with the course of depression. *JAMA Psychiatry*, *72*(12), 1219. https://doi.org/10.1001/jamapsychiatry.2015.2079

Van De Leemput, I. A., Wichers, M., Cramer, A. O. J., Borsboom, D., Tuerlinckx, F., Kuppens, P., Van Nes, E. H., Viechtbauer, W., Giltay, E. J., Aggen, S. H.,

Derom, C., Jacobs, N., Kendler, K. S., Van Der Maas, H. L. J., Neale, M. C., Peeters, F., Thiery, E., Zachar, P., & Scheffer, M. (2014). Critical slowing down as early warning for the onset and termination of depression. *Proceedings of the National Academy of Sciences*, *111*(1), 87–92. https://doi.org/10.1073/pnas.1312114110

Yang, M., Si, S., Zhang, K., Xi, M., & Zhang, W. (2024). Bridging the relationship between physical exercise and mental health in adolescents based on network analysis. *PsyCh Journal*. https://doi.org/10.1002/pchj.756

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 45-76.

10.24193/jebp.2025.1.3

THE TEST RELATED NEGATIVE COGNITIONS SCALE: A KEY PIECE OF THE PUZZLE IN UNDERSTANDING THE RELATIONSHIP BETWEEN TEST ANXIETY AND PSYCHOLOGICAL RESOURCES

Türkan Doğan[1], Ercan Akın[1], Eyüp Sabır Erbiçer[1], Nilüfer Koçtürk[1], Duygu Betül Özkanca[2], Elif Özüm Kuş[3], Cemile Dur Öztürk[1], M. Furkan Kurnaz[4], and Ahmet Metin[5]*

[1] Department of Guidance and Psychological Counseling, Hacettepe University, Ankara, Türkiye.
[2] Department of Guidance and Psychological Counseling, Bahcesehir University, Istanbul, Türkiye.
[3] Department of Psychology, Haliç University, Istanbul, Türkiye.
[4] Department of Guidance and Psychological Counseling, Necmettin Erbakan University, Konya, Türkiye.
[5] Department of Guidance and Psychological Counseling, Erciyes University, Kayseri, Türkiye.

Abstract

The present study aims to develop a valid and reliable scale to assess test-related negative cognitions of adolescents and examine whether these negative cognitions mediate the relationship between psychological resources (self-esteem and resilience) and test anxiety. A total of 446 participants were included in Study I (58.20% female, average age 15.69) and 466 (66.7% female, average age 15.06) in Study II. The data collection instruments included the Test-Related Negative Cognitions Scale (TRNCS), the Test Anxiety Inventory, the Brief Resilience Scale, and the Two-Dimensional Self-Esteem Scale. The study showed that the TRNCS, consisting of 15 items, explains 68% of the total variance and has a Cronbach alpha (α) value of 0.92. Confirmatory factor analysis revealed that items were fitted to four factors, and standardized item loadings ranged from .59 to .94. TRNCS is a valid and reliable tool for measuring students' test-related negative cognitions. Results indicated that test-related negative cognitions mediated the relationships between psychological resources and test anxiety. Based on the cognitive behavioral therapy model's understanding of the mutual influence of psychological resources, negative thought patterns, and anxiety, it is recommended that interventions aimed directly at identifying

[*] Correspondence concerning this article should be addressed to Ercan Akın, Ph.D, the Department of Guidance and Psychological Counseling, Hacettepe University, Ankara, Türkiye ORCID: https://orcid.org/0000-0002-7281-6848.
Mobile: +90 5076579914
Email: ercnakn@gmail.com

and addressing test-related negative cognitions may be effective in reducing test anxiety.

Keywords: test anxiety, negative cognitions, adolescent, resilience, self-esteem.

In modern education, it is commonplace for tests to be used as a decision-making tool, and individuals may encounter testing with regularity from early childhood until late adulthood. However, academic exams are a significant source of stress for many children and adolescents (Ergene, 2003; McDonald, 2001). Test anxiety, a common response to the stress of academic examinations (Brodersen, 2017; Gibson, 2014), is a form of anxiety that specifically pertains to the situation an individual experiences before, during, and after an evaluative situation (Zeidner, 1998; 2014). It refers to the subjective experience of intense physiological, cognitive, and/or behavioral anxiety symptoms that affect test performance before or during the test. Physiological arousal, tension, intrusive thoughts, intense worry, and mental disorganization typically characterize it (Sawka-Miller, 2011). Test anxiety interferes with learning through deficiencies in encoding, organization, and storage (Cassady, 2004). Students with test anxiety are easily distracted by cognitive tasks and have difficulty understanding relatively simple instructions and questions (Zeidner, 2014). Test anxiety, which often has destructive consequences in learning and achievement environments, is quite common (Roos et al., 2021). Related studies have estimated the prevalence of test anxiety for school-age children to be between 10% and 40% (McDonald, 2001; Putwain & Daly, 2014). The study conducted in Turkey regarding the prevalence of test anxiety revealed that among the student population surveyed, 19% exhibited low levels of test anxiety, 42% displayed moderate levels, and 39% were found to have high levels of test anxiety (Yıldırım, 2008). Elevated levels of test anxiety among students have been empirically linked to diminished academic performance (Cassady & Johnson, 2002; Putwain & Daly, 2013) and academic achievement in comparison to their peers exhibiting lower levels of test anxiety (Peleg, 2009). As a matter of fact, meta-analysis results also showed that high test-anxious students cannot perform their real performance due to their anxiety (Hembree, 1988; Seipp, 1991; von der Embse et al., 2018). However, students with test anxiety confront not only academic challenges but may also encounter concomitant mental health issues (Huntley et al., 2019; Soares & Woods, 2020). It was found that test anxiety is associated with depression, hopelessness, low self-esteem, trait anxiety, and suicidal ideation (Kavakçı et al., 2014; King et al., 1995; Peleg, 2009). Accordingly, it can be said that intensive test anxiety negatively affects students' academic, social, and psychological development.

Test anxiety is a multidimensional construct with more than one interrelated component (Gibson, 2014; Roos et al., 2021). Firstly, Liebert and Morris (1967)

conceptualized test anxiety as a two-component construct of worry and emotionality. The worry aspect involves negative thoughts, beliefs, or cognitive patterns linked to the potential of test failure, whereas the emotionality aspect is connected to the feelings and physiological sensations experienced in the body (Akinsola & Nwajei, 2013; Cassady, 2004; Cizek & Burg, 2006). Over the years, several measurement tools have been developed to assess test anxiety and its dimensions. Historically, two-factor measurement tools, including emotionality and worry (Spielberger, 1980), have diversified with multidimensional measurement tools. In the literature, there are measurement tools that include worry and test-irrelevant thinking as a cognitive dimension, bodily symptoms and tension as an emotional dimension (Sarason, 1984), thoughts as a cognitive dimension, autonomic reactions as an emotional dimension, and off-task behaviors as a behavioral dimension (Wren & Benson, 2004). Similarly, theoretical developments of test anxiety have evolved parallel with the measurement. In the deficit model, test anxiety is attributed to a deficiency in the knowledge and skills necessary to perform well in evaluative situations (Tobias, 1985). Lowe et al. (2008) suggested a framework for the biopsychosocial model of test anxiety. Thus, they have employed social and educational contexts such as family and school in understanding test anxiety. After that, Segool et al. (2014) used statistical modeling to propose a cognitive-behavioral framework for test anxiety. This framework includes a systematic interaction of cognitive processes and perceptions, learning experiences, demographic characteristics, social and cultural context, and the contingencies present in the environment. Besides that, meta-analyses have indicated that the link between test performance and test anxiety is generally more strongly related to cognitive factors than emotional dimensions (Hembree, 1988; Seipp, 1991; von der Embse et al., 2018). As a matter of fact, meta-analyses and systematic literature reviews on interventions for test anxiety have concluded that cognitive, behavioral, or cognitive-behavioral interventions with study skill training are effective (Ergene, 2003; Hembree, 1988; Huntley et al., 2019; Soares & Woods, 2020).

Test Anxiety and Negative Cognitions

According to the cognitive-behavioral model, people's emotions, behavior, and physiology are influenced by their perception of events, and negative thoughts cause negative emotions (Beck, 2021). The cognitive processes mediate the behavioral and emotional responses of the person to stressful evaluation situations (Beck, 2021; Tabur et al., 2024; Zeidner, 2014). When a student evaluates the testing process as potentially dangerous and beyond their competence and coping resources, the interaction between the student and the testing environment will be assessed as stressful and anxiety-provoking (Zeidner, 1998). In the Self-Referent Executive Processing (S-REF) model (Zeidner & Matthews, 2005) test-anxious students assess testing situations as personally significant. In situations where failure is a possible

outcome, these students apply inefficient coping strategies that will reduce their negative emotions rather than the possibility of failure. Thus, the behavioral, emotional, and cognitive components of test anxiety create a self-perpetuating cycle of anxiety as stated in other test anxiety models (Flaxman et al., 2003; Lowe et al., 2008; Zeidner, 1998).

High-test-anxious students experience more negative cognition and subjective distress before, during, and after the test (Beidel & Turner, 1988). Negative thoughts related to the test can be exemplified as a lack of confidence in self-performance, preoccupation with humiliating thoughts of the self, feeling unprepared for the test, and making false interpretations of the self (Cassady & Johnson, 2002; Zeidner, 1998). Students have negative thoughts about their skills in studying and taking tests, and their academic competence (Zeidner & Matthews, 2005). With the fear of failure, students may think that the worst possible outcome will occur and that they will not pass the exam (for instance, "If I fail this exam, my entire life will be deemed a failure."). Students may overgeneralize one poor performance to predict future failures (for instance, "I will fail all the tests I take."). They also have negative thoughts about comparing themselves with their peers and how other people, like parents and teachers, will evaluate the test result. Beyond the individual and social factors related to the test, students may also have negative thoughts about the test arrangements, like test conditions, and time constraints (Hembree, 1988; Putwain, 2008; Putwain, 2009; Putwain et al., 2010). These negative cognitions increase test anxiety by triggering maladaptive coping behavior (von der Embse et al., 2013). Students with academic procrastination have more test anxiety, fear of humiliation, irrational and negative thoughts (Bolbolian et al., 2021). Test-anxious students divide their attention between self-related (task-irrelevant) and task-relevant thoughts and display relatively more negative and task-irrelevant thoughts than others. These thoughts prevent students from focusing on the test and reduce their performance (Hollandsworth et al., 1979; Pekrun et al., 2002; Lowe, 2018; Wine, 1971). As a result, negative thoughts about before, during, and after the test continue the cycle of test anxiety.

Although many researchers have identified negative thoughts as an important component of test anxiety (Díaz et al., 2001; Wine, 1971; Wong, 2008), few studies have measured negative thinking directly. In the study conducted by Wong (2008) on test anxiety and the cognitive triad, dysfunctional attitudes, irrational beliefs, and automatic thoughts, The Automatic Thoughts Questionnaire developed by Hollon and Kendall (1980) was used. However, this questionnaire was developed to measure negative automatic thoughts associated with depression. The Positive and Negative Thoughts Checklist, developed by Galassi et al. (1981), which aims to measure the frequency of positive and negative thoughts about a particular exam, is designed to be used to collect real-time data about students' thoughts during the exam. In the study conducted by Putwain et al. (2010), examining the role of cognitive distortions in the relationship between test anxiety and exam performance,

it was found that cognitive distortions in the academic field had a fully mediating role. The Children's Negative Cognitive Error Questionnaire (Leitenberg et al., 1986) used in this study measures the cognitive distortions of catastrophizing, overgeneralization, personalization, and selective abstraction. The sub-dimensions of the survey consist of six hypothetical scenarios in academic, social, and sports areas, and only the academic sub-dimension was used in the mediation analysis. The Cognitive Test Anxiety Scale developed by Cassady and Johnson (2002), which focuses on the cognitive aspect of test anxiety, has been adapted to many cultures and countries. However, initially developed as a unidimensional scale, the scale showed a multidimensional structure when adapted to the Argentinian sample (Furlan et al., 2009). The shortened version of the scale was adapted to the Persian sample, and the number of items was changed (Baghaei & Cassady, 2014). In the Turkish adaptation of the scale, items that did not have sufficient factor loadings were removed, and a unidimensional structure was obtained (Bozkurt et al., 2017). In the study of Németh and Bernáth (2023), conducted on a Hungarian sample, the scale was reported as a three-dimensional structure, including general anxiety, freezing, and fear of failure. As a result, questions remain regarding the scale's factor structure.

Psychological Resources

Psychological resources can be defined as entities that are valued either intrinsically or as a means to achieve valued ends (Hobfoll, 2002). Individual psychological resources refer to individual characteristics, traits, skills, and abilities contributing to well-being, stress resistance, and adaptation. These resources are actively utilized by individuals who face stressors and difficulties. Taking a test, with its before and after process, is a stressful situation that students try to cope with by activating their psychological resources (Feldman et al., 2015; Zeidner, 1998). Self-esteem, as an aspect of the self linked to resilience, is one of the individual psychological resources most strongly associated with test anxiety (Hembree, 1998; von der Embse et al., 2018). Students who possess sufficient resources are anticipated to hold positive beliefs regarding their capacity to effectively navigate a challenging examination scenario (Zeidner, 1998). According to cognitive-behavioral theory, it has been suggested that maintaining positive beliefs regarding oneself, the world, and the future can facilitate healthy adaptation and cultivate self-esteem (Beck, 1967) through the activation of positive automatic thoughts, which serve as a buffer against the impact of stress, ultimately enhancing resilience (Ingram & Wisnicki, 1988; Lightsey, 1996; McCann et al., 1988). Conversely, negative automatic thoughts can be a mediator of the effects of personality vulnerability factors, life events, and difficulties on mood (Kopala-Sibley & Santor, 2009). These thoughts can lead to self-criticism, anxiety, and depression, further reinforcing the individual's low self-esteem (Fennel, 1998). However, individuals with low self-

esteem evaluate daily events more negatively and perceive negative events as more personally important (Campbell et al., 1991). Likewise, resilience measures have also been found to have a negative correlation with negative cognitive constructs such as pessimism, self-blame, and denial (Smith et al., 2008). Negative thinking styles such as self-blame, rumination, blaming others, and catastrophizing have been found to play an important role in the relationship between the experience of negative life events and reporting symptoms of depression and anxiety (Garnefski et al., 2001). Also, these negative thinking styles have been found negatively correlated with resilience in patients with depression and/or anxiety disorders (Min et al., 2013).

Self-esteem

In the literature, self-esteem consists of definitions that historically emphasize the individual's self-evaluation, the cognitive process of self-definition, and the positive or negative affective degree regarding these aspects that define oneself. Afterward, self-esteem was defined in terms of the individual's worthiness and competence (Mruk, 2013). Tafarodi and Swann (2001) defined self-esteem as a two-dimensional structure, including all these elements: self-liking and self-competence. Self-liking entails evaluating oneself as a social entity, either positively or negatively. This overarching characteristic ultimately boils down to one's enduring, comprehensive perception of their value within society. Furthermore, self-competence refers to how one evaluates oneself as an active force, a deliberate entity capable of achieving desired results through the exertion of their will. It encompasses the general inclination towards viewing oneself either positively or negatively as a force of influence and effectiveness. According to Ferkany (2008), self-esteem can play an important role in developing the confidence and motivation necessary for students to be academically successful. When faced with a daunting or challenging task, students with self-doubt may have difficulty engaging with or concentrating on it to the extent necessary to complete it successfully. However, test anxiety and self-esteem are mutually interrelated, with each impacting the other (Dan & Raz, 2015). Hembree (1988) found that test anxiety has an inverse relationship with students' self-esteem. Martos et al. (2021) reported that higher levels of psychological resources, such as self-esteem, are associated with lower levels of test anxiety.

Many studies stated that there is a negative relationship between test anxiety and self-esteem, but the role of test-related negative cognitions in this relationship has not been thoroughly investigated (Barutçu Yıldırım & Demir, 2020; Fathalla, 2018; Peleg, 2009; Xie et al., 2019). Peleg (2009) found that disturbing thinking is related to test anxiety and self-esteem. On the other hand, Xie et al. (2019) stated that self-esteem has an indirect effect through control beliefs and a direct effect on math anxiety.

Resilience

Resilience is the ability to adapt and bounce back from adversity, threats, or significant sources of stress. It involves the capacity to withstand and recover from difficult situations, challenges, or setbacks. Resilience, effectively coping with and overcoming obstacles when they arise, is a dynamic process that can be developed and strengthened over time (Masten, 2021). In the educational context, resilience contributes to individuals' ability to assess their own strengths in the face of various academic and psychosocial challenges and demands (De La Fuente et al., 2017; Parlak et al., 2022). Pupils with resilience may be poised to outperform in demanding testing scenarios by upholding a confident belief in their abilities. They can sustain their motivation and perseverance or effectively manage adverse emotions, internal concerns, and external distractions that could impede their performance (Martin & Marsh, 2006). Hayat et al. (2021) found that self-efficacy's effect on test anxiety is mediated by resilience. Additionally, research shows that individuals with lower levels of resilience tend to experience higher levels of cognitive test anxiety (Lim & Chue, 2023). Similarly, although studies point to a negative relationship between test anxiety and resilience (Fathalla, 2018; Hayat et al., 2021; Liu et al., 2021; Trigueros et al., 2020), the role of test-related negative cognitions in this relationship has not been examined.

The Present Study

Students struggling with test anxiety tend to have more negative thoughts than others (Hollandsworth et al., 1979; Jolly et al., 2021; Maloney et al., 2014). Clinical experience of test anxiety emphasizes the importance of identifying and changing negative thoughts (Alibak & Alibak, 2021; Brown et al., 2011; D'Alelio & Murray, 1981; Demirci & Erden, 2016; Miloseva, 2012). Considering the literature on test anxiety, determining the negative thoughts of individuals related to testing can be important in understanding test anxiety and providing change. In addition, studies showed that self-esteem and resilience predict test anxiety negatively (Fathalla, 2018; Hayat et al., 2021; Trigueros et al., 2020; Xie et al., 2019). On the other hand, although it is known that self-esteem and resilience are related to negative cognitive structures (Campbell et al., 1991; Smith et al., 2008), the effect of negative cognitions on the relationship between resilience and self-esteem with test anxiety is not fully known. We consider that test-related negative cognitions may have a confounding effect on the relationship between resilience and self-esteem with test anxiety. Therefore, the present study aims to develop a valid and reliable scale to assess test-related negative cognitions of adolescents and examine the mediating role of cognitions in the relationship between test anxiety and self-esteem and resilience. Since the research indicated that test anxiety varies according to

gender, grade level, and grade point average (Chapell et al., 2005; Everson et al., 1991; Hembree 1988; McDonald 2001; Putwain et al., 2014; Szafranski et al., 2012; von der Embse et al., 2018) test anxiety scores were adjusted according to these variables in the mediation analysis.

Based on all these, the following hypotheses were addressed:

Hypothesis 1: The Test-Related Negative Cognitions Scale (TRNCS) developed in the sample of [masked], is a valid and reliable measurement tool.

Hypothesis 2: a) Test-related negative cognitions would relate to test anxiety, b) test-related negative cognitions would mediate in the relationship between resilience and test anxiety, and c) test-related negative cognitions would mediate in the relationship between self-esteem and test anxiety.

Study I: Scale Development

Method

Ten steps in scale development and reporting described by Carpenter (2018) were followed in reporting this study. In this phase of the study, we examined the reliability and Exploratory Factor Analysis (EFA) results of the TRNCS. Specifically, the stability and internal consistency, as well as the underlying structure of the items comprising, were evaluated through EFA.

Participants and Procedure

Carpenter (2018) highlighted the importance of conducting individual interviews that focused on the specific goal of the scale that was developed to generate and validate dimensions and items. Therefore, we conducted interviews with high school students who struggle with test anxiety to identify potential factors and items for the initial item pool. A total of 62 negative thoughts were obtained during the interviews with the students who struggle with test anxiety and literature review. After the evaluation of field experts and the relevant literature, the item pool was reduced to 51 items based on the components of test anxiety assessed by Hodapp and Benson (1997). A pre-test was conducted with a sample of twenty-four high school students to evaluate the scale's feasibility and preliminary psychometric properties. Pre-tests were used to improve the design and wording of scale items. Researchers can identify and address potential issues such as ambiguous wording, leading questions, confusing phrasing, difficult language, skipped items, sensitive topics, and missing items by conducting pre-tests (Carpenter, 2018). Based on the feedback obtained from the high school students who participated in the study, the TRNCS was finalized after incorporating minor item changes. The final draft of the

TRNCS consisted of 51 items, each comprising a five-point Likert-type scale ranging from "1= *Never*" to "5= *Always*."

We included 475 students from various high schools in the city of [masked] in Study I. However, 31 students were excluded from the analysis due to a high percentage of missing data, careless responses, and outliers. Therefore, the final sample for the analysis consisted of 446 students, including 182 (40.80%) boys, 260 (58.20%) girls, and four (0.90%) students who did not specify their gender. The average age of the participants was 15.69 (*SD* = 2.03, *Range* = 13-19), and the participants' grade point average for the last semester was 84.80 (*SD* = 10.70).

Data Analysis

R version 4.2.2 (R Core Team, 2022) was used to clean and pre-process data and for preliminary analyses. The following R packages were utilized: careless for inattentive responding, dplyr for data cleaning, mice for missing data imputation, corrplot for correlations, psych for Factor analysis, oblique rotations, and reliability analysis, and nFactors for estimating the number of factors. In determining the number of factors, both goodness of fit indexes and parallel analysis were considered.

Results

Factor loadings, descriptive statistics, item-total correlations, and reliability are presented in Table I. After verifying the accuracy and completeness of the data and identifying any potential outliers, we assessed the additivity of the scale by examining the correlations between individual items. The range of correlation coefficients between items in the scale was .20-.71. To determine whether the data were normally distributed, we generated random data, fit a linear model to it, standardized the fitted values of the model, and plotted a histogram of the standardized fitted values. We concluded that the data were normally distributed based on the resulting histogram. Additionally, the data met the assumptions of sphericity, as demonstrated by the results of Bartlett's test (χ^2 = 16,708.73, *df* = 1,275, $p < .001$) and sampling adequacy, as demonstrated by the results of the Kaiser-Meyer-Olkin test (KMO = .96). An EFA was then conducted using maximum likelihood extraction, direct oblimin rotation, and 100 iterations to analyze the internal structure of the scale. Four factors with eigenvalues greater than 1 emerged in the first analysis, explaining 49.8% of the variance. The factor loadings of individual items were then evaluated, revealing that, except for 29 items, most items had weak loadings, and seven items had cross-loading or no loading. After removing items incompatible with the factor structure, a two-factor structure was obtained based on eigenvalues.

Table I. Factor Loadings, Descriptive Statistics, Item-Total Correlations, and Reliability, Study I

Items	*M*	*SD*	Factor loadings	Item-Total correlations	Cronbach's alpha (α)
Catastrophizing failure					0.85
If I fail the test, it will be a total disaster.	3.39	1.26	0.83	0.81	
If I fail the test, all my hard work will be for nothing.	3.80	1.23	0.76	0.74	
If I fail the test, I will be ruined.	3.41		0.74	0.81	
Social consequences					0.88
If I fail the test, I will not be able to face my acquaintances.	2.57	1.46	0.69	0.80	
I will be disgraced if I do not pass the test.	2.74	1.53	0.91	0.87	
People will make fun of me if I do not pass the test.	2.31	1.48	0.80	0.79	
Distraction					0.86
What if I experience physical distress (headache, nausea, sweating, trembling, stomach-ache, etc.) during the test?	3.21	1.42	0.72	0.70	
During the test, there will be noises from outside, and I will be disturbed by these noises.	2.82	1.47	0.80	0.73	
I will not be able to focus on the questions in the test.	2.91	1.42	0.77	0.86	
I will not be able to concentrate on the test.	2.87	1.43	0.64	0.79	
Performance deficit					0.91
It is impossible to catch up with my competitors.	2.52	1.43	0.76	0.82	
No matter how hard I try, I will not succeed.	2.36	1.44	0.90	0.87	
I have just been lucky up until now; I will not be able to do it on the test.	2.29	1.43	0.76	0.77	
I will not even be able to do the questions I know in the test.	2.35	1.40	0.66	0.77	
I am not good enough to pass the test.	2.57	1.47	0.84	0.85	

Note. N = 446. Loadings are from EFA with maximum likelihood extraction and direct oblimin rotation

A parallel analysis with 51 items was conducted to identify the most appropriate set of items and factors. The new analysis resulted in an extraction of seven factors; the total variance explained was 55.6%. In this analysis, 19 items with loadings greater than .50 on 4 factors (with eigenvalues ranging from 1.02 to 19.21), with no cross-loading. The remaining factors were loaded with only two items, which were not deemed meaningful or defensible. Four factors with 19 items explained 63% of the variance. The reduced 19-item scale (loadings >.50) was re-evaluated by four field experts – two cognitive behavioral therapists and two test anxiety researchers and the items' content validity and four-dimensional structure were re-examined. A consensus was reached, and four items were identified as redundant or not close enough to the conceptual definition.

Reliability analysis using 51 items yielded a Cronbach's alpha (α) of .97. The first factor analysis identified two factors formed by 27 items with loadings greater than .50, with Cronbach's alphas (α) of .91 and .92, but the factor structure was

unclear. The Cronbach's alpha (α) values of the factors obtained through parallel analysis and formed by 15 items with factor loadings greater than .50 were found to be between .85 and .91. Goodness of fit indices were used to compare the two constructs. It was found that the 4-factor structure from parallel analysis (χ^2 (101) = 220.86, $p < .001$, CFI = .98, TLI = .96, RMSEA = .05, SRMR = .03) had better values and was more explainable and meaningful than the 2-factor structure based on eigenvalues (χ^2 (298) = 1467.71, $p < .001$, CFI = .86, TLI = .84, RMSEA = .09, SRMR = .05).

Discussion

Study I indicated that the TRNCS comprises four dimensions. Factor analysis allowed the identification of the most central items in the scale. The Cronbach's alpha (α) for the final 15 items, which comprised the performance deficit (5 items), social consequences (4 items), distraction (3 items), and catastrophizing failure (3 items) subscales, was found to be 0.92, indicating that these items demonstrated high levels of internal consistency. The Cronbach alpha (α) values of all sub-dimensions ranged between .81 and .92. These items explained 68% of the total variance, *M* = 2.40 (*SD* = 1.20) across all items.

Study II: Scale Validation and the Mediation Model

Method

At this step of the present study, the internal structure of the TRNCS was assessed by confirmatory factor analysis (CFA) using maximum likelihood estimation. Correlational analyses were then used to assess how strongly the scale was associated with similar concepts (i.e., test anxiety) for convergent validity. Correlational analyses were also used to compare the scale to other variables (i.e., self-esteem and resilience) for criterion validity. Additionally, reliability was calculated with different coefficients such as Cronbach alpha (α) and McDonald's omega (ω). Finally, we examined the mediating role of test-related negative cognitions in the associations between resilience, self-esteem, and test anxiety.

Participants and Procedure

Study II consisted of 466 high school students recruited from [masked]. The sample was 66.7% (*n* = 311) female and 33.3% (*n* = 155) male. The mean age of participants was 15.06 (*SD* = 1.35, *Range* = 13-19 years). Regarding the school year, the sample was 33.7% (*n* = 157) freshmen, 18.0% (*n* = 84) sophomores, 25.8% (*n* =

120) juniors, and 22.5% (*n* = 105) seniors. Finally, the grade point average of the participants was 81.10 (*SD*= 13.00, *Range*= 38-100).

The data were collected from [masked] in [masked] via Google Forms between November and December 2022. Students received a form for parental and informed consent. Depending on the respondents, filling out the screening tools took an average of twenty minutes. The research team meticulously followed the principle of confidentiality during data collection.

Measures

The *Test Anxiety Inventory (TAI),* developed by Spielberger (1980) and adapted into Turkish by Öner (1990), was used for the tests of convergent validity to measure test anxiety. Each item was rated on a scale from (1 = *never*, 4 = *always*). The scale has two sub-dimensions (worry and emotionality) and consists of 20 items. A high score on the scale indicated greater test-related anxiety. Some scale items are as follows: *"I feel safe and comfortable during the test"* and "*I can't help thinking about the consequences of failing during tests."* The adaptation of the scale into Turkish indicated that the reliability coefficient (Cronbach alpha [α]) was .87 and test-retest reliability was .80 for the scale. In this study, Cronbach alpha (α) coefficient was found to be .94.

The *Brief Resilience Scale (BRS)* and *Two-Dimensional Self-Esteem (TDSE)* were used for the tests of criterion validity. The BRS, developed by Smith et al. (2008) and adapted into Turkish by Doğan (2015), was used to measure the level of individual resilience. The BRS includes six items. Each item was rated on a scale from (1 = *strongly disagree*, 4 = *strongly agree*). Doğan (2015) stated that the one-dimensional structure of the Turkish BRS showed acceptable fit indices: χ^2(12.86/7) = 1.83, NFI = .99, NNFI = .99, CFI = .99, IFI = .99, RFI = .97, GFI = .99, AGFI = .96, RMSEA = .05, SRMR = .03. Some of the scale items are as follows: *"I tend to bounce back quickly after hard times*" and "*It does not take me long to recover from a stressful event*." We found the Cronbach alpha (α) coefficient of BRS .80, in this study.

The TDSE, developed by Tafarodi and Swan (2001) and adapted into Turkish by Doğan (2011), was used to measure the level of individual self-esteem. The CFA result showed that the scale's two-factor structure was confirmed as in its original form (Doğan, 2011). The Cronbach's alpha (α) coefficient was found to be .83 for "self-liking" and .74 for "self-competence.", in adaptation study. The test-retest reliability coefficient was also found to be .72 for both factors. Two-factor structure of the Turkish TDSE showed acceptable fit indices: χ^2 (258.93/98) = 2.64, NFI = .95, CFI = .97, IFI = .99, RFI = .94, GFI = .94, AGFI = .91, RMSEA = .05. Some of the scale items are as follows: *"I am highly effective at the things I do*" and "*I never doubt my personal worth*." In this study, Cronbach alpha (coefficient) was found to be .91.

Data Analysis

The internal structure of the TRNCS was assessed by CFA using maximum likelihood estimation in Mplus 8.8. Software (Muthén & Muthén, 1998; 2019). Model chi-square test (χ^2), Tucker-Lewis index (TLI), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), and comparative fit index (CFI) were used to evaluate model fit. In addition, the relationship of the TRNCS with test anxiety (convergent validity) and self-esteem and resilience (criterion validity) was calculated with the correlation coefficient in R version 4.2.2 (R Core Team, 2022). Reliability was also calculated with different coefficients, such as Cronbach alpha (α) and McDonald's omega (ω) in R version 4.2.2 (R Core Team, 2022). Finally, CFA and structural equation modeling (SEM) were conducted using Mplus 8.8 software (Muthén & Muthén, 1998; 2019) to examine the mediating role of test-related negative cognitions in the associations between resilience, self-esteem, and test anxiety. Weighted least squares estimation with a mean and variance-adjusted (WLSMV) chi-square was used, along with a polychoric covariance matrix and probit factor loadings (Lei & Shiverdecker, 2020) to test the individual CFAs of the variables of self-esteem, resilience, and test anxiety. The self-esteem measurement was treated as summed scores for two different subscales due to the results of the CFA, indicating low goodness of fit indexes for the scale. To test for mediation, the cross-products of the direct effects were calculated to obtain the indirect effects (Hayes, 2017). The Delta Method was used to estimate the standard errors of the indirect effects with 1000 nonparametric bootstrapped replications.

Results

The TRNCS Properties

The CFA revealed that the items were fitted to four factors, and the model showed perfect model fit with the 15-item TRNCS; WLSMV $\chi^2(86, N = 466) = 361.81$, $p < .001$, CFI = .98, TLI = .97, RMSEA = .08 (90% CI [.08, .09]), SRMR = .04. Standardized item loadings ranged from .59 to .94, and standardized item covariance residuals ranged from .11 to .65. The CFA is presented in Figure I.

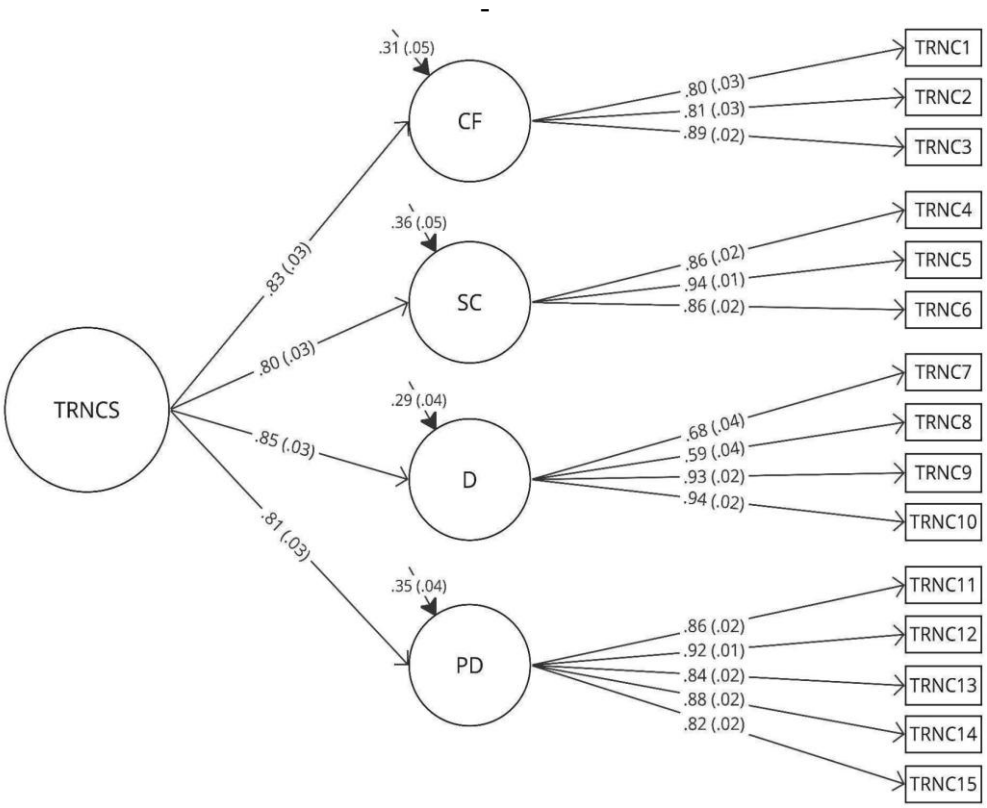


Figure I. Confirmatory Factor Analysis for Test-Related Negative Cognitions Scale

Note. TRNCS: Test related negative cognitions scale; CF: Catastrophizing failure; SC: Social consequences; D: Distraction; PD: Performance deficit.

Convergent and criterion validity results are presented in Table II. Related concepts for tests of convergent validity showed that the TRNCS total score was positively correlated with TAI total score (r = .762, p < .001). Sub-dimensions of the TRNCS, including performance deficits (r = .588, p < .001), social consequences (r = .460, p < .001), distraction (r = .693, p < .001), and catastrophizing failure (r = .605, p < .001), were positively correlated with the worry, a sub-dimension of the TAI. Moreover, significant positive relationships were found between TRNCS sub-dimensions and emotionality, another sub-dimension of the TAI (r = .672, .460, .675, .603, respectively, and p < .001 for all effect sizes).

Table II. Convergent and Criterion Validity Measures

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Performance deficits[a]	12.40	6.16												
2. Social consequences[a]	7.38	3.92	.535***											
3. Distraction[a]	11.90	4.57	.600***	.519***										
4. Catastrophizing failure[a]	9.46	3.58	.516***	.615***	.572***									
5. TRNCS Total	41.10	15.00	.858***	.788***	.825***	.787***								
6. Emotionality[b]	30.60	8.70	.672***	.460***	.675***	.603***	.747***							
7. Worry[b]	19.10	6.12	.588***	.460***	.693***	.605***	.719***	.832***						
8. TAI Total	49.70	14.20	.650***	.480***	.715***	.631***	.762***	.941***	.971***					
9. BRS	16.60	5.40	-.391***	-.351***	-.434***	-.415***	-.485***	-.424***	-.468***	-.470***				
10. Self-liking[c]	25.50	8.10	-.524***	-.404***	-.425***	-.389***	-.544***	-.444***	-.432***	-.455***	.455***			
11. Self-competence[c]	23.50	6.37	-.573***	-.379***	-.470***	-.403***	-.575***	-.478***	-.454***	-.484***	.470***	.742***		
12. TDSE Total	49.00	13.50	-.584***	-.421***	-.476***	-.423***	-.597***	-.491***	-.473***	-.501***	.494***	.949***	.916***	

Note. N= 466. TAI= Test Anxiety Inventory, TRNCS= Test Related Negative Cognitions Scale. BRS= Brief Resilience Scale, TDSE= Two Dimensional Self-Esteem Scale. [a] Subscale of the TRNCS, [b] Subscale of the TAI, [c] Subscale of the TDSE. ***$p < .001$.

Related concepts for tests of criterion validity, which examined how test-related negative cognitions related to variables that were expected to be influenced by or influence test-related negative cognitions, also revealed that the TRNCS total score was negatively correlated with the BRS (r = -.485, p < .001). Additionally, all TRNCS sub-dimensions, including performance deficits (r = -.391, p < .001), social consequences (r = -.351, p < .001), distraction (r = -.434, p < .001), and catastrophizing (r = -.415, p < .001) were negatively correlated with the BRS. On the other hand, results indicated that TRNCS total score was negatively correlated with the TDSE total score (r = -.597, p < .001). Similarly, all TRNCS sub-dimensions, including performance deficits (r = -.524, p < .001), social consequences (r = -.404, p < .001), distraction (r = -.425, p < .001), and catastrophizing failure (r = -.389, p < .001) were negatively correlated with self-liking, a sub-dimension of the TDSE. Moreover, significant negative relationships were observed between these TRNCS sub-dimensions and self-competence, another sub-dimension of the TDSE (r = -.573, -.379, -.470, and -.403, respectively, p < .001for all effect sizes).

The reliabilities of the 15-item TRNCS with four factors revealed that the Cronbach's alpha (α) (performance deficits = .83; social consequences= .87; distraction = .81; catastrophizing = .91; and the TRNCS Total = .92), and McDonald's omega (ω) (performance deficits = .83; social consequences = .88; distraction = .83; catastrophizing = .91; and the TRNCS Total = .93) were highly acceptable (*Hypothesis 1*).

The Results of SEM

We conducted SEM analysis to examine the mediating role of test-related negative cognitions in the associations between resilience, self-esteem, and test anxiety. Based on the theory and relevant literature, the general trend in the hypotheses of this study is that test-related negative cognitions represent the cognition dimension from cognitive behavioral therapy (CBT), associated with test anxiety, and mediating relations between resilience, self-esteem, and test anxiety. Resilience and self-esteem are related to test-related negative cognitions, which in turn are believed to contribute to test anxiety, including worry and emotionality dimensions. Additionally, grade level, grade point average (GPA), and gender (being female) have been identified as factors that may increase the severity of test anxiety (von der Embse et al., 2018). This model aligns with the principles of cognitive-behavioral therapy, which suggest that psychological difficulties often stem from maladaptive thinking patterns. The research model for this study is presented in Figure II.

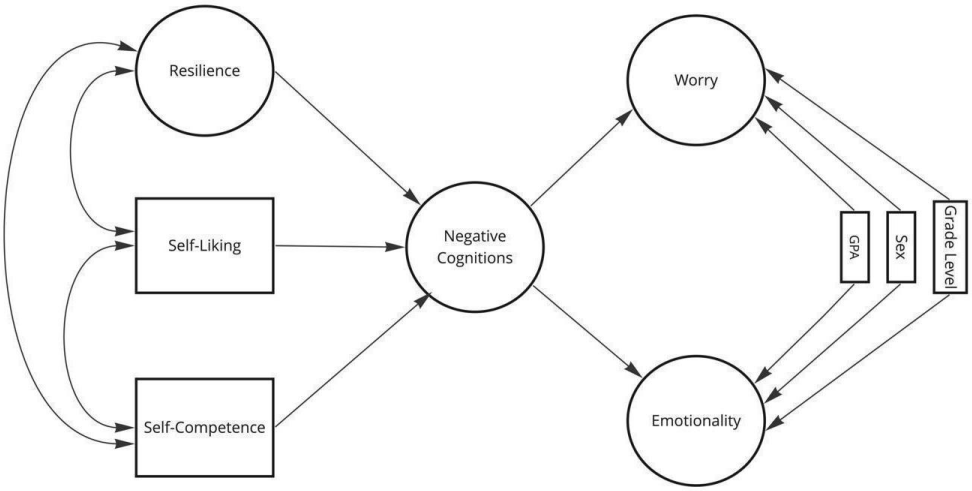


Figure II. Hypothesized Model for Psychological Contributors to Test Anxiety, Adjusting for Sex, GPA, and Grade Level

Note. Latent variables are represented by circles, while squares represent observed variables. Negative Cognitions = Test Related Negative Cognitions.

The CFA results for individual scales showed that sub-dimensions of test anxiety (i.e., worry and emotionality) measured by the TAI demonstrated good fit, $\chi^2(169, N = 466) = 505.07$, $p < .001$, CFI = .97, TLI = .97, RMSEA = .07 (90% CI [.06, .07]), SRMR = .04. Resilience that is measured by the BRS demonstrated adequate fit when the residual error variances of items 1 (*I tend to bounce back quickly after hard times*) and 3 (*It does not take me long to recover from a stressful event*) were correlated, as these items can be understood in the same way, especially in their Turkish translations, WLSMV $\chi^2 (8, N = 466) = 28.25$, $p < .001$, CFI = .96, TLI = .93, RMSEA = .07 (90% CI [.05, .10]), SRMR = .04. However, self-esteem did not show adequate fit WLSMV $\chi^2(100, N = 466) = 589.55$, $p < .001$, CFI = .82, TLI = .79, RMSEA = .10 (90% CI [.09-.11]). Therefore, two dimensions of self-esteem (i.e., self-liking and self-confidence) were treated as summed scores in SEM analysis.

The model shown in Figure II was tested and found to fit reasonably adequate based on most indices, $\chi^2 (971, N = 466) = 1977.88$, $p < .001$, CFI = .95, TLI = .95, RMSEA = .047 (90% CI [.04, .05]), SRMR = .09. Standardized parameter estimates with standard errors are presented in Figure III. It was found that both aspects of self-esteem, self-liking and self-confidence and resilience significantly predicted test-related negative cognitions when adjusting for sex, grade, and GPA. These results were in line with the hypotheses that lower self-esteem and resilience

would be associated with increased negative cognitions, significantly predicting higher levels of worry and emotionality in test anxiety (*Hypothesis 2*a). Additionally, the female sex was found to significantly predict higher levels of worry (β = -.26, *SE* = .04, *p* < .001) and emotionality (β = -.35, *SE* = .04, *p* < .001), while a higher GPA was significantly predicted lower levels of worry (β = -.19, *SE* = .05, *p* < .01). However, GPA did not significantly predict emotionality (β = -.04, *SE* = .05, *p* > .05). While a higher grade level was found to predict lower levels of worry significantly (β = -.09, *SE* = -.05, *p* < .05), it was found to predict emotionality insignificantly (β = .07, *SE* = .04, *p* > .05).

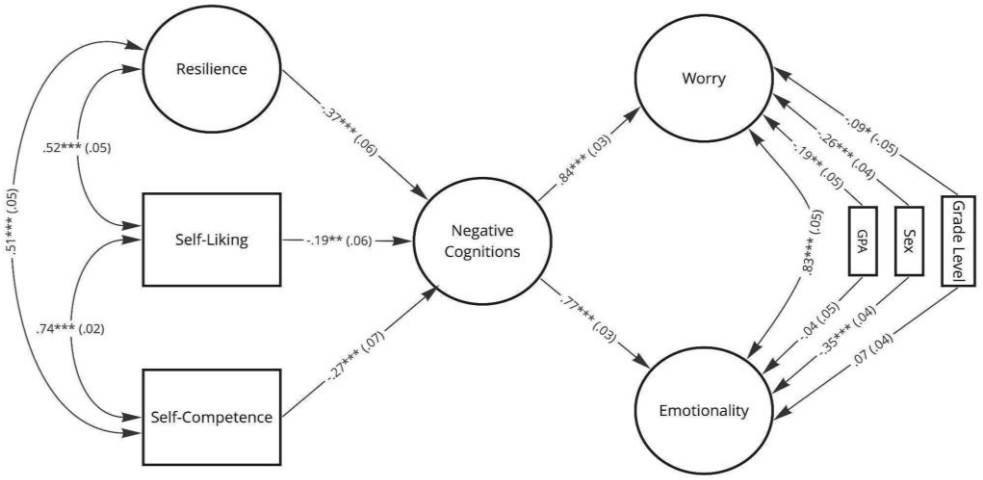


Figure III. SEM Model with Standardized Path Coefficients

Note. Circles represent latent variables, while squares represent observed variables. Negative Cognitions = Test Related Negative Cognitions, Sex was coded as female = 1, male = 2. Grade Level was coded as 1= freshman, 2 = sophomore, 3 = junior, 4 = senior. Factor loadings for the latent variables have been omitted for simplicity. However, they are available upon request to the first author. **p* < .05, ***p* < .01, ****p* < .001.

Finally, the mediation effects of negative cognitions between self-esteem dimensions and resilience on test anxiety dimensions were statistically significant, see in Figure III. First, in accordance with *Hypothesis 2*b, negative cognitions mediated the relationships between resilience and both worry (β = -.31, *SE* = .05, *p* < .001) and emotionality (β = -.28, *SE* = .05, *p* < .001) dimensions of test anxiety. Additionally, as predicted in *Hypothesis 2*c, negative cognitions mediated the relationships between self-competence and both worry (β = -.22, *SE* = .06, *p* < .001) and emotionality (β = -.21, *SE* = 0.05, *p* < .005) dimensions of test anxiety. Similarly, the relationship between self-liking and both the worry (β = -.16, *SE* = .05, *p* < .001) and emotionality (β = -.15, *SE* = .05, *p* < .005) dimensions of test anxiety was mediated by negative cognitions.

Discussion

The results of Study II showed that TRNC is a valid and reliable scale to assess negative cognitions related to testing, and it consists of four subscales: Performance deficit, social consequences, distraction, and catastrophizing failure. The performance deficit sub-scale consisted of students' cognitions indicating that they did not believe themselves to be sufficiently competent or skilled to complete the exam successfully. These thoughts may have reflected a lack of confidence in their academic abilities or a perception that they could not achieve the desired outcome. The social consequences sub-scale consists of thoughts that excessively anticipate adverse reactions and attitudes from the environment if students' test results are unsatisfactory. These cognitions may involve overestimating the negative consequences of not achieving the desired outcome. The cognitions comprising the distraction sub-scale are beliefs that students will be unable to control their anxiety or maintain focus during the exam. These thoughts may involve a perception of an inability to manage anxiety or concentrate effectively during the test-taking situation. Finally, the catastrophizing failure sub-scale consists of cognitions that pertain to the perceived negative impact on one's life if the desired outcome is not achieved on the test. These cognitions may involve exaggerating the negative consequences of not achieving the desired result.

According to the cognitive model, anxiety is characterized by an inaccurate assessment of one's personal coping resources, leading to a misperception of one's ability to handle a perceived threat. This model suggests that anxiety involves overestimating the threat and underestimating one's capacity to cope with it (Clark & Beck, 2011). In this study, we considered self-esteem and resilience as psychological resources and test anxiety as an outcome and tested whether negative cognitions significantly affect these relationships. The results of Study II indicated that lower self-esteem and resilience would be associated with increased test-related negative cognitions, significantly predicting higher levels of worry and emotionality in test anxiety. Moreover, students' negative cognitions about testing play a significant mediating role between their self-esteem, resilience, and their levels of test anxiety.

General Discussion

The purpose of the present study was to develop the TRNCS to measure students' negative cognitions related to testing and examine whether these cognitions significantly influence the relationship between test anxiety, self-esteem, and resilience. The study's results showed that the TRNCS is a valid and reliable tool for measuring students' test-related negative cognitions, confirming *Hypothesis 1*.

Additionally, the findings revealed that students' test-related negative cognitions predict test anxiety (*Hypothesis 2*a) with resilience and self-esteem being significant predictors of these cognitions. Finally, it was observed that test-related negative cognitions play a significant mediating role in the relationships between resilience (*Hypothesis 2*b), self-esteem (*Hypothesis 2*c), and test anxiety levels, even after adjusting for sex, GPA, and grade level.

However, it is noteworthy to recognise that within the broader context of the literature, there are studies suggesting that fear plays a potential positive role in enhancing motivation to a certain extent (Cassady & Johnson, 2002; Howard, 2020; Kader, 2016; Putwain, 2009). Although our study focused on the negative effects of test anxiety, it is important to recognise the nuanced interaction between anxiety and motivation.

This study's primary and significant finding is that a valid and reliable scale capable of measuring test-related negative cognitions has been developed. There was a need for the development of a scale to identify maladaptive negative cognitions related to testing, specifically for professionals and researchers focusing on test anxiety and applying CBT as a treatment approach. Professionals can use this measurement tool to evaluate the process and effectiveness of CBT interventions (e.g., before and after cognitive restructuring). By actively examining and challenging negative thoughts, individuals can learn to replace them with more adaptive and healthy thoughts that may help to reduce anxiety and improve overall well-being (Beck, 2021; Clark & Beck, 2011). This study's results align with the findings of Zeidner (1998), who reported that negative thoughts related to the test may be as self-doubt about one's performance abilities, preoccupation with self-deprecating thoughts, and making negative self-statements. However, this study found that individuals who struggle with test anxiety may develop negative beliefs about themselves and others, the future, and the test itself. In other words, the content of negative cognitions may change in individuals with test anxiety, similar to the cognitive triad included in the CBT's theoretical explanation of depression (Beck, 2021), and test-related negative cognitions are also included. Therefore, the scale developed in this study can facilitate the identification of the areas in which students develop negative cognitions, as well as the specific content of these cognitions, which can guide the development of interventions and provide clinicians with a useful tool for identifying these negative thoughts.

The results of SEM, the second aim of this study, showed that self-esteem indirectly affects test anxiety through test-related negative cognitions. In other words, self-esteem is indirectly related to test anxiety, and negative cognitions mediate or influence the relationship. It may be the case that individuals with lower self-esteem have more negative cognitions, leading to higher test anxiety levels. Moreover, individuals with high self-competence tend to place significant value on achieving their goals, making the reduction of test-related negative cognitions–a sign of progress towards desired outcomes–more effective. Likewise, those with a strong

sense of self-liking tend to exhibit fewer test-related negative cognitions. Hiçdurmaz et al. (2017) also found that self-esteem significantly predicted negative automatic thoughts and mental health symptoms among university students. Given the established between heightened levels of negative cognitions about tests or exams and increased test anxiety (Maloney et al., 2014), it is reasonable to posit that individuals' levels of self-competence and self-liking may mitigate test anxiety levels through their impact on test-related negative cognitions. Xie et al. (2019) similarly discovered direct and indirect effects of self-esteem on math anxiety among young men. Based on our study's findings, interventions aimed at reducing test-related negative cognitions while enhancing self-competence and self-liking could effectively alleviate test anxiety. However, since our study adopted a relational model, further research employing a causal model is warranted to establish definitive conclusions.

Another result of the SEM revealed that resilience indirectly affected test anxiety through test-related negative cognitions. In other words, even if students have high levels of resilience, which is conceptualized as the ability to withstand and recover from stress or distress (Luthar et al., 2000), if they have less negative cognitions about taking the test, and as a result they more less experience test anxiety. In this context, Mak et al. (2011) reported a significant association between resilience and positive cognitions about the self, the world, and the future. Specifically, individuals with higher levels of resilience had significantly more positive cognitions about self-competence for the test and reported significantly higher levels of life satisfaction and lower levels of depression. Students' past experiences in academic settings and the challenges they have encountered are crucial in building resilience. As a result, the more resilient students are, the better equipped they will be to manage their anxiety when faced with a new academic challenge (Trigueros et al., 2020; Jamshidi et al., 2018), because they have less test-related negative cognitions. In this context, it is suggested that the negative impact of test-related negative cognitions on test anxiety can be reduced through interventions working with improving resilience.

In addition to the influence of test-related negative cognitions on test anxiety, the effect of gender and GPA should not be ignored. Our study found that both gender and GPA (particularly GPA) are significant variables affecting test anxiety, which is in line with previous research (von der Embse et al., 2018; Zamir et al., 2021). The impact of GPA on students' test anxiety may be due to the fact that high school grade point averages are given extra weight in university entrance exams in [masked]. Further investigation is recommended to determine the reasons for the higher levels of test anxiety among female students and to develop potential interventions.

In conclusion, the results of this study highlight the utility of the TRNCS as a tool for assessing negative cognitions of students struggling with test anxiety. By identifying and addressing negative cognitions, students can learn to cope with test

anxiety more adaptively and positively, which may contribute to improved academic performance and overall functioning. The results of the SEM analysis suggest that low levels of self-esteem and resilience, as psychological resources, negatively affect test anxiety through test-related negative cognitions. Based on the CBT model's understanding of the mutual influence of these variables, it is recommended to identify children at risk by using various measurement tools, to provide services through school psychological counseling and guidance units, and to intervene in negative cognitions by conducting studies to increase self-esteem to reduce test anxiety effectively. Overall, this study adds to the growing body of research on the role of negative cognitions in test anxiety and the potential for CBT-based interventions to address these cognitions and alleviate anxiety.

Although the current study provides important information on test-related negative cognitions, a few limitations should be considered when interpreting the results. The sample of this study was taken from a metropolitan city, which may not be representative of the population, especially from rural areas. As a result, it is possible that the results of this study may not generalize to other regions or countries. Also, there may have been limitations in reporting cognitions because the cognitions that emerged during the test could not be measured during test-taking, and participants may have yet to remember the cognitions in their initial state due to the time factor. Moreover, the use of self-report scales to measure the variables may have introduced bias and may not accurately reflect the true cognitions or behaviors of the students. Finally, the current study employed a cross-sectional design that captures a snapshot of variables at a specific point in time. While this approach provides valuable insights into the relationships between variables, it may limit our ability to establish causality and trace developmental patterns. Future research endeavours could consider using longitudinal studies. Additionally, it is important to note that this study didn't utilize data based on test performance. Overall, these limitations should be considered when considering the implications of the study's findings.

Authors' Notes

Ethical Approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Two studies also received ethical approval from the Non-interventional Clinical Researches Ethics Board, Hacettepe University (13/01/2022; Application No: 16969557-64) and Ethics Board of Ministry of National Education in Türkiye (08/03/2022; Application No: E-59090411).

Competing Interests: All authors declare no conflict of interest.

Informed Consent: Online informed consent was obtained from all participants and their parents.

Data Availability: The corresponding author can provide the dataset analyzed for this study upon request.

Funding: This study is supported by the Scientific and Technological Research Council of Türkiye [TÜBİTAK-ARDEB-221K182].

Acknowledgements: None.

References

Akinsola, E. F., & Nwajei, A. D. (2013). Test anxiety, depression and academic performance: Assessment and management using relaxation and cognitive restructuring techniques. *Psychology, 4*(6A1), 18–24. https://doi.org.10.4236/psych.2013.46A1003

Alibak, F., & Alibak, M. (2021). Comparing online cognitive behavioral therapy versus online positive psychotherapy, well-being theory (PERMA) on test anxiety of online learning students: A randomised control study. *Journal of the Australian and New Zealand Student Services Association, 29*(1), 6-17. https://doi.org.10.30688/janzssa.2021.1.08

Baghaei, P., & Cassady, J. (2014). Validation of the Persian translation of the Cognitive Test Anxiety Scale. *Sage Open, 4*(4). https://doi.org/10.1177/2158244014555113

Barutçu-Yıldırım, F., & Demir, A. (2020). Self-handicapping among university students: The role of procrastination, test anxiety, self-esteem, and self-compassion. *Psychological Reports, 123*(3), 825-843. https://doi.org/10.1177/0033294118825099

Beck, A. T. (1967). *Depression: Clinical, experimental and theoretical aspects.* Harper and Row.

Beck, J. S. (2021). *Cognitive behavior therapy: Basics and beyond* (3rd ed.). The Guilford Press.

Beidel, D. C., & Turner, S. M. (1988). Comorbidity of test anxiety and other anxiety disorders in children. *Journal of Abnormal Child Psychology, 16*(3), 275–287. https://doi.org/10.1007/BF00913800

Bolbolian, M., Asgari, S., Sefidi, F., & Zadeh, A. S. (2021). The relationship between test anxiety and academic procrastination among the dental students. *Journal of Education and Health Promotion, 10,* 67. https://doi.org/10.4103/jehp.jehp_867_20

Bozkurt, S., Ekitli, G. B., Thomas, C. L., & Cassady, J. C. (2017). Validation of the Turkish version of the Cognitive Test Anxiety Scale–Revised. *Sage Open, 7*(1). https://doi.org/10.1177/2158244016669549

Brodersen, L. (2017). Interventions for test anxiety in undergraduate nursing students: An integrative review. *Nursing Education Perspectives, 38*, 131–137. http://doi.org/10.1097/01.NEP.0000000000000142

Brown, L. A., Forman, E. M., Herbert, J. D., Hoffman, K. L., Yuen, E. K., & Goetter, E. M. (2011). A randomized controlled trial of acceptance-based behavior therapy and cognitive therapy for test anxiety: A pilot study. *Behavior Modification, 35*(1), 31–53. https://doi.org/10.1177/0145445510390930

Campbell, J. D., Chew, B., & Scratchley, L. S. (1991). Cognitive and emotional reactions to daily events: The effects of self-esteem and self-complexity. *Journal of Personality, 59*, 473-505. https://doi.org/10.1111/j.1467-6494.1991.tb00257.x

Carpenter, S. (2018). Ten steps in scale development and reporting: A guide for researchers. *Communication Methods and Measures, 12*(1), 25-44. https://doi.org/10.1080/19312458.2017.1396583

Cassady, J. C. (2004). The impact of cognitive test anxiety on text comprehension and recall in the absence of external evaluative pressure. *Applied Cognitive Psychology, 18*(3), 311–325. https://doi.org/10.1002/acp.968

Cassady, J. C., & Johnson, R. E. (2002). Cognitive test anxiety and academic performance. *Contemporary Educational Psychology, 27*(2), 270-295. https://doi.org/10.1006/ceps.2001.1094

Chapell, M. S., Blanding, Z. B., Silverstein, M. E., Takahashi, M., Newman, B., Gubi, A., & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology, 97*(2), 268–274. https://doi.org/10.1037/0022-0663.97.2.268

Cizek, G. J., & Burg, S. S. (2006). *Addressing test anxiety in a high-stakes environment*. Corwin Press.

Clark, D. A., & Beck, A. T. (2011). *Cognitive therapy of anxiety disorders: Science and practice*. Guilford Press.

D'Alelio, W. A., Murray, E. J. (1981). Cognitive therapy for test anxiety. *Cognitive Therapy and Research, 5*, 299–307. https://doi.org/10.1007/BF01193413

Dan, O., & Raz, S. (2015). The relationships among ADHD, self-esteem, and test anxiety in young adults. *Journal of Attention Disorders, 19*(3), 231-239. https://doi.org/10.1177/1087054712454571

De La Fuente, J., López-García, M., Mariano-Vera, M., Martínez-Vicente, J. M., & Zapata, L. (2017). Personal self-regulation, learning approaches, resilience, and test anxiety in psychology students. *Estudios Sobre Educación, 32*, 9–26. https://doi.org/10.15581/004.32.9-26

Demirci, İ., & Erden, S. (2016). Bilişsel davranışçı yaklaşıma dayalı grupla psikolojik danışma uygulamasının 8. sınıf öğrencilerinin sınav kaygısına etkisi [The effect of cognitive-behavioral group counseling on test anxiety of eight-grade elementary school students]. *Marmara Üniversitesi Atatürk Eğitim*

Fakültesi Eğitim Bilimleri Dergisi [Marmara University Atatürk Education Faculty Journal of Educational Sciences], *43*(43), 67-83.

Díaz, R. J., Glass, C. R., Arnkoff, D. B., & Tanofsky-Kraff, M. (2001). Cognition, anxiety, and prediction of performance in 1st-year law students. *Journal of Educational Psychology, 93*(2), 420–429. https://doi.org/10.1037/0022-0663.93.2.420

Doğan, T. (2011). Two-dimensional self-esteem: adaptation of the self-liking/self-competence scale into Turkish: a validity and reliability study. *Education and Science*, *36*(162), 1-29.

Doğan, T. (2015). Kısa psikolojik sağlamlık ölçeği'nin Türkçe uyarlaması: Geçerlik ve güvenirlik çalışması [Adaptation of the Brief Resilience Scale into Turkish: A validity and reliability study]. *The Journal of Happiness & Well-Being*, *3*(1), 93-102.

Ergene, T. (2003). Effective interventions on test anxiety reduction: A meta-analysis. *School Psychology International, 24*(3), 313–328. https://doi.org/10.1177/01430343030243004

Everson, H. T., Millsap, R. E., & Rodriguez, C. M. (1991). Isolating gender differences in test anxiety: A confirmatory factor analysis of the Test Anxiety Inventory. *Educational and Psychological Measurement, 51*(1), 243–251. https://doi.org/10.1177/0013164491511024

Fathalla, M. (2018). The structural equation model for the mediating effect of self-esteem in the relationship of mindfulness to academic resilience and test anxiety. *Psycho-Educational Research Reviews*, 73-77.

Feldman, D. B., Davidson, O. B., & Margalit, M. (2015). Personal resources, hope, and achievement among college students: The conservation of resources perspective. *Journal of Happiness Studies, 16*, 543–560. https://doi.org/10.1007/s10902-014-9508-5

Fennell, M. J. V. (1998). Low self-esteem. In N. Tarrier, A. Wells, & G. Haddock (Eds.), *Treating complex cases: The cognitive behavioural therapy approach* (pp. 217–240). John Wiley & Sons.

Ferkany, M. (2008). The educational importance of self-esteem. *Journal of Philosophy of Education*, *42*(1), 119-132. https://doi.org/10.1111/j.1467-9752.2008.00610.x

Flaxman, P. E., Bond, F. W., & Keogh, E. (2003). Preventing and treating evaluation strain: A technically eclectic approach. In F. W. Bond, & W. Dryden (Eds.), *Handbook of brief cognitive-behavior therapy* (pp. 239–288). John Wiley & Sons.

Furlan, L. A., Cassady, J. C., & Perez, E. R. (2009). Adapting the Cognitive Test Anxiety Scale for use with Argentinean university students. *International Journal of Testing*, *9*, 3–19. https://doi.org/10.1080/15305050902733448

Galassi, J. P., Frierson, H. T., & Sharer, R. (1981). Behavior of high, moderate, and low test anxious students during an actual test situation. *Journal of Consulting*

and Clinical Psychology, 49(1), 51–62. https://doi.org/10.1037/0022-006X.49.1.51

Garnefski, N., Kraaij, V., Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences, 30*(8), 1311-1327. https://doi.org/10.1016/S0191-8869(00)00113-6

Gibson, H. A. (2014). A conceptual view of test anxiety. *Nursing Forum*, *49*(4), 267–277. https://doi.org/10.1111/nuf.12069

Hayat, A. A., Choupani, H., & Dehsorkhi, H. F. (2021). The mediating role of students' academic resilience in the relationship between self-efficacy and test anxiety. *Journal of Education and Health Promotion, 10*, 297. https://doi.org/10.4103/jehp.jehp_35_21

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Press.

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research, 58*(1), 47–77. https://doi.org/10.3102/00346543058001047

Hiçdurmaz, D., İnci, F., & Karahan, S. (2017). Predictors of mental health symptoms, automatic thoughts, and self-esteem among university students. *Psychological Reports*, *120*(4), 650–669. https://doi.org/10.1177/0033294117707945

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology, 6*(4), 307–324. https://doi.org/10.1037/1089-2680.6.4.307

Hodapp, V., & Benson, J. (1997). The multidimensionality of test anxiety: A test of different models. *Anxiety, Stress & Coping*, *10*(3), 219–244. https://doi.org/10.1080/10615809708249302

Hollandsworth, J. G., Glazeski, R. C, Kirkland, K., Jones, G. E, & Norman, L. R. (1979). An analysis of the nature and effects of test anxiety: Cognitive, behavioral, and physiological components. *Cognitive Therapy and Research, 3*(2), 165–180. https://doi.org/10.1007/BF01172603

Hollon, S. D., & Kendall, P. C. (1980). Cognitive self-statements in depression: Development of an automatic thoughts questionnaire. *Cognitive Therapy and Research, 4*(4), 383–395. https://doi.org/10.1007/BF01178214

Howard, E. (2020). *A review of the literature concerning anxiety for educational assessments.* Ofqual research report. Retrieved January 20, 2021, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/865832/A_review_of_the_literature_concerning_anxiety_for_educational_assessment.pdf

Huntley, C. D., Young, B., Temple, J., Longworth, M., Smith, C. T., Jha, V., & Fisher, P. L. (2019). The efficacy of interventions for test-anxious university students: A meta-analysis of randomized controlled trials. *Journal of Anxiety Disorders, 63*, 36–50. https://doi.org/10.1016/j.janxdis.2019.01.007

Jamshidi, M. A., Moghadam, M. F., Ghorbani, S., & Farhoush, M. (2018). Self-efficacy and resilience as mediators in the relationship between test anxiety and spiritual intelligence among high school students in Qom. *Journal of Research on Religion & Health, 4*(1), 7-21.

Jolly, A. T. W., Garratt-Reed, D., & McEvoy, P. M. (2022). Does repetitive negative thinking mediate the relationship between perfectionistic concerns and cognitive test anxiety? *Anxiety, Stress & Coping, 35*(6), 662-672. https://doi.org/10.1080/10615806.2021.1994142

Kader, A. (2016). Debilitating and facilitating test anxiety and student motivation and achievement in principles of microeconomics. *International Review of Economics Education, 23,* 40–46. https://doi.org/10.1016/j.iree.2016.07.002

Kavakçı, Ö., Semiz, M., Kartal, A., Dikici, A., & Kuğu, N. (2014). Test anxiety prevalence and related variables in the students who are going to take the university entrance examination. *The Journal of Psychiatry and Neurological Sciences, 4* (27), 301-307. https://doi.org/10.5350/DAJPN2014270403

King, N. J., Mietz, A., Tinney, L., & Ollendick, T. H. (1995). Psychopathology and cognition in adolescents experiencing severe test anxiety. *Journal of Clinical Child Psychology, 24*(1), 49–54. https://doi.org/10.1207/s15374424jccp2401_6

Kopala-Sibley, D. C., & Santor, D. A. (2009). The mediating role of automatic thoughts in the personality-event-affect relationship. *Cognitive Behaviour Therapy, 38*(3), 153–161. https://doi.org/10.1080/16506070802694644

Ingram, R. E., & Wisnicki, K. S. (1988). Assessment of positive automatic cognition. *Journal of Consulting and Clinical Psychology, 56*(6), 898–902. https://doi.org/10.1037/0022-006X.56.6.898

Lei, P. W., & Shiverdecker, L. K. (2020). Performance of estimators for confirmatory factor analysis of ordinal variables with missing data. *Structural Equation Modeling*, *27*(4), 584-601. https://doi.org/10.1080/10705511.2019.1680292

Leitenberg, H., Yost, L. W., & Carroll-Wilson, M. (1986) Negative cognitive errors in children: Questionnaire development, normative data, and comparison between child with and without self-reported symptoms of depression, low self-esteem, and evaluaton anxiety. *Journal of Consulting and Clinical Psychology, 54*(4), 528-536. https://doi.org/10.1037/0022-006X.54.4.528

Liebert, R. M., & Morris, L. W. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. *Psychological Reports, 20*(3), 975–978. https://doi.org/10.2466/pr0.1967.20.3.975

Lightsey, O. R., Jr. (1996). What leads to wellness? The role of psychological resources in well-being. *The Counseling Psychologist, 24*(4), 589–759. https://doi.org/10.1177/0011000096244002

Lim, M. L., & Chue, K. L. (2023). Academic resilience and test anxiety: The moderating role of achievement goals. *School Psychology International, 0*(0). https://doi.org/10.1177/01430343231162876

Liu, Y., Pan, H., Yang, R. et al. (2021). The relationship between test anxiety and emotion regulation: The mediating effect of psychological resilience. *Annals of General Psychiatry, 20*, 40. https://doi.org/10.1186/s12991-021-00360-4

Lowe, P. A. (2018). An investigation into the psychometric properties of the test anxiety measure for college students. *Journal of Psychoeducational Assessment, 36*(4), 322–336. https://doi.org/10.1177/0734282916678536

Lowe, P. A., Lee, S. W., Witteborg, K. M., Prichard, K. W., Luhr, M. E., Cullinan, C. M., Mildren, B. A., Raad, J. M., Cornelius, R. A., & Janik, M. (2008). The test anxiety inventory for children and adolescents (TAICA): Examination of the psychometric properties of a new multidimensional measure of test anxiety among elementary and secondary school students. *Journal of Psychoeducational Assessment, 26*(3), 215–230. https://doi.org/10.1177/0734282907303760

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development, 71*(3), 543–562. https://doi.org/10.1111/1467-8624.00164

Mak, W. W. S., Ng, I. S. W., & Wong, C. C. Y. (2011). Resilience: Enhancing well-being through the positive cognitive triad. *Journal of Counseling Psychology, 58*(4), 610–617. https://doi.org/10.1037/a0025195

Maloney, E.A., Sattizahn, J.R., & Beilock, S.L. (2014). Anxiety and cognition. *WIREs Cognitive Science, 5*, 403-411. https://doi.org/10.1002/wcs.1299

Martos, T., Jagodics, B., Kőrössy, J., & Szabó, É. (2021). Psychological resources, dropout risk and academic performance in university students – pattern-oriented analysis and prospective study of Hungarian freshmen. *Current Psychology*. https://doi.org/10.1007/s12144-021-02073-z

Martin, A. J., & Marsh, H. W. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools, 43*(3), 267–281. https://doi.org/10.1002/pits.20149

Masten, S. A. (2021). Multisystem resilience: Pathways to an integrated framework. *Research in Human Development, 18*(3), 153-163. https://doi.org/10.1080/15427609.2021.1958604

McCann, I. L., Sakheim, D. K., & Abrahamson, D. J. (1988). Trauma and victimization: A model of psychological adaptation. *The Counseling Psychologist, 16*, 531-594. https://doi.org/10.1177/0011000088164002

McDonald, A. S. (2001). The prevalence and effects of test anxiety in school children. *Educational Psychology, 21*(1), 89-101. https://doi.org/10.1080/01443410020019867

Min, J. A., Yu, J. J., Lee, C. U., & Chae, J. H. (2013). Cognitive emotion regulation strategies contributing to resilience in patients with depression and/or anxiety disorders. *Comprehensive Psychiatry, 54*(8), 1190-1197. https://doi.org/10.1016/j.comppsych.2013.05.008

Miloseva, L. (2012). Can automatic thoughts and test anxiety explain school success and satisfaction in adolescents? *Primenjena Psihologija, 5*(1), 43–57. https://doi.org/10.19090/pp.2012.1.43-57

Mruk, C. J. (2013). *Self-esteem and positive psychology: Research, theory, and practice*. Springer.

Németh, L., & Bernáth, L. (2023). The nature of cognitive test anxiety: An investigation of the factor structure of the Cognitive Test Anxiety Scale. *Educational Assessment, 28*(1), 27-47, https://doi.org/10.1080/10627197.2022.2130747

Öner, N. (1990). *Sınav kaygisi envanteri el kitabi [Anxiety Inventory Handbook]* (3th Ed.). Yöret Publishing.

Parlak, S., Tunç, E. B., Eryiğit, D., & Uluman, M. (2022). Relationships between hostility, resilience and intolerance of uncertainty: A structural equation modelling. *Journal of Evidence-Based Psychotherapies*, 22(1), 1-20. https://doi.org/10.24193/jebp.2022.1.1

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist, 37*(2), 91-105. https://doi.org/10.1207/S15326985EP3702_4

Peleg, O. (2009). Test anxiety, academic achievement, and self-esteem among Arab adolescents with and without learning disabilities. *Learning Disability Quarterly, 32*(1), 11–20.

Putwain, D. W. (2008). Deconstructing test anxiety. *Emotional & Behavioural Difficulties, 13*(2), 141–155. https://doi.org/10.1080/13632750802027713

Putwain, D. W. (2009). Assessment and examination stress in Key Stage 4. *British Educational Research Journal, 35,* 391–411. https://doi.org/10.1080/01411920802044404

Putwain, D. W., & Daly, A. L. (2013). Do clusters of test anxiety and academic buoyancy differentially predict academic performance? *Learning and Individual Differences, 27,* 157–162. https://doi.org/10.1016/j.lindif.2013.07.010

Putwain, D., & Daly, A. L. (2014). Test anxiety prevalence and gender differences in a sample of English secondary school students. *Educational Studies, 40*(5), 554-570. https://doi.org/10.1080/03055698.2014.953914

Putwain, D., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology, 80*(1), 137-160. https://doi.org/10.1348/000709909X466082

R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/

Roos, A. L., Goetz, T., Voracek, M., Krannich, M., Bieg, M., Jarrell, A., & Pekrun, R. (2021). Test anxiety and physiological arousal: A systematic review and

meta-analysis. *Educational Psychology Review*, 33, 579–618. https://doi.org/10.1007/s10648-020-09543-z

Sarason, I. G. (1984). Stress, anxiety, and cognitive interference: Reactions to tests. *Journal of Personality and Social Psychology, 46*(4), 929–938. https://doi.org/10.1037/0022-3514.46.4.929

Sawka-Miller, K. (2011). *Test anxiety.* In S. Goldstein & J. A. Naglieri (Eds.), *Encyclopedia of child behavior and development.* Springer.

Segool, N. K., von der Embse, N. P., Mata, A. D., & Gallant, J. (2014). Cognitive behavioral model of test anxiety in a high-stakes context: An exploratory study. *School Mental Health: A Multidisciplinary Research and Practice Journal, 6*(1), 50–61. https://doi.org/10.1007/s12310-013-9111-7

Seipp, B. (1991). Anxiety and academic performance: a meta-analysis of findings. *Anxiety Research, 4*(1), 27–41.http://dx.doi.org/10.1080/08917779108248762

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*(3), 194-200. https://doi.org/10.1080/10705500802222972

Soares, D., & Woods, K. (2020). An international systematic literature review of test anxiety interventions 2011–2018. *Pastoral Care in Education, 38*(4), 311-334. https://doi.org/10.1080/02643944.2020.1725909

Spielberger, C. (1980). *Preliminary manual for the State-Trait personality inventory*. Palo Alto.

Szafranski, D. D., Barrera, T. L., & Norton, P. J. (2012). Test Anxiety Inventory: 30 years later. *Anxiety, Stress & Coping, 25*(6), 667-677. https://doi.org/10.1080/10615806.2012.663490

Tabur, S. T., Akın, E., & Turkcapar, M. H. (2024). Personality traits, preoperational thinking, and mental health. *Journal of Evidence-Based Psychotherapies*, 24(1), 117-134. https://doi.org/10.24193/jebp.2024.1.7

Tafarodi, R. W., & Swann W. B. (2001). Two-dimensional self-esteem: Theory and measurement. *Personality and Individual Differences*, *31*(5), 653-673. https://doi.org/10.1016/S0191-8869(00)00169-0

Tobias, S. (1985). Test anxiety: Interference, defective skills, and cognitive capacity. *Educational Psychologist, 20*(3), 135–142. https://doi.org/10.1207/s15326985ep2003_3

Trigueros, R., Padilla, A. M., Aguilar-Parra, J. M., Rocamora, P., Morales-Gázquez, M. J., & López-Liria, R. (2020). The influence of emotional intelligence on resilience, test anxiety, academic stress and the Mediterranean diet: A study with university students. *International Journal of Environmental Research and Public Health, 17*(6), 2071. https://doi.org/10.3390/ijerph17062071

von der Embse, N., Barterian, J., & Segool, N. (2013), Test anxiety interventions for children and adolescents: A systematic review of treatment studies from 2000–

2010. *Psychology in the Schools, 50* (1), 57-71. https://doi.org/10.1002/pits.21660

von der Embse, N., Jester, D., Roy, D., & Post, J. (2018). Test anxiety effects, predictors, and correlates: A 30-year meta-analytic review. *Journal of Affective Disorders, 227*, 483–493. https://doi.org/10.1016/j.jad.2017.11.048

Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin, 76*(2), 92–104. https://doi.org/10.1037/h0031332

Wong, S. S. (2008). The relations of cognitive triad, dysfunctional attitudes, automatic thoughts, and irrational beliefs with test anxiety. *Current Psychology, 27*, 177–191. https://doi.org/10.1007/s12144-008-9033-y

Wren, D. G., & Benson J. (2004). Measuring test anxiety in children: Scale development and internal construct validation. *Anxiety, Stress, and Coping: An International Journal*, 17, 227-240.

Xie, F., Xin, Z., Chen, X., & Zhang, L. (2019). Gender difference of Chinese high school students' math anxiety: The effects of self-esteem, test anxiety and general anxiety. *Sex Roles, 81*(3–4), 235–244. https://doi.org/10.1007/s11199-018-0982-9

Yıldırım, İ. (2008). Family variables influencing test anxiety of students preparing for the university entrance examination. *Eurasian Journal of Educational Research, 31*, 171-186.

Zamir, S., Arshad, M. & Nazir, N. (2021). Gender based analysis of test-anxiety and self-esteem among university students. *Biannual Uswa Journal of Research, 1*(2).

Zeidner, M. (1998). *Test anxiety: The state of the Art*. Plenum Press.

Zeidner, M. (2014). Test anxiety. In P. Emmelkamp, & T. Ehring (Eds.), *The Wiley handbook of anxiety disorders* (pp. 581-595). John Wiley & Sons.

Zeidner, M., & Matthews, G. (2005). Evaluation anxiety. In A. J. Elliot, & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 141–163). London: Guilford Press.

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 77-98.

10.24193/jebp.2025.1.4

IRRATIONAL BELIEFS ARE ASSOCIATED WITH THE EXPERIENCE OF NEGATIVE FEELINGS IN POSITIVE SITUATIONS. THE ROLE OF BIASED POSITIVE APPRAISALS IN MIXED FEELINGS

Marius Drugaș[1], Alexandru Tiba[1], Ioana Sîrbu[1], Simona Trip[1], Daiana Miclăuș[1], Rafaela Petriuc[1], Ioana Sanislav[1], Lavinia Rat[1], Feliciana Borz[1], Miruna Domuta[1], Simona Pop[2], and Mircea Pop[2]*

[1] Department of Psychology, University of Oradea, Oradea, Romania
[2] Faculty of Medicine and Farmacy, University of Oradea, Oradea, Romania

Abstract

Appraisals are important processes involved in both healthy and pathological emotional experiences. Realistic appraisals are required for healthy positive and negative emotions. Instead, biased appraisals are involved in cognitive vulnerability to emotional disorders. We examined a specific type of biased appraisal, irrational beliefs, and their relationships with the experience of negative and neutral feelings, along with positive feelings in positive situations. 115 participants imagined eight positive situations and endorsed their ratings and appraisals of the situations and feelings they would experience in each situation. Correlation and mediation analyses were conducted to examine the relationship between biased appraisals and negative, neutral, and mixed feelings in response to positive situations. Results showed that participants who react to positive situations by endorsing high levels of biased appraisals reported experiencing more mixed feelings in positive situations. We also observed that mixed feelings are inversely related to functional positive feelings in positive situations. This research is the first to evidence irrational beliefs as a specific type of biased appraisal process involved in the experience of mixed feelings. Suggestions for the processes involved in well-being, the negative effects of positive fantasies, and mixed emotions are made.

Keywords: irrational beliefs, biased appraisals, mixed emotions, neutral feelings, positive emotions, positive fantasies.

[*] Correspondence concerning this article should be addressed to Alexandru Tiba, Department of Psychology, University of Oradea, Oradea, Romania.
E-mail: alexandrutiba@gmail.com

> Windy Dryden (W.D.):
> Now imagine that you still have the same absolute belief that you must have a minimum of 11 dollars at all times, and this time you find that you have 12 dollars in your purse. Now, how will you feel? Karen: Relieved. W.D.: Right, or pleased. But holding that same belief that you absolutely must have a minimum of 11 dollars at all times, you think something that leads you to become anxious again. What do you think that thought would be? Karen: That I might lose 2 dollars? W.D.: Right, or you spend 2 dollars or get robbed. Now the point of this example is that all humans, male or female, rich or poor, black or white, now and in the future, will make themselves emotionally disturbed when they don't get what they believe they must get. And they will also make themselves miserable when they do get it, because of their musts-because even when they must have, they could always lose it. (Dryden & DiGiuseppe, 1990, p 66)

In this example from a seminal training book in the oldest form of cognitive behavior therapy, Rational Emotive and Behavior Therapy (REBT; Dryden & DiGiuseppe, 1990), the authors have suggested that biased appraisals in the form of primary irrational beliefs (Ellis, 1962) such as rigidly appraising getting important things as a necessity (demandingness) result in a particular type of dysfunctionality of positive experiences: negative feelings in positive situations or when our desires are met. However, based on the REBT model of positive emotion (Ellis, 1994) an opposite suggestion was made: demandingness results in rather more intense dysfunctional positive feelings when goals that individuals demand to attain are met (Ellis, 1994). Based on this proposal, we have the following scenario: You don't have $12, and you consider that you always need to have $12 in your pocket. It is a necessity. As a last try, you check your pocket again, and you find that, in fact, you have $12 in it. You will feel excited and euphoric, not just happy. Recent research supports the ABC model of positive emotions (Ellis, 1994), showing that demandingness and secondary biased positive appraisals are associated with intense and high arousal dysfunctional positive feelings in response to positive situations (Tiba et al., 2023a) and a predisposition to hypo/mania (Tiba et al., 2023b). Based on these findings, the proposal that irrational beliefs may result in negative emotions when goals are met seems to be in contradiction with theoretical and empirical support for the effect of irrational beliefs on positive feelings. Although they appear contradictory, theories and findings from the field of mixed emotions suggested that it may not be at all a contradiction to experience both positive and negative feelings in the same positive situation (Berrios et al., 2015a; Larsen et al., 2001). Thus, it is more likely that individuals who have negative feelings in positive situations will experience positive feelings as well. Most often, we encounter multifaceted situations that activate sometimes conflicting goals. For instance, we are happy about starting to study at a new university, but at the same time, we feel sad about letting

go of our close friends. Moreover, other forms of altered emotionality in positive situations have been proposed: neutral feelings (Gasper, 2018). Thus, in positive situations, we may have several types of biased feelings according to the positive-negative valence axis: (1) dysfunctional positive feelings, (2) negative feelings, (3) neutral feelings, and (4) mixed emotions. Given the domain of mixed emotions, the theory and practice of REBT (Dryden & DiGiuseppe, 1990) suggested a complex process for dysfunctional mixed emotions in positive situations: considering a desired situation as a necessity may activate avoidance goals of losing the desired situation when we encounter a positive situation.

Starting from early proposals from the practice of REBT (Dryden & DiGiuseppe, 1990) and the field of mixed and neutral feelings, we examined whether biased appraisals in the form of positive irrational beliefs (Ellis, 1994) are related to: (1) negative feelings; (2) neutral feelings; and (3) mixed feelings in response to imagined positive events. This research has the potential to point to new clinically relevant mechanisms of mixed emotions and expand the REBT theory of well-being and mental health.

Albert Ellis (1957) proposed that responding with biased appraisals to adversity (negative irrational beliefs) determines dysfunctional negative feelings. Ellis (1962) suggested that there are four types of biased appraisals, or irrational beliefs: (1) demandingness or considering attaining goals and desires as a necessity in response to adversity; (2) catastrophizing (adversity is awful and 100% bad); (3) frustration intolerance (intolerance of the adversity); and (4) depreciation beliefs (self, life, and future are worthless). Demandingness is considered a primary form of irrational beliefs, while catastrophizing, frustration intolerance, and depreciation beliefs are considered secondary irrational beliefs (Ellis, 1962). Additionally, Ellis (1962) suggested that primary irrational beliefs are distal to dysfunctional emotions and that their effect on emotions is mediated by secondary irrational beliefs, which are proximal determinants of emotion (Ellis, 1962). Each of these irrational beliefs has a positive counterpart (positive irrational beliefs): (1) demandingness in response to positive situations; (2) wonderfulizing (positive events are wonderful and 100% good); (3) positive emotion intolerance (positive emotions are so intense that they are unbearable); and (3) extreme appreciation beliefs (self, life, and future are extremely positive) (Tiba et al., 2023a).

Previous research has shown that irrational beliefs are types of appraisals (David et al., 2002; David et al., 2019), that can have multiple types of representational formats in our cognitive system (Szentagotai et al., 2015; Tiba, 2010; Tiba & Manea, 2018). Substantial research has shown that negative rational and irrational beliefs have a large impact on psychopathology (Bridges & Harnish, 2010; Vîslă et al., 2016) and well-being (Oltean et al., 2017; Oltean et al., 2019).

For instance, studies have shown significant relationships between negative irrational beliefs and depression (De Castella et al., 2013; Taghavi et al., 2006), anxiety disorders (Himle et al., 1989), obsessive-compulsive disorders (Hamidi &

Motlagh, 2010), personality disorders (Westphal et al., 2016), stress-related disorders (Hyland et al., 2014), loneliness (Oltean et al., 2024), and parenting stress (Tiba et al., 2012), among other relevant conditions (Vîslă et al., 2016). On the other hand, studies that investigated the relationship of negative rational and irrational beliefs and well-being showed that negative rational beliefs foster positive emotions and happiness (Oltean et al., 2019), while negative irrational beliefs are detrimental to well-being, fostering lower levels of positive emotions and high levels of dysfunctional negative emotions (Oltean et al., 2017; Oltean et al., 2019). Recently, it has been evidenced a new pathway by which positive irrational beliefs affect mental health: by promoting dysfunctional positive emotions and the risk of mania as well (Tiba et al., 2023a). Examining the relationships between irrational beliefs, negative, neutral, and mixed feelings in positive situations may point to new ways in which irrational beliefs may be involved in well-being: they may promote negative, neutral, and mixed emotions in response to positive situations.

Mixed emotions

Mixed emotions are feelings that include experiencing two or more emotions that have the same or opposite valence (Larsen et al., 2001). Oceja and Carrera (2009) proposed four types of mixed emotions: (1) sequential emotions (two emotions, one following the other-primary and secondary emotions with opposed valence); (2) prevalence emotions (reactions to the same event of two opposing emotions, but one more intense than the other), (3) inverse emotions (two emotions with an opposed dynamic, such as an increase in one results in decreases in the other), and (3) highly simultaneous emotions (both emotions have an overlapping dynamics, *happy-sad*, *nostalgia*). As there are a multitude of varieties of both positive and negative emotions, mixed emotions appear in a multitude of varieties.

Although the first experimental evidence for mixed emotions dates back more than a century (Kellogg, 1915), over time, scientific tests have proven it to be a robust phenomenon (Berrios et al., 2015b). There is a large consensus that conflicting goals are a common mechanism underlying mixed emotions. Thus, a situation may activate different goals, which in turn result in both positive and negative feelings (Berrios et al., 2015a; Berrios et al., 2017). Several studies suggest a positive effect of mixed feelings on mental health and well-being (Berrios et al., 2017; Hershfield et al., 2013). Hershfield et al. (2013) found that higher rates of mixed feelings are associated with a lower rate of physical health symptoms and a lower rate of health degradation (Hershfield et al., 2013). Yet recent research showed a negative effect as well. For instance, the study conducted by Oh (2022) showed that mixed feelings and emotional ambivalence that are experienced by an individual naturally, day by day, were associated with lower levels of psychological well-being and a higher level of burnout. Up until now, results about the effect of mixed feelings appeared to be in contradiction. Previous research linked mixed feelings with

conflicting goals and appraisal theories of emotions (Berrios et al., 2015a). Since biased appraisals may be associated with dysfunctional mixed feelings and health costs and non-biased appraisals may be associated with functional mixed feelings and health benefits, examining the role of biased appraisals in mixed feelings may help to clarify these contradictory findings. Yet there has been no research that has investigated the link between mixed feelings and biased appraisals, such as irrational beliefs.

Given the REBT theory of emotion (Ellis, 1994) there are several implications for mixed emotions: (1) biased appraisals such as demandingness may activate opposing goals and appraisals (needing something to much-intense approach goal may bring the fear of losing it-avoidance goal) and often result in a mixed emotional experience in positive situations, (2) there are both functional and dysfunctional mixed feelings. Thus, mixed emotions may be: (a) functional mixed feelings that include two functional and opposing valence emotions; and (b) dysfunctional mixed feelings that include at least one dysfunctional positive or negative feeling. Moreover, mixed feelings may involve a combination of both primary (functional and dysfunctional) and secondary (functional and dysfunctional) feelings. Functional mixed feelings are expected to be part of a healthy sense of well-being. On the other hand, dysfunctional mixed feelings may be detrimental to well-being.

Neutral Feelings

Neutral feelings, or "feeling nothing in particular" (Gasper et al., 2021), refer to *feelings of indifference* (Gasper et al., 2021). It is what individuals feel in neutral or routine situations (Gasper et al., 2021). Although their existence has been long debated, recent research has shown the validity of the concept of neutral feelings (Gasper et al., 2019), evidencing both their positive (Gasper et al., 2021) and negative consequences (Gasper & Danube, 2016). Gasper (2018) proposed five types of neutral feelings: *minimal affective states* (when other feelings are minimal), *in-the-middle states* (neither positive nor negative), *deactivated states* (feelings resulting from neutral affect induction procedures that induce deactivation), *typical state*, and *indifferent states* (Gasper, 2018).

Several mechanisms have been suggested to underlie each of these different types of neutral feelings. Among these, the most important are progress as expected in regulation theory (Carver & Scheier, 1990), appraisal mechanisms (Yih et al., 2020), and conflicting goals or mixed feelings (Schneider et al., 2016). Of interest, reports of feeling neutral in positive situations are often mistaken for a lack of positive affect or an index of apathy (Gasper et al., 2021). On the contrary, from the perspective of neutral feelings, this kind of "neutral apathy" is rather a type of neutral feeling in response to activating situations, not an apathy mood or feeling numbness (the inability to respond with feelings). Accordingly, we may have different types of

neutral feelings in positive situations, which may reflect different mechanisms than a lack of positive emotions, with neutral feelings co-occurring with positive and negative feelings (Gasper et al., 2021; Schneider et al., 2016). Based on a theory of no interest or lack of positive emotions for explaining neutral feelings, neutral feelings are not expected to have a relationship with biased appraisals of relevance and congruence or biased secondary appraisals. Instead, if neutral feelings are conceptualized as a type of mixed feelings or middle feelings (Yih et al., 2020), we can observe a role for biased appraisals and a relationship with mixed feelings.

The Present Study

Traditionally, research on the REBT binary model of emotion used a dimensional valence model of emotion. Accordingly, it examined the role of biased or flexible negative appraisals (negative irrational beliefs) in response to negative events in determination of negative feelings and the role of biased or flexible positive appraisals (positive irrational beliefs) in response to positive events in determination of positive feelings. In the present study we took a different approach: we have investigated the relationships between positive biased appraisals and reports of neutral, negative and mixed feelings in response to positive events.

Given that in natural settings individuals respond to complex activating situations by multiple appraisals, it is recognized that they may experience multiple rapidly occurring positive and negative or mixed feelings (Oatley & Johnson-Laired, 1996). The practice of REBT (Dryden & DiGiuseppe, 1990) suggests that rigid appraisals such as demanding a desired outcome also activate appraisals related to fear of losing the "must have" situation and results in negative feelings in positive situations (when the goals are met). Yet no study has examined this possibility. In this study we assessed for the first time positive irrational beliefs in response to positive events and their effect on negative emotions based on current methodology for assessing appraisals (Scherer, 2021). Participants had to vividly imagine approach-related positive events (e.g., learning it is possible to get a large amount of money/succeed) happening to them and were asked to report their estimates of how they would appraise each situation by situational positive irrational beliefs and the intensity they would experience for positive, neutral, and negative feelings.

According to proposals based on REBT theory (Dryden & DiGiuseppe, 1990), we expected that primary irrational beliefs would be associated with reports of negative and/or mixed feelings in positive situations. As neutral feelings may be a form of mixed feelings, we also examined the relationship between irrational beliefs and reports of neutral feelings in positive situations. Furthermore, we expected that the demandingness effect on negative, neutral, and mixed feelings would be mediated by secondary biased appraisals.

Method

Participants

116 undergraduate students from the University of Oradea were selected to participate in this study. Due to his repeated responses to the same question, one participant was excluded from the analysis. 115 individuals made up our final sample—102 women and 13 men. The ages of the participants ranged from 18 to 61 ($M = 24.56$, $SD = 9.47$). The study was carried out in accordance with the Declaration of Helsinki (World Medical Association [WMA], 2013), and received the approval issued by the faculty's ethical review board (approval number 2872/18.05.2023).

Measures

Symptoms of hypomania. The Altman Self-Rating Scale for Mania (ASRM; Altman et al., 1997) assesses the experience of hypo/manic symptoms. The internal consistency coefficient, alpha Cronbach, was acceptable at 0.61. Participants evaluated their responses on a Likert scale from 1 (e.g., "I do not feel happier or more cheerful than usual") to 5 (e.g., "I feel happier or more cheerful than usual all the time").

Positive feelings. To measure positive feelings, we used ten positive emotion descriptors. A Likert-type scale from 1 (not at all) to 9 (very much) was used by participants to indicate how much they agreed with each statement. Six adjectives associated with positive emotions were used to create a functional positive feelings subscale, including "delighted," "happy," "glad," "joyful," "cheerful," and "pleased" (alpha Cronbach was excellent at 0.98). Four adjectives were used to create a dysfunctional feelings scale: exuberant, ecstatic, elevated, and accelerated; (the internal consistency coefficient alpha Cronbach was excellent at 0.95).

Neutral, negative, and mixed feelings. A Likert-type scale from 1 (not at all) to 9 (very much) was used by participants to indicate how much they agreed with feeling neutral (neutral feelings) or feeling negative (negative feelings) in the situation. Mixed feelings were calculated based on the minimum index method between positive feelings and negative feelings (e.g., Priester & Petty, 1996). The minimum index considers the intensity of mixed feelings to be represented by the lowest value between positive and negative feelings (Priester & Petty, 1996; Berrios et al., 2015a). Two additional scores were calculated for dysfunctional mixed feelings (minimum score between dysfunctional positive feelings and negative feelings) and functional mixed feelings (minimum score between functional positive emotions and negative feelings).

Situational Positive Irrational Beliefs. To measure specific positive irrational beliefs, we used seven items. On a Likert-type scale from 1 (not at all) to 9 (very much), participants had to indicate how strongly they agreed with the

following statements for each favorable scenario: It is wonderful if this situation occurs (*wonderfulizing*); I can't handle the happiness if this situation occurs (*positive emotion intolerance*); I believe I am a special being if this situation occurs; I believe I am superior to others if this situation occurs (two items of *extreme self-valuing*); and I need this situation to occur (two items of positive demandingness); and I think I will succeed in all other things that are essential to me if this event occurs *(overgeneralization;* Eisner et al., 2008). An additional item measured positive rational belief (I want this to happen, but I understand that just because I desire something, doesn't mean it will) (the internal consistency coefficient alpha Cronbach was excellent at 0.97).

Positive Irrational Beliefs Scale. There are 23 items in the Positive Irrational Beliefs Scale (Tiba et al., 2023a) that assess dispositional positive irrational beliefs. Participants responded on a Likert-type scale by indicating whether they (1) fully disagreed with or (5) totally agreed with each statement. We determined the following scores: (1) general positive irrationality (all items); (2) general positive demandingness (two items; "When I see that important others may appreciate me, their appreciation becomes a must that I must have"), (4) general positive irrational beliefs (four items, "When I am about to succeed, succeeding is a must for me and is wonderful and I almost cannot stand the happiness"); (3) demandingness in a positive context (i.e., "I must obtain important things"), and (5) positive emotion intolerance (three items, "When I succeed at something, I almost can't bear the happiness") (the internal consistency coefficient, alpha Cronbach was excellent at 0.94).

The Attitude and Beliefs Scale-Short Form. We used the Attitude and Beliefs Scale-Short Form (ABS-SF; DiGiuseppe et al., 2021) to assess dispositional irrational beliefs about adversity. On a Likert type scale, participants indicated which irrational belief topics they (1) absolutely disagreed with or (5) totally agreed with. We determined a rational subscale score and an irrational subscale score, as suggested by the authors. In order to further examine differences in assessing irrational processes towards negative situations, we also generated a demandingness in negative context score (the internal consistency coefficient alpha Cronbach was acceptable at 0.69).

Procedure

Data from a previous study investigating positive feelings and the role of irrational and rational positive beliefs in positive emotions were used in the present study (https://doi.org/10.21203/rs.3.rs-3034444/v1). The data was collected online. A link with an invitation to the study was posted on university social media groups. Participants read the study description and the informed consent form after clicking the link. Demographic data came from those who provided their permission. Following the methodology for measuring appraisals and emotion dispositions (the

Emotion Disposition Index, Scherer, 2021), we developed eight positive scenarios that were then shown in succession (Appendix A). Participants were asked to vividly imagine each positive scenario happening to them. For each scenario, the participants were asked to judge how they would appraise each situation by each dimension of appraisal (Scherer, 2021). In this study, participants had to appraise each situation based on positive irrational beliefs. Also, they were asked to judge the intensity with which they would experience each of the ten positive emotions and how much they would feel neutral or negative in that situation. After the task, participants completed a measure of dispositional irrational beliefs about adversity (the ABS short form, DiGiuseppe et al., 2021), a measure of dispositional positive irrational beliefs (the Positive Irrational Beliefs Scale, Tiba et al., 2023a), and the Altman Self-Rating Scale for Mania (Tiba et al., 2023a).

Data Analysis

An expectation-maximization approach was employed to manage the missing data for personally endorsed valence scores. Chi-square tests were used to compare the demographic and frequency data between groups. Based on SPSS statistics, the outliers for the correlation and regression analyses were eliminated. Each positive irrational process received a single score. Additionally, a total score of all-encompassing positive irrational beliefs was calculated. Exploratory factor analyses of the positive irrational scale and the dysfunctional positive feelings scale were performed using SPSS version 23 (IBM, 2015) in order to identify the best model. For positive primary rational beliefs, excessive self-valuation, general irrational views, general rational beliefs, generalization, and general positive irrational beliefs, the Kolmogorov-Smirnov test of normality indicated normal distributions (all *ps* > .01). The other variables showed non-normal distributions (all *ps* < .01). The P-P plot and scatterplot's visual assessment indicated that the residuals had a normal distribution, and that the data satisfied the homoscedasticity condition for mediation. A sample size of 115 offered sufficient power for mediation analyses, according to a power analysis using Monte Carlo Simulation for both simple mediation and parallel mediation based on correlation coefficients and standard deviation (Schoemann et al., 2017).

Results

Descriptive Statistics

The means and standard deviations for the main variables in the study are summarized in Table 1.

Table 1. Sample Characteristics

Sample characteristics	**Descriptive statistics**
Age in years, mean (*SD*, range)	24.65 (± 9.47, 18–61)
Gender identity, *n/N* (%)	
Female	102 / 115 (88.7 %)
Male	13 / 115 (11.3 %)
Dispositional irrationality in adverse situations scores (ABS-SF) (*SD*, range, *n*)	
Irrationality subscale (IB)	19.41 (± 9.62. 1–44. *n* = 115)
Rationality subscale (RB)	33.38 (± 8.77. 8–64.21. *n* = 115)
Dispositional positive irrationality scores (*SD*, range, *n*)	
Dispositional positive irrational beliefs	82.91 (± 16.74. 35–115. *n* = 115)
Situational biased appraisals (*SD*, range, *n*)	
Positive primary irrational beliefs	5.07 (± 1.91. 1.13–8.50. *n* = 115)
Positive primary rational beliefs	5.20 (± 1.77. 1.13–9. *n* = 115)
Positive emotion intolerance	6.65 (± 1.73. 1.50–9. *n* = 115)
Wonderfulizing	6.87 (± 1.79. 1.88–9. *n* = 115)
Extreme self-valuing	4.00 (± 2.03. 1–8.63. *n* = 115)
Total mixed emotions (*SD*, range, *n*)	12.73 (± 7.95. 8–60. *n* = 115)
Dysfunctional mixed emotions mean (*SD*, range, *n*)	12.78 (± 7.99. 8–60. *n* = 115)
Functional mixed emotions mean (*SD*, range, *n*)	13.21 (± 8.39. 8–60. *n* = 115)
Neutral feelings (*SD*, range, *n*)	19.26 (± 10.16. 8–54. *n* = 115)
Negative feelings (*SD*, range, *n*)	13.78 (± 9.27. 8–61. *n* = 115)

Abbreviations: IB=Dispositional Irrational Beliefs; RB= Dispositional Rational Beliefs.

When analyzing the responses across situations, between 20% and 40% of participants reported experiencing negative feelings when they imagined positive situations. Similarly, between 35.7 % and 62.6 % participants reported neutral feelings when they imagined positive situations. Except in two situations, all participants who reported negative or neutral feelings also reported having positive feelings when they imagined being in positive situations. Moreover, the participants who reported negative and neutral feelings in one scenario reported experiencing these feelings in all positive scenarios (except one participant in scenario 1 and another participant in scenario 5).

The Correlations between Negative, Neutral, and Mixed Feelings and Cognitive and Mood Variables

Table 2 summarizes the Spearman correlation coefficients between negative, neutral, and mixed feelings and cognitive and mood variables.

Table 2. Correlation Coefficients between the Study Variables

	N	**1**	**2**	**3**	4	5	6	7	8	9
1.NEG	**115**	-								
2. MIXT	**115**	.944**	-							
3. NEUTRAL	115	.663**	.683**	-						
4. PD-S	**115**	.173	.231*	.273**	-					
5. SV-S	**115**	.371**	.419**	.369**	.733**	-				
6. OVER-S	**115**	.392**	.422**	361**	.702**	.840**	-			
7.IB	**115**	.226*	.249**	.116	.259**	.318**	.297**	-		
8. RB	115	-.081	-.110	-.050	.128	.047	-.022**	.897**	-	
9. FPF	115	-.255**	-.201*	.080	.426**	.290**	.250**	.560**	.433**	-

Abbreviations: NEG= negative feelings; MIXT=mixed feelings; PD-S=Positive Demandingness-Situational (Positive Primary Irrational Beliefs); SV-S= Extreme Self Valuing-Situational; OVER-S= Overgeneralizations- Situational; IB=Dispositional Irrational Beliefs; RB= Dispositional Rational Beliefs; FPF = Functional Positive Feelings

Note. $*p < .05$ (2-tailed). $**p < .01$ (2-tailed).

Results from correlational Spearman analyses showed that negative feelings significantly correlated with dispositional irrational beliefs about adversity, extreme situational self-valuing, situational overgeneralization (biased future expectancies), and marginally with situational demandingness. A significant negative relationship has been observed with positive functional feelings, but no relationship has been observed with dysfunctional positive feelings. No significant relationships were found between negative feelings and dispositional rational beliefs, wonderfulizing, positive emotion intolerance, situational preferences, or hypomania (all *p*s > .05).

Mixed feelings significantly correlated with dispositional irrational beliefs in negative situations, extreme situational self-valuing, situational over-generalization, and situational demandingness. Moreover, an inverse relationship

has been observed between mixed feelings in positive situations and positive functional feelings, but no relationship has been observed with dysfunctional positive feelings. Similar relationships were observed between the investigated variables and both forms of mixed functional and mixed dysfunctional positive feelings. No significant relationships were found between mixed feelings and general rational beliefs, wonderfulizing, positive emotion intolerance, situational preferences, or hypomania (all *p*s > .05).

Neutral feelings significantly correlated with general irrational beliefs about negative situations, extreme situational self-valuing, situational over-generalization, and situational demandingness. An inverse relationship has been observed between neutral feelings in positive situations and positive functional feelings, but no relationship has been observed with dysfunctional positive feelings. No significant relationships were found between neutral feelings and dispositional rational beliefs, wonderfulizing, positive emotion intolerance, situational preferences, or hypomania (all *p*s > .05).

The Effect of Demandingness on Negative Feelings in Positive Situations Was Mediated by Extreme Secondary Positive Appraisals

All forms of situational irrational beliefs correlated with negative feelings in positive situations (all *p*s < .05). Since wonderfulizing and positive emotion intolerance were associated with rational and not irrational dispositional beliefs about adversity, they were considered rational beliefs in this study. Two types of biased positive appraisals (extreme self-valuing and over-generalization) were positively correlated with irrational dispositional beliefs about adversity and were not correlated with rational beliefs and were considered secondary biased positive appraisals.

Based on REBT theory (Ellis, 1994), it is expected that when individuals highly demand the situation to be the way they want it, demandingness results in secondary biased appraisals, which in turn result in emotional consequences. Thus, we tested the mediation effect of demandingness on negative feelings in positive situations through biased secondary appraisals using two mediation models based on Hayes model 4: one with extreme self-valuing as a mediator and the other with over-generalization as a mediator.

For extreme self-valuing, results based on 5000 bootstrapped samples indicated that extreme self-valuing fully mediates the relationship between demandingness and negative feelings. Specifically, there was a significant indirect effect of the impact of demandingness on negative feelings through extreme self-valuing (b = 1.621, 95% CI [0.799, 2.647]). Furthermore, the direct effect of demandingness on negative feelings was not significant (b = - 0.985, t = -1.566, p = .120) when self-valuing was entered in the equation, suggesting a total mediation.

For over-generalization, results based on 5000 bootstrapped samples indicated that over-generalization fully mediates the relationship between positive demandingness and negative feelings. Specifically, there was a significant indirect effect of the impact of demandingness on negative feelings through overgeneralization (b = 1.790, 95% CI [0.887, 2.915]). Furthermore, the direct effect of positive demandingness on negative feelings was marginally significant (b = -1.154, t = -1.987, p = .049) when overgeneralization was entered in the equation, suggesting a partial mediation.

The Effect of Demandingness on Mixed Feelings in Positive Situations Was Mediated by Extreme Secondary Positive Appraisals

All forms of situational irrational beliefs correlated with mixed feelings in positive situations (all ps < .05). Similar to our analyses for negative feelings, we tested the mediation effect of demandingness on mixed feelings in positive situations through biased secondary appraisals of extreme self-valuing and over-generalization.

For extreme self-valuing, results based on 5000 bootstrapped samples indicated that extreme self-valuing fully mediates the relationship between demandingness and mixed feelings. Specifically, there was a significant indirect effect of the impact of demandingness on mixed feelings through self-valuing (b = 1.466, 95% CI [0.744, 2.362]). Furthermore, the direct effect of demandingness on mixed feelings was not significant (b = -0.736, t = -1.384, p = .168) when self-valuing was entered in the equation, suggesting a total mediation.

For over-generalization, results based on 5000 bootstrapped samples indicated that over-generalization fully mediates the relationship between demandingness and mixed feelings. Specifically, there was a significant indirect effect of the impact of demandingness on mixed feelings through overgeneralization (b = 1.527, 95% CI [0.730, 2.584]). Furthermore, the direct effect of demandingness on mixed feelings was not significant (b = -0.797, t = -1.613, p = .109) when overgeneralization was entered in the equation, suggesting a total mediation.

The Effect of Demandingness on Neutral Feelings in Positive Situations Was Mediated by Extreme Secondary Positive Appraisals

Similar to our analyses for negative feelings, we tested the mediation effect of positive demandingness on neutral feelings in positive situations through extreme secondary appraisals of extreme self-valuing and over-generalization.

For extreme self-valuing, results based on 5000 bootstrapped samples indicated that extreme self-valuing fully mediates the relationship between demandingness and neutral feelings. Specifically, there was a significant indirect effect of the impact of demandingness on neutral feelings through self-valuing

(*b* = 1.462, 95% CI [0.411, 2.456]). Furthermore, the direct effect of demandingness on neutral feelings was not significant (*b* = -0.150, *t* = -0.220, *p* = .826) when self-valuing was entered in the equation, suggesting a total mediation.

For over-generalization, results based on 5000 bootstrapped samples indicated that over-generalization fully mediates the relationship between demandingness and neutral feelings. Specifically, there was a significant indirect effect of the impact of demandingness on neutral feelings through overgeneralization (*b* = 1.274, 95% CI [0.387, 2.159]). Furthermore, the direct effect of demandingness on neutral feelings was not significant (*b* = 0.373, *t* = 0.572, *p* = .954) when overgeneralization was entered in the equation, suggesting a total mediation.

Discussion

We examined the relationship between negative, neutral, and mixed feelings in response to imagined positive situations and the role of a specific type of biased positive appraisal: *situational positive irrational beliefs*. First, participants who reported feeling negative or neutral when they imagined positive situations also reported experiencing positive feelings. Thus, our study suggests that negative and neutral feelings are part of a mixed emotional experience. In our study 40% of participants reported mixed feelings involving positive and negative feelings. This percent is consistent with previous estimates of mixed emotions ranging from 5% to 50% (Larsen et al., 2017).

Our results supported the hypotheses and showed that participants who endorsed responding with higher levels of demandingness, extreme self-valuing and over-generalization to positive situations also reported higher levels of mixed feelings when imagining being in positive situations. Thus, they tend to experience higher levels of negative and neutral feelings along with positive feelings in positive situations. As predicted by REBT theory, the effect of situational demandingness on all negative, neutral, and mixed feelings as responses to positive situations is mediated by situational secondary irrational beliefs (extreme self-valuing and overgeneralization).

The main way of interpreting these results is in line with existing theories of the mechanisms involved in mixed emotions. Our first finding was that biased positive appraisals were associated with mixed feelings in positive situations. Except for two situations, all participants who endorsed negative and/or neutral feelings in positive situations reported positive feelings as well in all scenarios. Thus, feeling negative in response to positive situations may be interpreted as a type of mixed feelings. Similar relationships between negative and mixed feelings were found with other variables, which supports the idea that negative feelings reported in positive situations are most likely a type of mixed feelings.

The main theory that explains mixed feelings suggests that mixed feelings are the result of the activation of conflicting goals. For instance, previous studies by Berrios et al. (2015a) showed that mixed emotions are triggered when a person decides about conflicting goals in the present. Thus, the emotions reported by the participants result from multifaceted evaluations of the relevance and implications of the event, often based on appraisals that may be in conflict (Shuman et al., 2013). In our study, there are two types of conflicts that may arise in imagining positive situations: (1) the conflict between having the imagined thing they need and losing or not getting it (Dryden & DiGiuseppe, 1990); and (2) the conflict between imagining the situation and the reality of the situation (Oettingen et al., 2016). Thus, in the first situation, imagining a highly positive event happening and feeling superior to others may lead to the thought that the event may not happen, which will result in negative and mixed feelings. In the second type of conflict, imagining a highly positive event in which they felt superior to others and had a highly successful life may contrast with the reality of the participants (e.g., in reality, I am not special, and all the things I want will not happen). The greater the level of extreme positive appraisals, the higher the amount of discrepancy and subsequent negative feelings. Thus, similar to the proposals of Shuman et al. (2013) a conflict will arise between appraisals of a multifaceted situation. Although based on our data we cannot differentiate between the two scenarios, our result suggests a new pathway of conflicting goals and experiencing negative and mixed emotions in positive situations: demandingness and associated extreme positive self and life appraisals in response to imagined positive situations.

Our results are in line with the findings examining the negative effects of positive fantasies (Oettingen et al., 2016). In a series of experiments, Oettingen et al. (2016) found that positive fantasies increase depressive symptoms in the long term. Although they interpreted the negative long-term effect of positive fantasies in terms of avoidance, ameliorating symptoms "only until reality hits" (Oettingen et al., 2016, p. 8) and then increasing depression, this is consistent with a conflicting goals and mixed emotions framework. Thus, it is possible that in individuals who react to positive fantasies with extreme positive appraisals, due to a larger discrepancy, reality hits sooner and negative feelings are evident much earlier. No relationship was observed between the vividness of imagining positive fantasies and mixed feelings. This result strengthens the idea that behind the negative effects of positive fantasies is not how vividly individuals imagine positive fantasies but how much they think they need that situation, and they overvalue their self and future based on that fantasy.

Macrynikola et al. (2017) explored the mechanisms behind the negative effects of positive fantasies. They found that experiencing positive fantasies results in a dampening of positive affect, higher levels of rumination (repeatedly thinking of the mood consequences, such as "why I deserve it" or "why I react this way") and then higher depressive reactions (Macrynikola et al. 2017). Based on our results, we

suggest adding a new mechanism: reacting to positive imagined situations with extreme positive appraisals will increase the discrepancy between the imagined and real situations, resulting in mixed feelings and thoughts about positive fantasies. Then, further rumination may, over time, foster higher levels of depressive symptoms.

In our study, negative and mixed feelings correlated negatively with functional positive feelings, and no relationship was found between negative, neutral, or mixed feelings and dysfunctional positive feelings. This result suggests that experiencing negative and mixed feelings in positive situations goes hand in hand with lower levels of experiencing positive functional emotions; no relationship was observed between extremely intense positive feelings and mixed feelings. Thus, it is not that individuals with extreme positive feelings will end up with negative feelings, but individuals with exaggerated positive appraisals will experience more negative and mixed feelings in positive situations.

We also found that irrational beliefs are associated with reports of neutral feelings in positive situations**.** Our findings show that neutral feelings are significantly correlated with mixed and negative feelings. Neutral feelings endorsed by participants in our study may be interpreted as forms of mixed feelings (Schreier et al., 2016) or in the middle of neutral affect (Gasper, 2018). Thus, participants who endorse rigid motivational relevance and congruence of the positive situations (things must be as I want) probably also activate incongruent appraisals of the real situation (Yih et al., 2020). This is the first report of this "neutral feelings" type of mixed emotion in positive situations that is associated with high demands and exaggerated secondary appraisals (biased self-worth and over-generalization). Nonetheless, this result is consistent with clinical reports of highly demanding individuals who verbally report that because situations were supposed to happen, there was no extra benefit when they happened (i.e., it was as expected, so it was no surprise). Further research should clarify the nature of this type of neutral feelings (whether they are secondary or concomitant mixed emotions).

There are several limitations to the study. First, we used self-reported data, and the results are vulnerable to self-reporting bias. Second, most participants were females (88.7 %), so the generalization to the male population is limited. Third, we tested the assessment of emotions individuals would endorse if the situation happened. Thus, our measures of emotions are based on a subjective report of more foreseen emotions than experienced emotions. Fourth, the small sample size suggests that further studies are needed to replicate the results. Further studies should focus on using different measures of experienced feelings.

There are several implications for the field of mixed emotions and positive fantasies. First, we point to demandingness and biased positive appraisals as new pathways for mixed feelings in positive situations. Second, we suggest a new type of goal discrepancy induction mechanism based on mixed feelings via demandingness and biased secondary appraisals that may result in negative mood

effects from positive fantasies. Our study also has implications for the REBT model of well-being. It points to a new pathway by which biased appraisals may affect mental health: increasing the experience of negative, neutral, and mixed emotions in positive situations. Thus, our study suggests that biased appraisals in the form of irrational beliefs may act on several pathways to affect mental health: (1) reduce functional positive emotions; (2) increase dysfunctional positive emotions; and (3) increase mixed feelings in positive situations.

The current models of the well-being advantage of mixed emotions focus on the advantage of experiencing mixed emotions in stressful situations (Reichet al., 2003), conflicting positive situations (Berrios et al., 2017), or at moderate levels of frequency or intensity (Miyamoto & Ryff, 2011).

Here we show that mixed emotions in positive situations have rather negative effects, being linked with lower levels of healthy positive emotions and processes involved in vulnerability to emotional disorders (e.g., rigid goals). In different contexts (positive or negative), amounts (low, moderate, or high), or depending on their ingredients (rigid goals, biased appraisals), mixed feelings may be healthy or unhealthy. Thus, we may find contradictory findings depending on the context in which mixed feelings were measured. Berrios et al. (2017) found positive effects of mixed emotions in positive situations on well-being. Yet they measured mixed emotions in a rather conflicting positive situation (graduation accompanied by messages about conflicting goals) and functional positive and negative emotions (enthusiasm-sad; happy-sad) and not dysfunctional emotions (enthusiasm-depressed or euphoric-depressed).

Based on REBT theory, we suggest that mixed feelings may be healthy or unhealthy depending on their ingredients: functional or dysfunctional feelings, rigid goals, and biased appraisals. In this study, we explored the relationships between mixed feelings that include functional positive emotions and mixed feelings containing dysfunctional positive emotions with different variables. No difference in their relationships with other variables was observed. Our results did not support this distinction when we analyzed mixed feelings with functional positive emotions and mixed feelings with dysfunctional positive emotions. It seems that mixed feelings in positive situations are unhealthy based on the presence of negative feelings, regardless of whether positive feelings are functional or dysfunctional. Yet a different situation may exist for negative feelings. We did not differentiate mixed feelings based on functional and dysfunctional negative feelings. Further research should examine mixed emotions that include dysfunctional negative feelings and their effect on well-being.

Indulging ourselves in positive fantasies makes us feel better, but it comes with a cost: it adds negative feelings. The more we demand those fantasies happen and let ourselves feel more valuable and have a brighter future, the more negative feelings we experience. Mixed emotions and biased positive appraisals seem to be important processes involved in the negative effects of positive fantasies. It seems

that both practical suggestions and theoretical proposals from the REBT cognitive theory of emotions are right: when things we demand happen, we feel dysfunctional positive feelings and negative feelings as well.

Authors' Notes

Acknowledgement. This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2021-1090, within PNCDI III.

References

Altman, E. G., Hedeker, D., Peterson, J. L., & Davis, J. M. (1997). The Altman self-rating mania scale. *Biological Psychiatry*, *42*(10), 948–955.

Berrios, R., Totterdell, P., & Kellett, S. (2015a). Investigating goal conflict as a source of mixed emotions. *Cognition and Emotion*, *29*(4), 755–763. https://doi.org/10.1080/02699931.2014.939948

Berrios, R., Totterdell, P., & Kellett, S. (2015b). Eliciting mixed emotions: A meta-analysis comparing models, types, and measures. *Frontiers in Psychology*, *6*, 428.

Berrios, R., Totterdell, P., & Kellett, S. (2017) When Feeling Mixed Can Be Meaningful: The Relation Between Mixed Emotions and Eudaimonic Well-Being. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, *19*(3), 841–861. https://doi.org/10.1007/s10902-017-9849-y

Bridges, K. R., & Harnish, R. J. (2010). Role of irrational beliefs in depression and anxiety: A review. *Health*, *2*(08), 862.

Carver, C. S., & Scheier, M. (1990). *Principles of self-regulation: Action and emotion.* The Guilford Press.

David, D., Cotet, C., Matu, S., Mogoase, C., & Stefan, S. (2018). 50 years of rational-emotive and cognitive-behavioral therapy: A systematic review and meta-analysis. *Journal of Clinical Psychology*, *74*(3), 304–318.https://doi.org/10.1002/jclp.22514

David, D. O., DiGiuseppe, R., Dobrean, A., Păsărelu, C. R., & Balazsi, R. (2019). The measurement of irrationality and rationality. In M. E. Bernard & W. Dryden (Eds.), *Advances in REBT: Theory, practice, research, measurement, prevention and promotion* (pp. 79–100). Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-319-93118-0_4.

David, D., Schnur, J., & Belloiu, A. (2002). Another search for the "hot" cognitions: Appraisal, irrational beliefs, attributions, and their relation to emotion. *Journal of Rational-Emotive and Cognitive-Behavior Therapy*, *20*, 93–131.

De Castella, K., Goldin, P., Jazaieri, H., Ziv, M., Dweck, C. S., & Gross, J. J. (2013). Beliefs about emotion: Links to emotion regulation, well-being, and psychological distress. *Basic and Applied Social Psychology, 35*(6), 497–505. https://doi.org/10.1080/01973533.2013.840632

DiGiuseppe, R., Gorman, B., Raptis, J., Agiurgioaei-Boie, A., Agiurgioaei, F., Leaf, R., & Robin, M. W. (2021). The development of a short form of an irrational/ rational beliefs scale. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 39*(3), 456-490 https://doi.org/10.1007/s10942-021-00386-3

Dryden, W., & DiGiuseppe, R. (1990). *A primer on rational-emotive therapy.* Research Press.

Eisner, L. R., Johnson, S. L., and Carver, C. S. (2008). Cognitive responses to failure and success relate uniquely to bipolar depression versus mania. *Journal of Abnormal Psychology, 117*(1), 154-163. https://doi.org/10.1037/0021-843X.117.1.154

Ellis, A. (1957). Rational psychotherapy and individual psychology. *Journal of Individual Psychology, 13*(1), 38-44.

Ellis, A. (1962). *Reason and emotion in psychotherapy.* Lyle Stuart.

Ellis, A. (1994). *Reason and emotion in psychotherapy* (Rev. Ed.). Birch Lane.

Gasper, K. (2018). Utilizing neutral affective states in research: Theory, assessment, and recommendations. *Emotion Review, 10*(3), 255–266. https://doi.org/ 10.1177/1754073918765660

Gasper, K., & Danube, C. L. (2016). The scope of our affective influences: When and how naturally occurring positive, negative, and neutral affects alter judgment. *Personality and Social Psychology Bulletin, 42*(3), 385–399. https://doi.org/10.1177/0146167216629131

Gasper, K., Danube, C. L., & Hu, D. (2021). Making room for neutral affect: Evidence indicating that neutral affect is independent of and co-occurs with eight affective states. *Motivation and Emotion, 45*, 103–121. https://doi.org/10.1007/s11031-020-09861-3

Gasper, K., Spencer, L. A., & Hu, D. (2019). Does neutral affect exist? How challenging three beliefs about neutral affect can advance affective research. *Frontiers in Psychology, 10*, 2476. https://doi.org/10.3389/fpsyg.2019.02476

Hamidi, F., & Motlagh, S. S. (2010). Comparison of irrational beliefs and defence mechanisms in patients with obsessive compulsive disorder and normal individuals. *Procedia-Social and Behavioral Sciences, 5*, 1620–1624.

Hershfield, H. E., Scheibe, S., Sims, T. L., & Carstensen, L. L. (2013). When feeling bad can be good: Mixed emotions benefit physical health across adulthood. *Social Psychological and Personality Science, 4*(1), 54–61. https://doi.org/ 10.1177/1948550612444616

Himle, J. A., Himle, D. P., & Thyer, B. A. (1989). Irrational beliefs and the anxiety disorders. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 7*, 155–165.

Hyland, P., Shevlin, M., Adamson, G., & Boduszek, D. (2014). Modeling the structure of the Attitudes and Belief Scale 2 using CFA and bifactor

approaches: Toward the development of an abbreviated version. *Cognitive Behaviour Therapy*, *43*(1), 60–71. https://doi.org/10.1080/16506073.2013.777467

Larsen, J. T., Coles, N. A., & Jordan, D. K. (2017). Varieties of mixed emotional experience. *Current Opinion in Behavioral Sciences*, *15*, 72–76. https://doi.org/10.1016/j.cobeha.2017.05.021

Larsen, J. T., McGraw, A. P., & Cacioppo, J. T. (2001). Can people feel happy and sad at the same time? *Journal of Personality and Social Psychology*, *81*(4), 684-696. https://doi.org/10.1037/0022-3514.81.4.684

Macrynikola, N., Goklani, S., Slotnick, J., & Miranda, R. (2017). Positive future-oriented fantasies and depressive symptoms: Indirect relationship through brooding. *Consciousness and Cognition: An International Journal, 51,* 1–9. https://doi.org/10.1016/j.concog.2017.02.013

Miyamoto, Y., & Ryff, C. D. (2011). Cultural differences in the dialectical and nondialectical emotional styles and their implications for health. *Cognition & Emotion, 25*(1), 22–39. https://doi.org/10.1080/02699931003612114

Oatley, K., & Johnson-Laird, P. N. (1996). The communicative theory of emotions: empirical tests, mental models, and implications for social interaction. In L. Martin and A. Tesser (Eds.), *Striving and Feeling. Interaction Among Goals, Affect, and Self-Regulation*, (pp. 363–393). New York, NY: Russell Sage.

Oceja, L., & Carrera, P. (2009). Beyond a single pattern of mixed emotional experience: Sequential, prevalence, inverse, and simultaneous. *European Journal of Psychological Assessment*, *25*(1), 58–67. https://doi.org/10.1027/1015-5759.25.1.58

Oh, V. Y. (2022). Torn between valences: Mixed emotions predict poorer psychological well-being and job burnout. *Journal of Happiness Studies*, *23*(5), 2171–2200. https://doi.org/10.1007/s10902-021-00493-z

Oltean, H. R., Hyland, P., Vallières, F., & David, D. O. (2017). An empirical assessment of REBT models of psychopathology and psychological health in the prediction of anxiety and depression symptoms. *Behavioural and Cognitive Psychotherapy*, *45*(6), 600-615. https://doi.org/10.1017/S1352465817000133

Oltean, H. R., Hyland, P., Vallières, F., & David, D. O. (2019). Rational beliefs, happiness and optimism: An empirical assessment of REBT's model of psychological health. *International Journal of Psychology: Journal international de psychologie*, *54*(4), 495–500. https://doi.org/10.1002/ijop.12492

Oltean, L.-E., Canache, M.-G., Patrichi, A., Rimbu, R. I., Sintoma, D., Miu, A. C., & Szentágotai-Tatar, A. (2024). Loneliness and cognitive vulnerability factors: A systematic review focused on maladaptive cognitions. *Journal of Evidence-Based Psychotherapies*, *24*(2), 117–138. https://doi.org/10.24193/jebp.2024.2.14

Oettingen, G., Mayer, D., & Portnow, S. (2016). Pleasure Now, Pain Later: Positive Fantasies About the Future Predict Symptoms of Depression. *Psychological Science*, *27*(3), 345–353. https://doi.org/10.1177/0956797615620783

Priester, J. R., & Petty, R. E. (1996). The gradual threshold model of ambivalence: relating the positive and negative bases of attitudes to subjective ambivalence.

Journal of Personality and Social Psychology, 71, 431–449. https://doi.org/10.1037/0022-3514.71.3.431

Scherer, K. R. (1998). Analyzing Emotion Blends In A. Fischer (Ed.), *Proceedings of the 10th Conference of the International Society for Research on Emotions* (pp. 142-148). ISRE Publications.

Scherer K. R. (2021). Evidence for the existence of emotion dispositions and the effects of appraisal bias. *Emotion (Washington, D.C.), 21*(6), 1224–1238. https://doi.org/10.1037/emo0000861

Schneider, I. K., Veenstra, L., van Harreveld, F., Schwarz, N., & Koole, S. L. (2016). Let's not be indifferent about neutrality: Neutral ratings in the International Affective Picture System (IAPS) mask mixed affective responses. *Emotion, 16*(4), 426-430. https://doi.org/10.1037/emo0000164

Schoemann, A. M., Boulton, A. J., & Short, S. D. (2017). Determining power and sample size for simple and complex mediation models. *Social Psychological and Personality Science, 8*(4), 379–386. https://doi.org/10.1177/1948550617715068

Shuman, V., Sander, D., & Scherer, K. R. (2013). Levels of valence. *Frontiers in Psychology, 4*, 261. https://doi.org/10.3389/fpsyg.2013.00261

Taghavi, M. R., Goodarzi, M. A., Kazemi, H., & Ghorbani, M. (2006). Irrational beliefs in major depression and generalized anxiety disorders in an Iranian sample: A preliminary study. *Perceptual and Motor Skills, 102*(1), 187–196.

Tiba, A. I. (2010). Grounded cognition perspective on irrational beliefs in Rational Emotive Behaviour Therapy. *Journal of Cognitive and Behavior Psychotherapy, 10*, 87-99

Tiba, A., Drugaș, M., Sîrbu, I., Trip, S., Bora, C., Miclăuș, D., Voss, L., Sanislav, I., & Ciurescu, D. (2023a). *The ABC Model of Positive Feelings: A Preliminary Test*. https://doi.org/10.21203/rs.3.rs-3034444/v1

Tiba, A. I., & Manea, L. (2018). The embodied simulation account of cognition in Rational Emotive Behaviour Therapy. *New Ideas in Psychology, 48*, 12–20. https://doi.org/10.1016/j.newideapsych.2017.08.003

Tiba, A. I., Trip, S., Bora, C. H., Drugas, M., Borz, F., Miclăuș, D. C., Voss, L., Iova, S. C., & Pop, S. (2023b). Positive irrational beliefs are associated with hypomanic personality. *Frontiers in Psychology, 14*, 1053486. https://doi.org/10.3389/fpsyg.2023.1053486

Tiba, A., Johnson, C., & Vadineanu, A. (2012). Cognitive vulnerability and adaptation of parents of children with Autistic Spectrum Disorder. *Journal of Cognitive and Behavioral Psychotherapies, 12*, 209-218

Vîslă, A., Flückiger, C., Grosse Holtforth, M., & David, D. (2016). Irrational beliefs and psychological distress: A meta-analysis. *Psychotherapy and Psychosomatics, 85*(1), 8–15. https://doi.org/10.1159/000441231

Westphal, M., Leahy, R. L., Pala, A. N., & Wupperman, P. (2016). Self-compassion and emotional invalidation mediate the effects of parental indifference on psychopathology. *Psychiatry Research, 242*, 186–191. https://doi.org/10.1016/j.psychres.2016.05.040

World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *Jama*, *310*(20), 2191–2194.

Yih, J., Kirby, L. D., Spitzer, E. G., & Smith, C. A. (2020). Emotion as a process: Appraisal, emotion, and coping patterns across time. *Motivation Science*, *6*(3), 221. https://doi.org/10.1037/mot0000144

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 99-128.

10.24193/jebp.2025.1.5

RESEARCH AND DEVELOPMENT OF A SUICIDE ASSESSMENT SCALE IN SINGLE-SESSION SUICIDE CRISIS INTERVENTION

Jiao-Yan Wang[1,5], Mei-Fang Lin[1,2,3], Chu-Yi Yang[1,5], Zhendong Liang[3,4], and Yun-Ming Chang[1,2,3]*

[1] Department of Psychology, School of Education and Psychology, Minnan Normal University, China/ Fujian, Zhangzhou City, 363000.
[2] Fujian Province University Key Laboratory of Applied Cognition & Personality, China.
[3] Institute of Applied Psychology, Minnan Normal University, China.
[4] School of Business, Minnan Normal University, China/ Fujian, Zhangzhou City, 363000.
[5] Nuanyang Zizai Psychological Center, China.

Abstract

The incidence of suicide, particularly among youth, is on the rise. Research has shown that single-session suicide interventions can effectively reduce suicide risk. The objective of this study was to develop a concise suicide assessment scale that incorporates both risk and protective factors, designed specifically for use in single-session interventions. A combination of item analysis, factor analysis, and characteristic curve analysis was employed to select 83 items from existing literature. These items were then subjected to a two-stage scale development process, including a pre-test and a formal test. The finalized scale, derived from a sample of 798 college students, consists of 30 items across four factors: suicidal behavior, depression, hopelessness, and reasons for living. The Cronbach's α for these factors ranged from 0.85 to 0.95. The criterion validity was found to be 0.77 ($p < 0.01$). ROC curve analysis determined the critical value of the scale to be 120 points, with scores of 120 or lower indicating a suicide risk, which can be further classified as mild, moderate, or severe. This suicide assessment scale is reliable, valid, easy to use, and has the ability to identify suicide risk.

* Correspondence concerning this article should be addressed to Mei-Fang Lin, associate professor, Department of Psychology, School of Education and Psychology, Minnan Normal University, China; Fujian Province University Key Laboratory of Applied Cognition & Personality, China; Institute of Applied Psychology, Minnan Normal University, China. Address: No.36, Qianzhi Street, Zhangzhou City, Fujian Province, China, 363000.
E-mail: Meifang.lin86@gmail.com
Other author e-mails: Jiao-Yan Wang：445720109@qq.com; Zhendong Liang：Lzd1611@mnnu.edu.cn; Yun-Ming Chang：yunm055@qq.com; Chu-Yi Yang：260135322@qq.com

Keywords: single-session suicide intervention; suicide assessment scale; warning sign; suicide risk factor; protective factor; college students.

Suicide is a serious public health problem and can negatively affect individuals, families, and society. According to the World Health Organization (WHO) (2021), 703,000 people die by suicide worldwide every year, and the WHO estimates about 25 cases of suicide attempts occur for each suicide death. A modest estimate of the suicide death data is that about 20 million people attempt suicide each year (Lew, et al., 2021); however, due to the imperfect registration system, the suicide phenomenon and the number of suicide patients are far more than reported.

China's suicide rate has dropped sharply in recent years, but the number of suicide deaths remains alarming. According to the China Health Statistical Yearbook 2022, the number of suicide deaths per 100,000 among urban and rural residents was 4.31 and 7.09, respectively in 2021 (The Central People's Government of the People's Republic of China, 2023). Lew et al. (2021) found that for each suicide death, about 135 people experienced a substantial negative impact, suggesting that about 10.18 million people in China were negatively affected by suicide in 2021. To reduce the impact of suicide events, it is crucial to develop effective suicide intervention strategies.

Suicide occurs at all stages of the life cycle, and the suicide of young people should be given increased attention. According to the Status of Global Suicide 2019 published by the WHO, suicide remains one of the leading causes of death worldwide, and suicide is the fourth leading cause of death in the global age group of 15-29 years (WHO, 2021). A meta-analysis of suicide attempts among Chinese adolescents pooled 43 previous studies involving 200,124 participants and found that the overall prevalence of suicide attempts among Chinese adolescents was 2.94%, ranking among the median global prevalence of adolescent suicide attempts (Hu, et al., 2015). The suicide phenomenon is particularly serious among college students, especially in the high incidence of suicide attempts among young people. The suicide situation of college students is particularly prominent, with a suicide rate that is two to four times that of their peers and that continues the rise (Hu, et al., 2016). In summary, as a high-risk group for suicide, adolescent suicide assessments have high research value and practical significance. Therefore, this article based its research on the adolescent and young adult population (14-15 years old).

The purpose of suicide assessment and intervention is to reduce the risk of suicide, increase the positive feelings of individuals at risk, and improve the chances of individuals at risk to receive services and thus save their lives. Compared with ordinary cases, suicide risk cases can be given fewer opportunities and time for

intervention, yet the treatment of suicide problems is more urgent than ordinary problems. Therefore, interventions for at-risk individuals should consider achieving effects in a limited number of times or even a single opportunity within a short period (minutes, hours, or days). The single-session intervention model belongs to the short-term working model; that is, within the opportunity of only one or a limited number of interventions, the model can meet the need for emergency treatment for individuals who are at risk for suicide. Previous studies have confirmed the applicability of the single-session suicide crisis intervention model to suicide issues. Lin et al. (2022) found that the Single-Session Suicide Crisis Intervention can effectively reduce suicide risk (an average reduction rate of suicide risk of 21.35%) and produce sustained positive effects covering the individual, relationships, and spirituality, but that the single-session suicide crisis intervention model using four independent scales in the suicide risk evaluation is not suitable for suicide cases with only one intervention opportunity in a short time. A simplified suicide assessment scale covering suicide risk factors and protective factors will be developed and applied to the single-session suicide intervention to effectively reduce suicide risk. Integrating the advantages of assessment and intervention will greatly increase the possibility of saving lives and achieve the goals of rapid clinical assessment and effective intervention. Therefore, based on the study of Lin et al. (2022), this research developed a single-session suicide assessment scale that could be applied to a single-session suicide crisis intervention covering suicidal behavior, cognition, and emotional orientation, and then verified the effectiveness of this scale.

Literature Review

Factors associated with suicide

The factors associated with suicide can be categorized into risk factors, protective factors, and warning signs. While many articles have extensively covered suicide risk factors, this paper will focus on the less-explored areas of suicide protective factors and warning signs. It's important to note that suicide risk factors might not always indicate an immediate crisis (for example, a history of suicide attempts does not necessarily reflect the urgency of the current situation). Therefore, risk factors are generally used as reference points for assessing potential crises. However, to better identify imminent risks and save lives, this study emphasizes suicide warning signs, which can urgently signal the presence of risk, and protective

factors, which serve as crucial buffers during intervention. While all three categories are included in this scale, each has a distinct focus, which is a key feature of this assessment tool.

From a temporal perspective, there is an imbalance in the research on these different factors. Previous suicide research has primarily concentrated on passive (risk) factors that may increase the likelihood of suicide, with relatively little attention given to active (protective) factors that could reduce this risk (Deng, et al., 2012). Rudd (2008) also highlighted the abundance of studies on suicide risk factors compared to the scarcity of research on suicide warning signs. Consequently, this paper aims to develop a scale that encompasses all three factors related to suicide.

Protective factors of suicide

Protective factors can serve as seeds of hope for patients at suicide risk, reducing their short- or long-term suicide risk. The role of protective factors in suicide prevention and interventions is increasingly being recognized (Wang & Wu, 2013). Therefore, in addition to assessing risk factors, suicide risk assessment should also include protective factors, reasons for living, and other factors that can reduce suicide risk. This is consistent with the idea proposed by O'Keefe et al. (2019) that incorporating risk factors and protective factors into assessments and combining them with suicide interventions can improve the psychological resilience of individuals at risk of suicide.

Suicide warning signals

Risk factors can predict danger but not emergencies, which is not conducive to capturing the urgency of suicide risk, so this study investigated suicide warning signals. Suicide warning signals (warning signs for suicide) refer to short-term indications (a few minutes, hours, or days) from high-risk individuals and can be detected by processing the earliest signals closely related to suicidal behavior, such as mood, thoughts, or behavior (Rudd, 2008). In the case of suicide, suicide warning signals present a simple and direct goal: to increase the chance of suicidal individuals to receive services and save their lives (Rudd, 2008).

The suicide warning signal is different from the concept of the suicide risk factor, which applies to different clinical situations. Rudd et al. (2006) stated that most studies of suicide risk factors are clinically relevant, with predictions of suicidal behavior ranging from one year to as long as 20 years, such as past suicide history. Most individuals who reported a past history suicide do not complete suicide, whereas many individuals who do complete suicide have no history of suicide attempts. Rudd et al. (1994) showed that most risk factors are predictive or

informative about suicide, but it was difficult to identify immediate substantial risk at the first point in time. Suicide warning signals are critical and identifiable in the short term, which is conducive to identifying the urgency of suicide risk. Suicide crises are essentially acute and time-limited, so suicide intervention requires assessing critical and identifiable suicide warning signals and taking immediate suicide interventions, which is different from suicide risk discrimination, as suicide warning signs are more closely related to clinical intervention. Rudd et al. (2006) called for the inclusion of suicide warning signs in various theories of suicide.

According to Rudd et al. (2006), the commonly recognized suicide warning signals that require immediate intervention are as follows: the oral or written expressions of suicidal intent (such as the threat of self harm), looking for fatal suicide means (such as weapons, drugs, poison, etc.), preparing for suicide (such as creating a suicide plan, making arrangements for after the related plan, etc.). Other widely recognized warning signs include despair, rage, resentment, reckless or dangerous behavior, feeling helpless, increased alcohol use, interpersonal withdrawal, anxiety, difficulty falling asleep or drowsiness, dramatic shifts in mood, and failure to find a reason to survive (Rudd, 2008).

The scale of this paper was compiled based on previous research covering suicide risk factors, protection factors, and suicide warning factors, and the suicide risk scale was compiled using the content of the suicide warning signal as the risk detection signal.

A theoretical model of suicide

With the deepening of the field of suicide research, researchers have begun to transition from the influencing factors of suicide to a systematic and deep theoretical model to interpret suicide. This paper developed the suicide risk scale according to the following two theories.

Hypothetical theory of suicidal behavior history

Bonner and Rich (1987) put forward the course of suicidal behavior, which states that suicidal behavior is caused by multiple elements (that is, the generation of suicidal behavior is a process of the interaction of environment, cognition, society, emotion, and other variables), and put forward the corresponding concept to form a pattern of the suicide process, as shown in Figure 1.

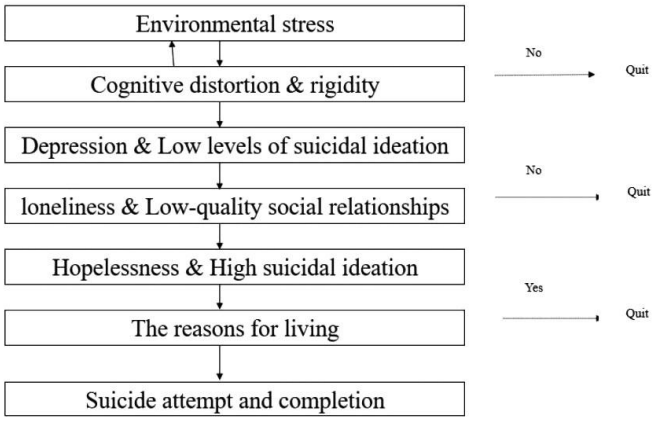


Figure 1. Suicidal behavior course hypothesis

First, the model suggests that the interaction between environmental stress and cognitive distortion/rigidity leads to depression. Schotte and Clum (1982) showed that depression is the most predictive of low levels of suicidal ideation. When falling into depression, individual loneliness and social support variables become crucial. Depressed individuals with high-quality social relationships can overcome depression and loneliness more effectively, while lonely or isolated people are more likely to feel hopeless. Hopelessness predicts higher levels of suicidal ideation and behavior. However, not everyone who experiences hopelessness and intense suicidal ideation attempts suicide. Reasons for living play a key factor in whether crisis cases will lead to suicidal behavior. Based on previous research, Linehan combined cognitive behavioral theory and her own experience to first propose the concept of "reason to living" (Liu & Zhao, 2017). This concept has been widely used as a protective factor of suicide and in the preparation of the reasons for living scale. It is believed that people who commit suicide generally lack important beliefs and values and are more likely to turn suicidal ideation into suicidal behavior, or even complete suicide. The model takes environmental stress, cognition, negative emotions, social support, and reasons for living as the predictive variables of suicide. Suicide involved the interaction of many variables and must go through a series of development processes to finally completed suicide. Therefore, we can think backwards about how to eliminate the development of suicide. Starting from the different variables of the model, especially the protective factors (the buffering role of the reasons for living), changing any one of the variables can fulfill the purpose of intervening in suicide and save lives. The hypothetical model of the suicidal behavior course provides new perspectives on understanding the development of suicide.

Multiple interaction modes of suicidal behavior

Rickelman and Houfek (1995) proposed the multiple interaction model of suicidal behavior, based on the hypothesis of suicidal behavior history. This model includes the environmental, personal, and epidemiological effects on suicidal behavior, as shown in Figure 2.

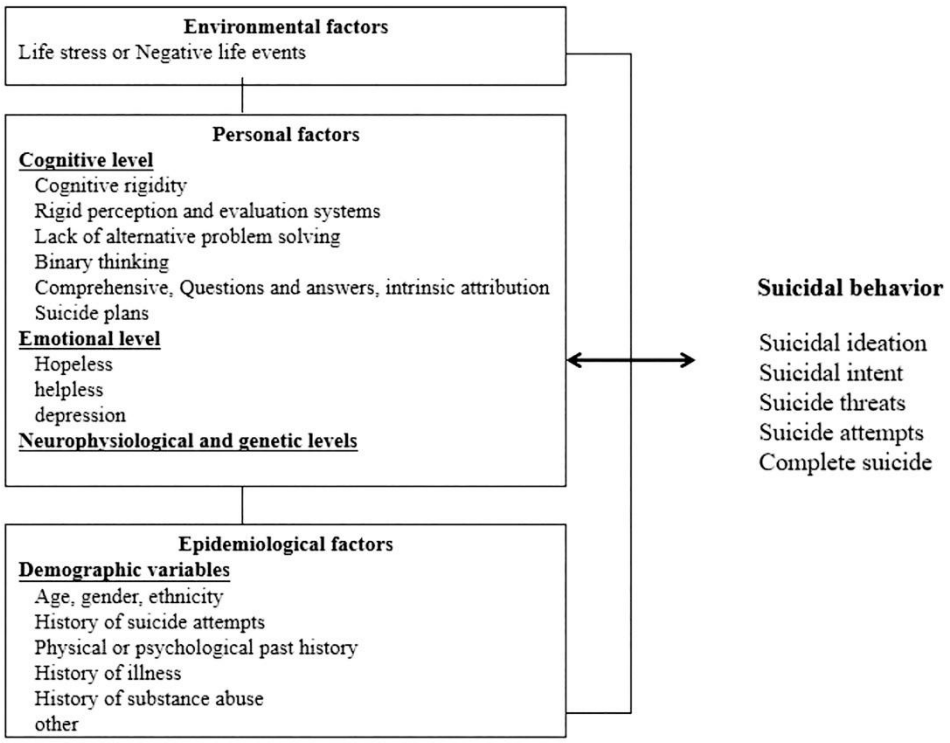


Figure 2. Multiple interaction modesof suicidal behavior

When these aspects are combined, suicidal behavior can be predicted. Neurobiological and genetic factors are involved in suicide. Because the multiple interaction model is based on the assumption of suicidal behavior, it also emphasizes the interaction of multiple variables (namely, environmental life stress or negative life events), which can lead to individual cognition, emotion, neurophysiological and genetic influences. The degree of adverse effect is closely related to demographic variables and epidemiological factors, and variables in the epidemiological factors will in turn affect an individual's environmental life pressure or negative life events.

These factors all form an interaction that jointly promotes the generation of suicidal behavior.

Although the multiple interaction model is built on the pattern of suicidal behavior, the two have some differences. Suicidal behavior course does not mention the neurophysiological and genetic levels or demographic variables; rather, it puts more emphasis on positive interpersonal relationships as survival reasons and other adaptive beliefs, and tries to use adaptive survival reasons as a buffer for suicide to carry out prevention. In addition, the two models construct the suicide course from different levels, and the multiple interaction modes mainly construct the suicide course from the risk factor theory of suicide, while the hypothesis model of suicidal behavior course is explained by the protective factor with deterrent effect, while avoiding the state variables that are difficult or cannot be corrected.

This study adopted the hypothetical model of suicidal behavior and the multiple interaction theory of suicide, combined with risk factors and protective factors. While measuring individual suicide risks, it also simultaneously explored and developed available resources as buffers, thereby developing a suicide scale for use in a single-session suicide crisis intervention. Suicide crisis interventions are different from the practice of suicide risk identification, due to the criticality and urgency of the situation. Suicide risk identification must involve evaluating key and identifiable suicide warning signals. Therefore, the scale covered suicide risk factors, protective factors, and suicide warning factors. Particular emphasis was placed on using suicide warning signals as risk detection signals to compile a one-time unit intervention suicide risk scale.

Development connotation of the suicide risk scale

The general development of suicide risk assessment scales

Building on previous research in the development of suicide risk scales, this paper aims to create a comprehensive scale that integrates both risk factors and protective factors, aligning with the dual objectives of risk assessment and protective intervention. Below is an overview of the research conducted in the development of this Suicide Scale:

The development of suicide risk assessment tools, from a single suicide risk scale to evaluate suicide to a relatively comprehensive and systematic suicide assessment theory, has resulted in a relatively complete evaluation system (Xu, et al., 2019). The single suicide risk scale can be classified into suicidal ideation, suicidal mood, suicidal behavior, and other suicide-related scales according to the measurement dimensions. Relatively comprehensive and systematic suicide assessments were used to assess suicide risk in groups. Suicide risk assessment tools are constantly being developed and improved. They are not only available for different ages, objects, and application places but also combine suicide risk screening

and assessment to form a mature and complete suicide assessment process, which greatly improves the success rate of suicide prevention.

The development of suicide assessment in China is still in its early stage. Single-dimensional scales are being used to evaluate suicide, with some self-compiled scales still in use and being improved, but complete assessment processes and targeted intervention measures are still in the exploratory period (Xu, et al., 2019). The commonly used scales can be divided into two categories. The first category includes scales that are clinically and directly translated but not strictly revised, such as Hamilton Depression Rating Scale (HAM-D; Hamilton, 1967) and the Beck Hopelessness Scale (BHS; Beck, et al., 1974). Their applicability in the Chinese population has not been rigorously or extensively studied. The second category includes suicide risk assessment scales of different dimensions compiled by scholars, such as the suicide attitude questionnaire of Xiao et al. (1999) covering four dimensions: attitudes toward suicidal behavior, attitudes toward suicide victims, attitudes toward suicide victims' families, and attitudes toward euthanasia. Liu et al. (2010) created the the college student suicidal tendency scale, which involved the five dimensions of suicide attempts, despair, mental disorders, negative responses, and stress events. Yang and Tong (2008) compiled the preliminary preparation of suicide risk scale for college students, including factors such as suicide ideation, suicide preparation, despair, suicide identity, and life identity. Li et al. (2012) created the Suicide Risk Rating Scale (SRRS) suitable for the Chinese population that included four dimensions: negative mood, cognitive rigidity, suicide attitude, and suicide motivation. Nie et al. (2013) created a questionnaire that measured four dimensions: enjoy the moment, social pressure, family responsibility, and fear of death.

From the above materials, it could be found that most of the compiled scales in China tend to focus on the risk factors of suicide (suicide ideation, suicide attempts, suicide preparation, etc.); however, scales of positive dimensions such as protection factors and reasons for living have begun to increase, indicating that attention to the positive dimensions is also increasing. Based on previous studies, this study developed a risk scale covering suicide risk factors and protection factors to synchronize risk assessment and protection factors intervention.

Preparation structure of the suicide risk scale

Content architecture of the suicide risk scale

Both Bonner and Rich (1987) and Rickelman and Houfek (1995) divided suicidal behavior into different continuous courses. This paper defined a series of suicide-related behaviors such as suicide ideation, suicide attempts, and incomplete suicide as suicide risk behaviors. Suicide risk behavior is a continuous process, and the severity of the suicide risk can be distinguished. Suicide can be divided into different levels based on cognitive, emotional, and behavioral components, and past

scholars have developed different test tools to evaluate different suicide components (Range & Antonelli, 1990).

Suicide cognition is related what an individual thinks about the future. Beck et al. (1979) constructed the argument for the correlation between suicide and hopelessness. Studies of psychiatric inpatients have found that factors such as hopelessness and pessimism about the future effectively predict suicidal behavior (Beck, et al., 1985), and the study of Schotte and Clum (1982) found that despair is a better predictor of a higher level of suicidal ideation. Another study found a high correlation between feelings of despair, suicidal ideation, and suicidal behavior (Rudd, et al., 1994). Some scholars have found that hopelessness is a better predictor of suicidal ideation in adolescents than depression (Kovacs & Beck, 1977), and the Beck Hopelessness Scale was developed to assess hopelessness. Another component of suicidal cognition is "reasons for living" which serves as a buffering factor for suicidal cognition and was developed by Linehan et al. (1983) and developed the Reasons for Living Inventory to measure suicidal cognition.

The emotional component associated with suicide is depression (Zung, 1965). In the past, most studies noted that the more severe the depressive symptoms in adolescents, the higher the rate of suicidal risk behaviors (Liu, et al., 2005; O'Donnell, et al., 2004). A cross-sectional study among Hong Kong adolescents found that depressive symptoms are highly correlated with adolescent suicidal ideation, and pattern tests found a direct effect of depressive symptoms on adolescent suicidal ideation (Lee, et al., 2006). Kim and Kim (2008) studied the risk of suicide attempts in Korean adolescents and found that depressive symptoms can predict suicide attempts in adolescents; therefore, they recommended that suicide risk be assessed by measuring suicidal behavior.

At the level of suicidal behavior, including individual suicidal ideation and suicide attempts, Beck (1979) found that suicidal ideation can be an indicator of suicide risk. He developed a suicidal ideation scale using 50 psychiatric inpatients and 55 outpatients with mood disorder, and identified active suicidal desire, specific plans for Suicide, and passive suicidal desire as factors. The scale also specifically included suicide plans. Harris and Barraclough (1997) and others stated that suicide attempts are the most powerful predictor of suicide, and used this to develop the Suicide Behaviors Questionnaire (SBQ). Thompson and Eggert's (1999) suicide risk screening scale collected 581 high school dropouts aged 14-20 as subjects, from which five dimensions were found: suicidal ideation, suicide attempts, incomplete suicide, depression, and drug abuse.

Combing through the data found that substance abuse is associated with suicide (Marcenko, et al., 1999). Substance abuse refers to the uncontrolled repeated and extensive use of synthetic or semi-synthetic substances with dependent properties to experience pleasure, which can cause great harm to the body and mind (Yang, et al., 2017). Studies have found that substance abuse in adolescents and early adults is associated with suicide (Levy & Deykin, 1989; Vega, et al., 1993). When

adolescents engage in alcohol and drug abuse, the rate of suicidal risk behavior becomes high (Bae, et al., 2005; Borowsky, et al., 2001). Thompson and Eggert (1999) developed a suicide risk screening scale that includes five dimensions: suicidal ideation, suicide attempts, incomplete suicide, depression, and substance abuse. Therefore, in this study, substance abuse was also included in the assessment of the suicide risk scale.

To sum up, suicide contains different aspects, including suicidal behavior (such as suicidal ideation, suicide attempts, suicide plans, feasibility of the suicide method, etc.), suicide cognition (hopelessness and reasons for living), suicide mood (depression), as well as the high-risk factor of substance abuse. A review of the existing scales found that most of them involve only one or two of the three components, and that no scale covers all three. Therefore, this paper proposed a suicide risk scale that could comprehensively cover suicide cognition, suicide emotions, suicidal behavior dimensions, substance abuse, suicide warning signals, and reasons for living, to achieve the dual purposes of covering suicide risk factors and protective factors, to realize the risk assessment and protection factor intervention, and to verify the rationality and feasibility of the structure hypothesis. The suicide risk scale construction pattern is shown in Figure 3 below. At the end of the scale, the background information of the subjects was collected (such as stress events, residence conditions, substance abuse, medical history, family history, etc.), to more comprehensively assess the risk and improve the suicide risk screening rate. This study expected to establish an assessment tool suitable for young people (14-35 years old) with good reliability and effective assessment of suicide high-risk groups, which could be provided as a reference for clinical suicide risk assessment tools.

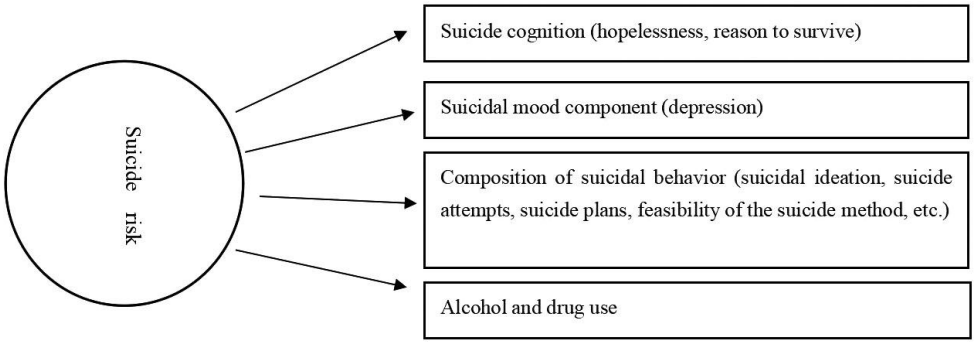


Figure 3. Construction pattern of the suicide risk scale

Questionnaire item structure

The selection of the question bank mainly refers to the content of suicide warning signs by Rudd (2008), in which suicidal behavior is mainly collected from

the suicide-related scale (see Appendix 1 for details); the hopelessness scale adopts the Chinese translation of the Taiwan version of the Beck Hopelessness Scale by Chen (2000); depression is designed with items based on The Diagnostic and Statistical Manual of Mental Disorders-5 diagnostic criteria; substance use is designed with items based on DSM-5 diagnostic criteria; reasons for living refer to Linehan et al. (1983) Reasons for Living Scale Item design. Before determining the question bank, three experts were invited to revise the face validity and expert validity, and then a pre-test study was conducted to test the appropriateness of the model, and items were deleted based on this.

Research Methods

The two-stage scale preparation method was used for pre-testing and formal testing, as shown in Figure 4. Considering the convenience of data collection, the two stages of the study involved university students, and data were collected by offline participants and online questionnaires.

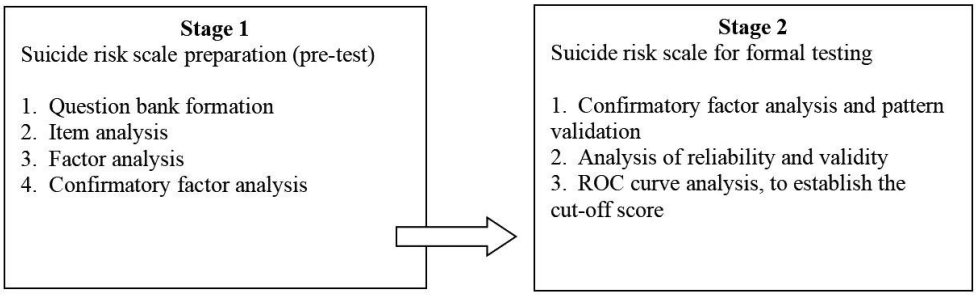


Figure 4. The study process

Preparation suicide scale: pretest

Study procedures

After inviting students to cooperate, with their consent, the participants were informed of the test items and standards, and the group test was carried out. During the collection process, the research member invited students offline to fill in the online scale and informed them of the test content prepared, such as the purpose and confidentiality of the testing, etc. The test place was a university classroom or other place of activity. The final item of the questionnaire encouraged the participants to leave their contact information if they had the above-mentioned suicide problems and wanted help. We also included free help resources and mental health information at the end. For students in need of assistance, help-seeking resources and self-help

messages were provided immediately after data collection, and the students also become potential service subjects for subsequent single-session suicide interventions.

Research tools

The study used Chen's (2000) Taiwan version of the Beck Hopelessness Scale as criterion validity. The scale is composed of 20 "yes-no statements" and is used to assess the subjects' negative expectations for the present and long-term future. The scale is suitable for adolescents over 17 years old, and is especially suitable for measuring subjects who are depressed or have attempted suicide as a predictor of suicide risk. Previous studies demonstrated an internal consistency of 0.82 to 0.93 and a retest reliability (interval) of 0.66 to 0.69, and the correlation with the Beck Depression Inventory (BDI) was 0.46 to 0.76. In the pretest, the internal consistency coefficient of the Beck Hopelessness Scale in this article was 0.96.

Statistical methods

The pretest aimed to streamline the question bank. First, the content validity, surface validity, and expert validity were evaluated for the original question bank, which was revised according to the suggestions. A second round of expert validity evaluation was then carried out to improve the question items again. The following were the statistical methods used in this study:

(1) Descriptive statistics: SPSS23 statistical software was used to test missing values, item distributions, mean and standard deviation analysis, etc.

(2) Exploratory factor analysis: Principal component analysis was used to extract the factors with a characteristic value greater than 1, and a rotation factor matrix was used to find out the appropriate component factors. Questions with a factor load of more than 0.4 under a single factor were retained.

(3) Reliability: Cronbach's α.

(4) Validity: Beck's Hopelessness Scale was the criterion validity of this study

(5) The Confirmatory Factor Analysis: AMOS 23 was used for construct validation. This analysis is mostly used after the development of a scale, to test whether the special indicators (topics) are under the category of each dimension of the theory.

Preparation of the suicide risk scale: formal test

Study procedures

In the formal test data collection process, graduate students with professionally trained psychology backgrounds served as data collectors while visiting university classes or group activity sites for data collection. The data collector participated in the data collection and answered questions on-site until the collection was completed.

Statistical methods

The purpose of the formal test was to calculate the Receiver Operating Characteristic Curve (ROC) and determine the optimal critical value to complete the formal scale. First, confirmatory analysis and an independent sample t-test were used for the overall model fit test, after which the reliability of the internal consistency (Cronbach's α coefficient) was evaluated. The Taiwan version of the Beck hopelessness scale was used to evaluate the association validity of the suicide risk scale. Finally, the ROC is calculated to determine the optimal critical value, cut-off point, sensitivity, specificity, positive predictive value and negative predictive value to establish the discrimination effect of the evaluation scale.

Results

Preparation of the suicide risk scale: pretest

Sample characteristics

A total of 385 participants were involved in the pre-test. After excluding 74 invalid questionnaires, the final sample consisted of 311 participants, resulting in a response rate of 80.8%.

The mean age of the subjects was 21 and there were more females than males (66.9% and 33.1%, respectively). 0.6% of the cases have a history of psychiatric treatment in their families; 1% of the cases themselves have a history of psychiatric treatment; Finally, 2.9% reported recent heavy alcohol consumption. In conclusion, the majority of subjects were women in early adulthood, had no religious beliefs, did not live alone, did not drink a large amount of alcohol, and did not have a family or personal psychiatric medical history.

Analysis results

The original question bank totaled 83 questions, including question 79 (I live on Earth), which tested whether the subjects answered the questions carefully. The analysis of the recovered data was performed as follows.

(1) Item analysis

The purpose of the analysis was to simplify the question bank by analyzing the questions in consideration of deleting items. The items selection standard was: (1) Cronbach's α after deleting the items; (2) internal consistency, set $\alpha < 0.01$; (3) total correlation analysis of project items = $r > 0.3$; (4) factor load > 0.4; (5) standard deviation > 0.67; and (6) two-tailed significance test < 0.05. After questions that did not meet the evaluation criteria were cut, 56 items were finally selected.

(2) Factor analysis

Exploratory factor analysis was conducted for the reserved 56 questions. Using the factors extracted from the principal component analysis, four factors were

set up according to the steep slope map, and oblique rotation (Oblimin rotation) was used to simplify the factor structure. The load of the set factor was > 0.4, and the explanatory variables of the four factors reached 62.313%, indicating that the 56 questions had good explanatory power for the suicide risk variables. The extracted factors were suicidal behavior (29 items), hopelessness (10 items), depression (12 items), and hope and Reasons for living (five items).

Considering the items of the suicidal behavior factor, as many factors had similar meanings or overlapping concepts, this study compared the items and considered their factor loads. Questions with similar items and relatively low factor loads were deleted, and only one similar question was retained. The final scale consisted of suicidal behavior (18 items), hopelessness (10 items), depression (12 items), and hope and the reasons for living (5 items), with 45 questions in total. According to the number of factors (four), the number of steep slope maps was set, and oblique rotation (Oblimin rotation) was used to simplify the factor structure. The loading of factors was > 0.4. The explanatory variables of the four factors reached 62.385%, higher than the original 56 (62.313%), indicating that the 45 questions had a better interpretation of the suicide risk variables. Among them, there are only two questions left in the substance use dimension, the 2 questions are classified under suicidal behavior factors, respectively, "I have recently drank and had trouble for myself (such as car accidents, injuries, conflicts, etc.)", and "I have recently used drugs and gotten into trouble (such as car accidents, injuries, conflicts, etc.)". The final question bank is a total of 45 items for four factors, including suicidal behavior 18, hopelessness 10, depression 12, and hope and the reasons for living 5. See Appendix 2.

Analysis of confirmatory factors

During the confirmatory factor analysis, if the overall fit indices of each factor do not fall within the standard range (RMSEA < 0.08; 1 < Chi-square/degrees of freedom < 3; GFI > 0.8; AGFI > 0.8), the items need to be revised. This revision process is conducted in two steps.

In the first step, the standardized estimated value for each item is determined. This value reflects the degree of alignment between the item and its corresponding factor, with 0.5 set as the threshold. Items with a standardized estimated value lower than 0.5 are considered to be below the standard and are candidates for deletion. This step involves model verification, and if the model fit indices are within the acceptable range, the model is deemed successfully constructed.

If the revision is not successful in the first step, the process moves to the second step, which involves adjusting the model based on the modification index of covariance. In this step, items that can most significantly reduce the chi-square value are identified and deleted, with model verification conducted after each deletion. This process continues until the model fit indices meet the acceptable standards, resulting in the deletion of 16 items.

After the model revision, 16 questions were deleted, and the total number of questions was reduced to 29. (see Table 1, Figure5), the analysis results of the adaptation index were known and confirmed that the construction validity of the model was reasonable and acceptable.

Table 1. Model diagram of the confirmatory factor analysis

Fitting the index	*df*	χ^2	χ^2/df	*CFI*	*NFI*	*RMSEA*
Critical value	—	—	< 3	> 0.90	> 0.80	< 0.10
First order model	371	797.84	2.15	0.93	0.88	0.06

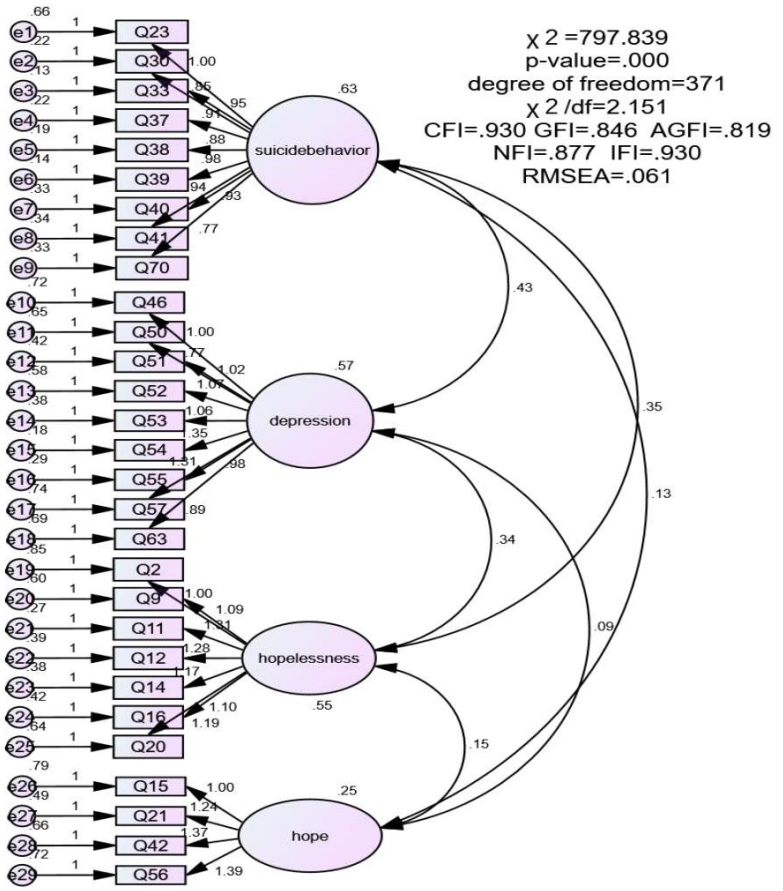


Figure 5. Confirmatory factor analysis model

Intervention strategies for groups at high risk of suicide need to develop shorter and more effective scales, with no more than 30 assessment items or less, and the goal of achieving good reliability and validity in a streamlined scale. In order to meet the needs of this purpose, questions are gradually eliminated in a layer-by-layer manner and achieve better explanatory power.

(4) Reliability analysis

The last retained suicide risk scale included 29 questions, with the Cronbach's α of the hopelessness scale= 0.912, the Cronbach's α of the suicidal behavior subscale= 0.941, the Cronbach's α of the hope and reasons for living subscale= 0.694, and the Cronbach's α of the depression subscale= 0.914. The total Cronbach's α was 0.946, indicating the above content showed good internal consistency.

(5) Expert validity analysis

After confirming that the construction validity of the model, the scale was subject to a second expert validity analysis for the formal test. Three psychology professors were involved in clinical psychology, counseling, and crisis intervention, etc. All rated their opinions on 29 items respectively. The scale has been revised through six versions, involving the grammatical expression of the items, the determination of the duration of the suicidal problem, and the modification of expert opinions. Considering the different subtypes of depression in young people, the question "In recent weeks, I have been depressed, frustrated, or irritable" was modified into two questions: "My mood is depressed" and "I tend to feel irritable." Finally, Determine a 30-item suicide assessment scale (see Appendix 3 for details). The factor structure of the formal scale is detailed in Table 2.

Table 2. Factor structure of the formal scale

items		Factor components			
		1	2	3	4
1.	Everything I see is unpleasant and no fun	0.17	-0.03	**0.70**	-0.04
2.	I'm not expecting to get what I want.	-0.13	0.02	**0.78**	-0.02
3.	Things never go my way	0.20	-0.06	**0.72**	-0.03
4.	I never get what I want (including people and things), so it's stupid to want to have anything.	-0.12	0.11	**0.84**	-0.05
5.	I want to give up because I can't make myself better.	0.17	-0.10	**0.65**	0.11
6.	Because I may not get what I want (including people and things), it's no use trying to pursue it.	-0.05	-0.01	**0.81**	0.05
7.	I just can't get good luck, and I don't think I can get good luck in the future.	-0.00	-0.03	**0.74**	0.10
8.	I want to die.	0.15	**0.39**	0.20	0.21
9.	I've already written a suicide note.	-0.14	**0.82**	0.12	-0.04
10.	The tools I plan to use to commit suicide are ready and readily available.	-0.10	**0.92**	0.01	-0.03
11.	I will punish others with my death.	-0.03	**0.83**	0.04	-0.02

items	Factor components			
	1	2	3	4
12. I will use suicide to lighten the burden on my family.	0.06	**0.80**	-0.09	0.08
13. Death is the best solution for me.	0.12	**0.72**	-0.01	0.14
14. I understand that the suicide method I choose has a very high death rate.	0.11	**0.80**	-0.13	0.05
15. I have the ability and the courage to commit suicide by myself.	0.18	**0.74**	-0.18	0.02
16. I recently drank alcohol and caused trouble for myself (car accidents, injuries, conflicts, etc.).	-0.05	**0.75**	0.14	-0.16
17. My mood is depressed.	**0.65**	0.05	0.15	0.04
18. I tend to feel irritable.	**0.67**	-0.00	0.13	0.07
19. My weight has increased or decreased significantly (without intentional weight gain or weight loss).	**0.51**	0.10	0.19	-0.19
20. In recent weeks, I have had insomnia almost every day.	**0.58**	0.16	0.11	-0.15
21. In recent weeks I have been sleeping almost every day.	**0.72**	-0.07	-0.04	-0.01
22. I am restless almost every day and need to move or do things constantly	**0.69**	0.21	-0.000	-0.06
23. I am sluggish almost every day.	**0.83**	-0.01	-0.06	0.03
24. I am almost tired or inactive every day.	**0.88**	-0.05	-0.05	0.07
25. I will feel guilty about my mistakes in the past.	**0.79**	-0.03	-0.13	-0.00
26. There has been a significant decline in the quality of my performance in school or at work.	**0.83**	-0.08	-0.04	-0.00
27. I am willing to survive.	-0.25	0.26	0.02	**0.65**
28. I have great confidence in the future.	0.12	-0.15	0.01	**0.9**
29. I consider myself very valuable.	0.08	-0.13	0.01	**0.90**
30. I have the reason/belief to live.	-0.11	0.18	0.03	**0.80**

Preparation of the suicide risk scale: formal test

Sample characteristics

To facilitate the test, the Beck hopelessness scale was included in the suicide risk scale. The number of questions in the combined scale was 43, among which the 39th question “I walk on both feet every day” was used to test whether the subjects were answering carefully. There were 839 data in formal test, 798 data were valid, the response rate was 95.11%.

The mean age of the subjects was 20.5 years, with more female subjects than males, at 61.5% and 38.15%, respectively. There were more undergraduates than graduate students, with 84.5% and 15.5%, respectively. Of the subjects, 2.9% had a history of psychiatric treatment, 3.5% had a family history of psychiatric treatment, and 3% had recently engaged in heavy alcohol consumption. In conclusion, the majority of subjects were women in early adulthood, had no religious beliefs, did not live alone, did not drink a large amount of alcohol, and did not have a personal or family history of psychiatric treatment.

Study results

(1) Validation analysis

The overall fit test of the second-order model was performed using Amos 23.0 software, and the data results were as shown in Table 3 and Figure 6.

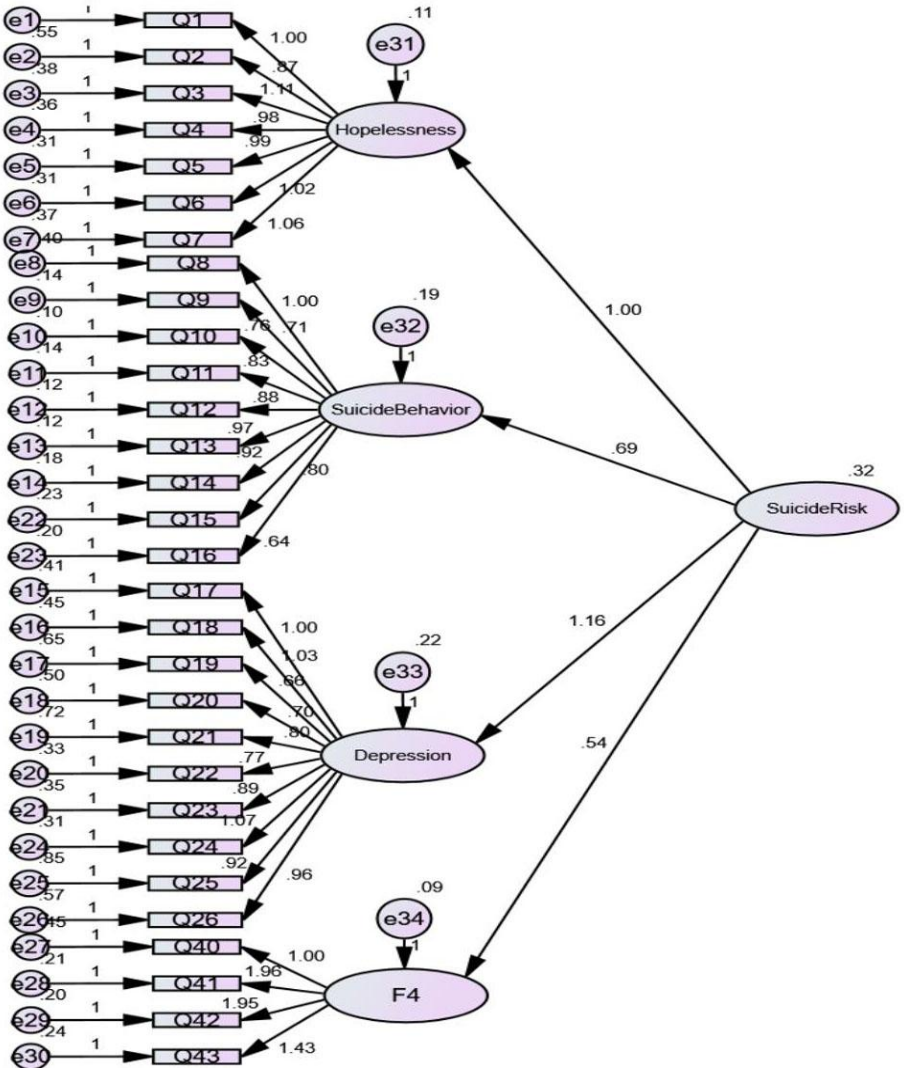


Figure 6. Overall fit of the second-order confirmatory analysis model

Table 3. Second-order model fit indicators

Fitting the index	*df*	χ^2	χ^2/df	*CFI*	*NFI*	*RMSEA*	*RMR*
Critical value	—	—	< 3	> 0.90	> 0.90	< 0.10	< 0.10
Second order model	401	2198.75	5.48	0.88	0.86	0.08	0.05

The data indicated that the values of χ^2 and χ^2/df were too large, and the χ^2 fit index is poor. To confirm whether the poor fit of the model is due to the large number of samples or problems with the model itself, we used the bootstrap (Bollen-Stinebootstrap) proposed by Efron and Tibshirani (1994) to verify the cause of poor fit.The Bollen-Stine bootstrap *p* value was calculated as 0.000 by the bootstrap method, meaning that the chance of the next occurrence was 0.0% below the Maximum Likelihood method (ML)method. This inferred that the chi-square value and value (*p*-value) estimated by the most approximate likelihood estimation method were less than 0.05, indicating the poor fit of the model was caused by the large sample number, rather than the model definition.

The result of the bootstrap distributions (default model) was *N* = 2000, *Mean* = 624.766, *Standard Error* = 1.875. The chi-square value of the model was replaced by the modified chi-square value (642.766). As the calculation formulas of each moderate index value were all related to the chi-square value, the model fit indexes all needed to be recalculated. The corresponding updated data are presented in Table 4.

Table 4. Model fit index corrected after bootstrap method

Metric	Numeric value	Metric	Numeric value
Bollen-Stine chi-square	642.77	Degree of freedom estimation	401
Independence model chi-square	15602.09	Parameter estimation	64
Goodness of fit (*GFI*)	0.96	Independent model degree of freedom	435
Adjust goodness of fit (*AGFI*)	0.95	Sample number	798
Normed fit index (*NFI*)	0.96	Normed chi-square (Chi^2/DF)	1.60
Non-normed fit index (*NNFI*)	0.98	Akaike information criterion (*AIC*)	770.77
Tucker-Lewis index (*TLI*)			
Incremental fit index (*IFI*)	0.98	Bayes information criterion (*BIC*)	1070.42
Related fit index (*RFI*)	0.96	Expected cross-validation index (*ECVI*)	0.97
Comparative fit index (*CFI*)	0.98	Gamma hat	0.99
RMSEA	0.03	McDonald's *NCI*	0.86
Hoelter's critical N	498.40	*PGFI*	0.88
p-ratio	0.92		0.88
PCFI	0.91		

From the above data, the high values of χ^2 and χ^2/df were due to the large sample size. The Bollen-Stine bootstrap correction results significantly improved the SEM overall model allocation moderation index. Regarding the fit index of this model, except for χ^2, all other indicators showed that the model fit well. According to the results of the overall adaptation index, this study confirmed that the matching model was acceptable.

(2) Independent sample t-test

To further confirmed the rigor of the scale design, the 25% extreme scores at both ends of the Beck hopelessness score were divided into two groups, and *t*-tests were conducted on the total score and the four dimensions of the scale respectively, and the results were found to be significantly different, as listed in Table 5: For the total score of the suicide risk scale, $t = -23.264$, $p < 0.01$; for hopelessness dimension, $t = -24.472$, $p < 0.01$; For suicidal behavior dimension, $t = -12.275$, $p < 0.01$; for depression dimension, $t = -15.468$, $p < 0.01$; For reasons for living dimension, $t = -19.729$, $p < 0.01$.

Table 5. T-test on extreme value groups at both ends of Beck Hopelessness score 25%

	Mean (standard deviation)		*df*	*t value*	*p*	effect size *d*
	Upper 25% (*N* = 207)	Under 25% (*N* = 221)				
The total score of the suicide scale	108.91(16.99)	139.10(7.98)	426	- 23.26	0.00	2.27
Hopelessness	22.49(5.03)	32.05(2.57)	426	- 24.47	0.00	2.39
Suicidal behavior dimension	38.72(6.28)	44.28(1.73)	426	- 12.28	0.00	1.20
Depression dimension	33.81(7.96)	44.02(5.33)	426	- 15.47	0.00	1.51
Reasons for living dimension	13.87(3.23)	18.75(1.52)	426	- 19.73	0.00	1.93

(3) Reliability analysis

The overall Cronbach's α coefficient of the suicide risk scale was 0.945, and the Cronbach's α coefficients for hopelessness, suicidal behavior, depression, and reasons for living were 0.889, 0.920, 0.905, and 0.853, respectively. The above data showed that the internal consistency of the suicide risk scale was good.

(4) Calibration and correlation validity

In this study, the Taiwanese version of the Beck hopelessness scale was used to determine the association validity of the suicide risk scale. The correlation coefficient between the Beck hopelessness scale and the total score of the suicide risk scale was 0.771 ($p < 0.01$), which showed that the Beck hopelessness scale had

a significant positive association with the suicide risk scale. The suicide risk scale had good standard validity.

(5) Predictive validity

The study used the ROC curve to verify the predictive validity, and the scale was scored in a 5-point Likert format. The higher the total score, the lower the risk of suicide, and vice versa. The Beck hopelessness scale was scored using the suicide risk scale, so a higher total score on the Beck hopelessness scale indicated the subject was more hopeful, while a lower score indicated the subject was more hopeless. A total score of the suicide risk scale greater than 120 indicated no suicide risk, while a score of 120 indicated a suicide risk and required attention. AMOS23 statistical software was used to draw the ROC curve. The ROC area (AUC) of the suicide risk scale was 0.905, the standard error was 0.014, and the 95% confidence interval was 0.877 to 0.932 ($p < 0.001$), as shown in Figure 7.

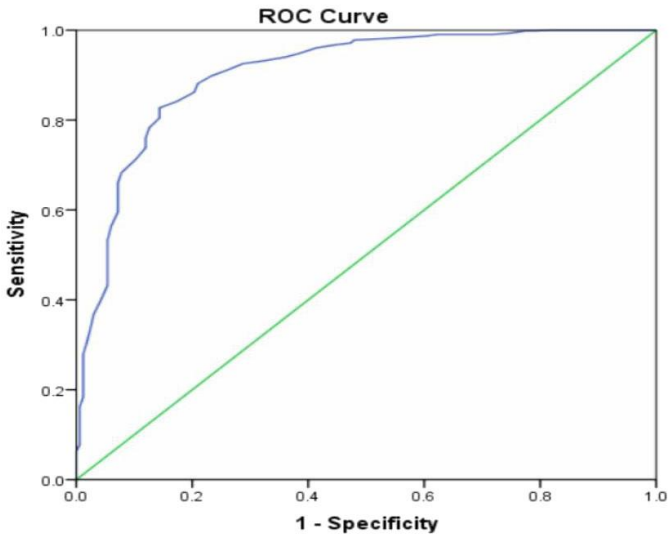


Figure 7. The ROCK curve of the suicide risk scale

(6) Optimal cut-off value

The suicide risk scale calculated the best cut-off values of the scale as the ROC curve as 20%, 15%, and 10%. When the suicide risk scale totaled 119.5, the sensitivity was 0.827, the specificity was 0.856, the area under the curve was 0.905, and the corresponding number of people was 32%. When the suicide risk scale totaled 114.5, the sensitivity was 0.89, the specificity was 0.832, the area under the curve was 0.922, and the corresponding number of people was 23%. When the suicide risk scale totaled 109.5, the sensitivity was 0.922, the specificity was 0.798, the area under the curve was 0.921, and the corresponding number of people was

16%. Therefore, the cut-off value of the suicide risk scale was set at 120. When the total score was greater than 120, no suicide risk was indicated, and the positive predictive value (predicting a healthy population) of the scale was 82.7%. When the score was 120 or less, the subject would require attention and intervention if necessary to reduce the suicide risk value. The suicide risk value could be further divided into low, medium, and high suicide risk. A low suicide risk was indicated when the total score was between 116 and 120, a medium suicide risk was indicated when the total score was 111-115, and a high suicide risk was indicated when the total score was 110.

Discussion and Conclusion

Preparation of the suicide risk scale: pretest discussion

In the pretest compiled by the scale, the dimension of substance abuse was not included in the modeling, and only one question was retained. The content of the substance use question reflected the behavioral level and had a high load of suicidal behavior factors (0.69), so it was included in the dimension of suicidal behavior. The factors are named suicidal behavior, depression, hopelessness, reasons to living, and the scale includes suicidal cognition (hopelessness, reasons to living), suicidal mood (depression), suicidal behavior (suicidal ideation, attempts, plans, accessibility, etc.) as a whole, which also involved the concept of early warning signals. This will reduce the time and effort for suicide clients to fill in multiple scales with different dimensions, and can also achieve the purpose of assessment and intervention in one single-session crisis intervention. This study complements the shortcomings of Lin et al. 's (2022) study of using four independent scales to assess suicide risk, and has a more integrated effect on the Single-Session Suicide Crisis Intervention with time urgency.

Compared with the general suicide scale, the Suicide Assessment Scale developed in this study emphasized the role of protective factors in addition to the common exploration of risk factors. O'Keefe et al. (2019) proved that including both risk and protective factors in the assessment and combining the two when introducing suicide interventions is effective in suicide prevention and improving the resilience of individuals at risk of committing suicide. Therefore, the fusion of risk factors and protection factors could play a direct role in reducing suicide risk, and could support the participants in receiving a positive intervention when first filling in the scale, to achieve the purpose of initially buffering the suicide risk.

Suicide risk scale preparation: formal test discussion

In the second stage of scale compilation, the concept of scale model construction was reasonable and acceptable, the excellent internal consistency of the suicide risk scale, the scale had good validity.

The suicide risk scale consisted of 30 questions that were clearly stated and easy to fill in, and that required about 15 minutes to complete. The simplicity and less time consuming were consistent with the clinical preference for the risk assessment scale（Wang, et al., 2022). The main purpose of the suicide risk was is to efficiently evaluate the population at risk of suicide, so the false negative rate was minimized when choosing reference values. When the score of the suicide risk scale was greater than 120, it was judged to be positive (no suicide risk). The positive predictive value (predicting a healthy population) was 82.7%, indicating that the probability of assessing a healthy population using the scale was high and was not easy to misjudge, while the negative predictive value was 14.4%, which was not easy to miss. When the suicide risk table was 120, there was a risk of suicide, and attention and intervention were needed. When the total scores were 116-120,111-115, and 110 or lower, the risk level could be divided into low, middle, and high suicide risk.

This scale can not only effectively assess risk and take immediate intervention, but also understand the degree of suicide risk for the first time, and its results can provide reference for subsequent intervention plans. Wang (2023) research shows that when suicide risk assessment and intervention are integrated, the purpose of risk assessment and life-saving can be effectively achieved. Yang and Tong (2008) proposed that suicide risk assessment needed to integrate multiple factors to be more comprehensive, which can reduce the error of false positives or false negatives. The suicide assessment scale developed in this study covered suicidal behavior, depression, and hopelessness, reasons for living, also included the concept of warning signs, plus the suicide risk background information at the end of the scale. Overall, a relatively comprehensive consideration of the multiple dimensions of suicide will improve the accuracy of suicide assessment.

In conclusion, the structural assumptions of the suicide risk scale were reasonable and feasible. The suicide risk scale had good reliability, validity, and applicability, had a short test time and easy operation, and could be used as a suicide risk assessment tool for young people (14-35 years old).

The suicide risk scale: individuals with high suicide risk

The risk status of the college students who completed the questionnaire was analyzed. Out of the 798 participants, 33.3% (266 students) were identified as being at risk of suicide. Among these, 73 participants (9.2%) scored between 116-120, 57 participants (7.1%) scored between 111-115, and 136 participants (17%) scored below 111. These results indicate that one-third of the respondents were at risk, with

a significant portion (17%) classified as high-risk. This underscores the seriousness of the suicide situation among college students, particularly those at high risk, highlighting the need for urgent attention and timely intervention.

These findings align with the study by Hu et al. (2016), which also identified college students as a particularly high-risk group for suicide. The pressing need to develop effective suicide assessment and intervention programs for this population is a key motivation behind this study.

The upper 25% of the scores and the under 25% of the scores on the Beck Hopelessness Scale as groups 1 and 2 and the two groups as independent variables, the t-tests of the total scores of the suicide risk scale and the four dimensions of the scale were found to be respectively significant. The formal ROC cut-off scores and the T Test of significance of the Beck hopelessness scale both proved that high-risk cases are different from low-risk or no-risk cases. It is obvious that the analysis of the cut-off score results of this study is feasible for identifying high-risk suicide groups.

Research limitations and outlook

This study utilizes a sample of Chinese college students, who, compared to their counterparts in other countries, exhibit distinctive suicide-related characteristics: they are predominantly early adult women, typically have no religious beliefs, do not live alone, do not consume alcohol, and have no personal or family history of mental illness. Given that Chinese college students primarily reside on campus and often adhere to atheistic beliefs, the characteristics of this suicide group differ from those identified in international research. Since suicide is influenced by a complex interaction of sociocultural, developmental, spiritual, psychological, and family environmental factors (Bridge, et al., 2006), it is recommended that the findings of this study be extended to other cultural groups to further validate its generalizability.

This study aims to offer a reference point for suicide intervention. It is recommended that the scale developed here be applied to future suicide crisis cases, such as those in suicide prevention and treatment centers, emergency departments, and psychiatric departments dealing with high-risk cases, including borderline personality disorder, to verify its discriminative effectiveness. Additionally, the scale could be integrated into the Single-Session Suicide Crisis Intervention developed by Lin et al. (2022) to assess the efficacy of combining suicide assessment and intervention within a single session, thus contributing to improved suicide prevention and treatment efforts.

Authors' Notes

Acknowledgments. This study sincerely thanks all students and their guardians for agreeing to participate, especially the school, for supporting the research and providing all resources.

Conflict of interest statement. I hereby declare that there are no potential conflicts of interest associated with this publication, and that any financial support has been noted in the Acknowledgment section.

Data availability statement. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Ethics Statement. The authors confirm that the study submitted was conducted according to the WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. The paper collects data in the form of questionnaires.

Anonymous coding is used, and the subjects' consent is obtained. The full text is analyzed with all data, and no individual data is reported. Cases can withdraw from the group voluntarily throughout the process.

References

Bae, S., Ye, R., Chen, S., Rivers, P. A., & Singh, K. P. (2005). Risky behaviors and factors associated with suicide attempt in adolescents. *Archives of Suicide Research, 9* (2), 193-202. doi.org/10.1080/13811110590904034

Beck, A. T., Kovacs, M., & Weissman, A. (1979). Assessment of suicidal intention: the Scale for Suicide Ideation. *Journal of Consulting and Clinical Psychology, 47* (2), 343.

Beck, A. T., Steer, R. A., Kovacs, M., & Garrison, B. (1985). Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. *American Journal of Psychiatry, 142* (5), 559-563. doi.org/10.1176/ajp.142.5.559

Beck, A.T., Weissman, A., Lester, D. L. (1974). The measurement of pessimism: The hopelessness Scale. *J Consult Clin Psychol, 42(*6), 861-865. doi.org/ 10.1037/h0037562

Bonner, R. L., & Rich, A. R. (1987). Toward a Predictive Model of Suicidal Ideation and Behavior: Some Preliminary Data in College Students. *Suicide and Life-Threatening Behavior, 17* (1), 50-63. doi.org/10.1111/j.1943-278X.1987.tb00061.x

Borowsky, I. W., Ireland, M., & Resnick, M. D. (2001). Adolescent suicide attempts risks and protectors. *Pediatrics, 107* (3), 485-493.

Bridge, J. A., Goldstein, T. R., Brent, D.A. (2006). Adolescent suicide and suicidal behavior. *J Child Psychol Psychiatry, 47*(3-4), 372-394. doi.org/10.1111/j.1469-7610.2006.01615.x. PMID: 16492264.

Chen, M. J. (2000). Retrieved 2023-03-23, from http://www.mytest.com.tw/Adult_page.aspx?title=P_BHS

Efron, B., & Tibshirani, R. J. (1994). An introduction to the bootstrap. CRC press.

Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome of mental disorders. *British Journal of Psychiatry, 170* (3), 205-228. doi.org/10.1192/bjp.170.3.205

Hamilton, M. (1967). Development of a rating scale for primary depressive illness. *Br J Soc Clin Psychol, 6*, 278-296.

Hu, J., Dong, Y., Chen, X., Liu, Y., Ma, D., Liu, X., Zheng, R., Mao, X., Chen, T., & He, W. (2015). Prevalence of suicide attempts among Chinese adolescents: A meta-analysis of cross-sectional studies . *Comprehensive Psychiatry, 61*, 78-89. doi.org/10.1016/j.compps-ych.2015.05.001

Hu, Y., Fan, F. M., Dai, Y. J., Cui, Ni., & Zhao, X. W. (2016). Life Events and Suicidal Ideation in College Students: Life Values as a Mediator and Moderator. *Chinese Journal of Clinical Psychology, 24* (1), 149-151. doi.org/10.16128/j.cnki.1005-3611.2016.01.034

Kim, H. S., & Kim, H. S. (2008). Risk factors for suicide attempts among Korean adolescents. *Child psychiatry and human development, 39* (3), 221-235.

Kovacs, M., & Beck, A. T. (1977). The wish to die and the wish to live in attempted suicide. *Journal of Clinical Psychology, 33*(2), 361-365. doi.org/10.1002/1097-4679(197704)33:2<361:aid-jclp2270330207>3.0.co;2-h

Lee, M. T., Wong, B. P., Chow, B. W., & McBride-Chang, C. (2006). Predictors of suicide ideation and depression in Hong Kong adolescents: Perceptions of academic and family climates. *Suicide and Life-Threatening Behavior, 36* (1), 82-96.

Lew, B., Osman, A., Chan, C. M. H., Chen, W. S., Ibrahim, N., Jia, C., & Siau, C. S. (2021). Psychological characteristics of suicide attempters among undergraduate college students in China: a cross-sectional study. *Bmc Public Health, 21*(1), 322. doi.org/10.1186/s12889-021-10370-2

Levy, J. C., & Deykin, E. Y. (1989). Suicidality, depression, and substance abuse in adolescence. *The American journal of psychiatry, 146* (11), 1462-1467. doi.org/ 10.1176/ajp.146.11.1462. PMID: 2817119

Li, P. C., Luo, Y. & Yang, L. (2012). The Development of the Suicide Risk Rating Scale. *Modern Preventive Medicine, 39* (6), 1427-1429. doi.org/CNKI:SUN:XDYF.0.2012-06-039

Lin, M. F., Chang, Y. M., Wang, J. Y, & Wang, C. H. (2022). Therapeutic Mechanism and Effectiveness of the Single-Session Suicide Crisis Intervention. *Journal of Evidence-Based Psychotherapies, 22* (2), 49-62. doi.org/10.24193/jebp.2022.2.12

Linehan, M. M., Goodstein, J. L., Nielsen, S. L., & Chiles, J. A. (1983). Reasons for staying alive when you are thinking of killing yourself: the reasons for living inventory. *Journal of Consulting and Clinical Psychology, 51* (2), 276-286. doi.org/10.1037//0022-006x.51.2.276

Liu, G. H., Guo, L. & Guo, Y. L. (2010). The development of college student suicidal tendency scale. *Chinese Journal of Behavioral Medicine and Brain Science, 19* (3), 272-275. doi.org/10.3760/cma.j.issn.1674-6554.2010.03.034

Liu, H. & Zhao, S. (2017). Review of Reasons for Living. *University of Electronic Science and Technology of China, 19* (3), 7-10. doi.org/10.14071/j.1008-8105(2017)03-0007-04

Liu, X., Tein, J., Zhao, Z., & Sandler, I. N. (2005). Suicidality and correlates among rural adolescents of China. *Journal of Adolescent Health, 37* (6), 443-451. doi.org/10.1016/j.jadohealth.2004.08.027

Marcenko, M. O., Fishman, G., & Friedman, J. (1999). Reexamining Adolescent Suicidal Ideation: A Developmental Perspective Applied to a Diverse Population. *Journal of Youth and Adolescence, 28* (1), 121-138. doi.org/10.1023/A:1021628709915

Nie, J., Huang, Y. Q., Tong, J. & Wang, Y. (2013). Development of the Chinese College Student's Reasons for Living Inventory. *China Journal of Health Psychology, 21* (5), 704-707. doi.org/10.13342/j.cnki.cjhp.2013.05.009

O'Donnell, L., O'Donnell, C., Wardlaw, D. M., & Stueve, A. (2004). Risk and resiliency factors influencing suicidality among urban African American and Latino youth. *American Journal of Community Psychology, 33* (1-2), 37-49. doi.org/10.1023/b:ajcp.0000014317.20704.0b

O'Keefe, V. M., Haroz, E. E., Goklish, N., Ivanich, J., Cwik, M. F., & Barlow, A. (2019). Employing a sequential multiple assignment randomized trial (SMART) to evaluate the impact of brief risk and protective factor prevention interventions for American Indian Youth Suicide. *Bmc Public Health, 19* (1), 1675. doi.org/10.1186/s12889-019-7996-2

Range, L. M., & Antonelli, K. B. (1990). A Factor Analysis of Six Commonly Used Instruments Associated With Suicide Using College Students. *Journal of Personality Assessment, 55* (3-4), 804-811. doi.org/10.1080/00223891.1990.9674115

Ren, Z. H., Liu, Q. Z. & Zhang, L. (2022). The Construction of Psychological Hotline Intervention Framework: From the Perspective of Single Session Intervention. *Chinese Journal of Clinical Psychology, 30* (1), 170-175. doi.org/10.16128/j.cnki.1005-3611.2022.01.035.

Rickelman, B. L., & Houfek, J. F. (1995). Toward an interactional model of suicidal behaviors: Cognitive rigidity, attributional style, stress, hopelessness, and depression. *Archives of Psychiatric Nursing, 9* (3), 158-168. doi.org/10.1016/S0883-9417(95)80039-5

Rong, T. (Editor). (2007). Amos and research methods. Wunan Book Publishing Co., Ltd

Rudd, M. D., Rajab, M. H., & Dahm, P. F. (1994). Problem-solving appraisal in suicide ideators and attempters. *American Journal of Orthopsychiatry, 64* (1), 136-149. doi.org/ 10.1037/h0079492

Rudd, M. D., Berman, A. L., Joiner, T. E., Nock, M. K., Silverman, M. M., Mandrusiak, M., Van Orden, K., & Witte, T. (2006). Warning Signs for Suicide: Theory, Research, and Clinical Applications. *Suicide and Life-Threatening Behavior, 36* (3), 255-262. doi.org/10.1521/suli.2006.36.3.255

Rudd, M. D. (2008). Suicide warning signs in clinical practice. *Current Psychiatry Reports, 10* (1), 87-90. doi.org/10.1007/s11920-008-0015-4

Schotte, D. E., & Clum, G. A. (1982). Suicide ideation in a college population: A test of a model. *Journal of Consulting and Clinical Psychology, 50* (5), 690.

The Central People's Government of the People's Republic of China. (2021). Retrieved 2022-5-26, from http://www.gov.cn/guoqing/2021-05/13/content_ 5606149.htm

The Central People's Government of the People's Republic of China. (2023). Retrieved 2023-1-26, from http://www.nhc.gov.cn/mohwsbwstjxxzx/ tjtjnj/202305/6ef68aac6bd14c1eb9375e01a0faa1fb.shtml

Thompson, E. A., & Eggert, L. L. (1999). Using the suicide risk screen to identify suicidal adolescents among potential high school dropouts [Journal Article; Research Support, U.S. Gov't, P.H.S.].*Journal of the American Academy of Child and Adolescent Psychiatry, 38* (12), 1506-1514. doi.org/10.1097/ 00004583-199912000-00011

Vega, W. A., Gil, A., Warheit, G., Apospori, E., & Zimmerman, R. (1993). The relationship of drug use to suicide ideation and attempts among African American, Hispanic, and white non-Hispanic male adolescents. *Suicide and Life-Threatening Behavior, 23* (2), 110-119.

Wang, C., Xu, D. M., Shao, J., Gu, J. N., Qu, Y. H., Ye, X. L., Zhang, M. Q., Luo, W., Li, Y. Q., Xu, E. Y., Wang, C. L., Li, F. F., Liang, H. (2022). Expert consensus of suicide care interventions for psychiatric inpatients with depression/Mental Health Professional Committee of Chinese Nursing Association. *Chinese Journal of Nursing, 18,* 2181-2185.

Wang, J. Y. (2023). *A study on the development of an integrated model of the single-session session suicide risk assessment and intervention* (Unpublished master's thesis). Zhangzhou Normal University. https://link.cnki.net/doi/10.27726/d. cnki.gzzsf.2023.000551doi: 10.27726/d.cnki.gzzsf. 2023.000551.

Wang, W. & Wu, X. M. (2013). The role of protective factors in suicide protection. *Chinese Journal of Health Education, 29* (12), 1110-1112. doi.org/10.16168/j.cnki.issn.1002-9982 .2013.12.001.

World Health Organization. (2021). Retrieved 2022-3-15, from https://www.who.int/zh/news/item/17-06-2021-one-in-100-deaths-is-by-suicide

Xu, K., Hu, D. Y., Tan, R., Ding, X. P., Teng, F., Zhou, Y. & Wang, S. J. (2019). Research progress in screening and assessment of patient suicide risk. *Chinese Journal of Nursing, 54* (3), 467-471. doi.org/10.3761/j.issn.0254-1769.2019.03.029

Xiao, S. Y., Yang, H., Dong, Q. H. & Yang, D. S. (1999). The Development, Reliability and Validity of Suicide Attitude Inventory. *Chinese Mental Health Journal, 13* (4), 250-251.

Yang, W. H., Zhang, S., Luo, C., Su, Y. L. & Zhang, Y. (2017). Clinic Epidemiological Characteristics of the Inpatients with Substance Abuse in Wuhan from 2013-2015. *Chinese Journal of Social Medicine, 34* (4), 347-349. doi.org/10.3969/j.issn.1673-5625.2017.04.010.

Yang, X. J., Wu, M. J., Tong, Y. S., Yin, Y., Xiao, C. L. & Liu, H. Q. (2020) . Likelihood of considering suicide under supposed adversities among individuals attempting suicide and their family member and acquaintance. *Chinese Mental Health Journal, (11),* 920-925.

Yang, X. L. & Tong, H. J. (2008). The development of college student suicidal risk inventory. *Chinese Journal of Behavioral Medical Science, 17* (1), 74-77. doi: 10.3760/cma.j.issn.1005-8559.2008.01.031

Zung, W. W. (1965). A self-rating depression scale. *Archives of general psychiatry, 12* (1), 63-70.

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 129-152.

10.24193/jebp.2025.1.6

THE ASSOCIATIONS AMONG MOTHERS' ATTACHMENT TO THEIR PARENTS, APPROACHES TO CHILD EMOTIONS, AND PARENT-CHILD RELATIONSHIP

Simel Parlak[1], Neslihan Yaman[2], İbrahim Hakkı Acar[3]*

[1] Associate Professor, PhD, Department of Psychology, Yalova University, Yalova, Türkiye. Adress: Yalova University, Yalova, Türkiye. E-mail: simelparlak@gmail.com – ORCID: https://orcid.org/0000-0002-8651-2693

[2] Assistant Professor, PhD, Department of Psychology, Yalova University, Yalova, Türkiye. Address: Yalova University, Yalova, Türkiye. E-mail: nesli_balci@hotmail.com – ORCID: https://orcid.org/ 0000-0003-0324-2390

[3] Professor, PhD, Department of Psychology, Faculty of Social Sciences, Özyeğin University, Cekmekoy Campus, 34794 Cekmekoy – Istanbul, Türkiye. E-mail: ibrahim.acar@ozyegin.edu.tr – ORCID: http://orcid.org/0000-0003-4007-5691

Abstract

The current study aimed to examine the direct and indirect contributions of mothers' early attachment to their parents (emotional warmth and overprotection) and approaches to children's emotions in mother-child relationship. The study sample consisted of 358 mothers of young children. Mothers' ages ranged from 20 to 53 (*M*=34.81, *SD*=4.90), and the children's ages ranged from 16 to 111 months (*M*=54.70, *SD*=19.44). Mothers reported their attachment to their parents (mothers and fathers), approaches to children's emotions, and mother-child relationship. Findings from the structural equation model showed that mothers' perceived emotional warmth from their parents was positively related to avoidance of their child's emotions and orientation child's emotions in the current context; overprotection experienced by mothers from their parents was positively associated with avoidance of their child's emotions in the current context. In addition, mothers' emotional warmth from their parents was indirectly related to mother-child relationship via mothers' orientation to child emotions. Overprotection experienced by mothers from their parents was indirectly related to mother-child relationship via avoidance of child

* Correspondence concerning this article should be addressed to Simel Parlak, Associate Professor, PhD, Department of Psychology, Yalova University, Yalova, Türkiye. Adress: Yalova University, Yalova, Türkiye.
Phone/fax: +902268155000
E-mail: simelparlak@gmail.com

emotions. Results highlight the potential transmission of relationship patterns between generations through emotional approaches.

Keywords: mothers, attachment, emotional approach to child, parent-child relationship.

Children begin their socialization by interacting with their immediate environment; therefore, parent-child relationship quality is crucial for childhood development and has consequences for lifelong health and well-being (Foran et al., 2020). Children learn to be more independent and self-reliant in the mother-child relationship in preschool years. Despite this increased independence, preschoolers still need a primary caregiver for support and security. Young children use the support and security they receive from their caregivers to adapt to the rapidly changing physical and social world around them (Marvin et al., 2016; Thompson, 2016). Parents could bring their history of attachment patterns to interaction with their children in the current context. By using these earlier patterns of attachment styles, parents utilize different approaches to their children's emotions, which could form a foundation for the quality of parent-child relationship (Cooke et al., 2019). Examining pathways from earlier perceived attachment patterns (both positive and negative aspects) to parental approaches to children's emotions in the context of parent-child interactions could pave the way for understanding differentiated links from attachment patterns of parents with young children supporting or inhibiting the quality of parent-child relationship.

Parents' emotional warmth and overprotection as part of the parent-child relationship could be considered as a proxy for parental attachment (Bahmani, et al., 2022). Attachment theory suggests that a secure attachment bond between parents and children is characterized by emotional warmth, responsiveness, and sensitivity to the child's needs (Bowlby, 1973; Juffer et al., 1997). While parents may have a well intention to protect the child, overprotective behaviors can hinder the child's autonomy and independence. Overprotection can be seen as an indicator of anxious or ambivalent attachment, where the parent may have heightened anxiety about the child's well-being and tend to overcompensate by being excessively controlling. Although emotional warmth and overprotection do not directly measure parents' attachment, they can provide valuable insights into the quality of the parent-child relationship and serve as approximate indicators of attachment dynamics. Further, parental attachment affects parenting behaviors (Watt, 2014). Parents use different parenting styles that can influence their children's growth and development. The evidence is clear that those parents who spend their childhood in less conflictual and more supportive conditions (i.e., receive more care, protection, and warmth from their parents) are more securely attached than those who live in a more conflictual environment. When there is a high degree of parental overprotection, children are

more likely to develop a dependent attachment style. When parental overprotection is low, children are more likely to adopt a secure attachment style (Young et al., 2019). In addition, parental emotional warmth facilitates the establishment of a harmonious relationship between parent and child by providing a positive family environment (MacDonald, 1992). Research shows that parental emotional warmth increases the closeness between parents and children and contributes to the development of secure parental attachment (Shadach et al., 2017). It is thought that studies conducted in this field can help improve parenting practices by guiding people on how they should raise their children. This is because, by utilizing these previous patterns of attachment styles, parents can exhibit different approaches to their children's emotions, which can form a basis for the quality of parent-child relationship (Cooke et al., 2019).

Theoretical Framework

Parent-child relationship affect children's cognitive, social, emotional, and language development (Fanti & Henrich, 2010; Kim & Baer, 2010; Tam et al., 2012). Simply, attachment theory posits that secure base behavior, characterized by parental sensitivity and responsiveness to the child's needs, plays a critical role in fostering a secure attachment bond (Ainsworth et al., 1978). By incorporating warmth and sensitivity as key components of the attachment patterns predicting parent-child relationship could expand the understanding of attachment patterns in parent-child relationship. In detail, we can move beyond a simplistic understanding of *overprotection* and gain a more comprehensive perspective by acknowledging that parental behaviors, such as overbearing reactions, can be multifaceted and rooted in complex dynamics within the parent-child relationship. While overprotection may initially capture the notion of excessive parental involvement and control, it fails to capture the nuanced interplay between warmth, sensitivity to emotional boundaries, and the development of attachment styles. Warmth and sensitivity refer to the emotional climate characterized by affection, support, and positive interactions between parents and children, fostering a sense of security and trust (Bowlby, 1969). On the other hand, sensitivity to emotional boundaries in the context of overprotection involves the parent's ability to recognize and respect the child's autonomy and emotional expressions, establishing appropriate boundaries while still providing guidance and support (Deans, 2020).

From the perspective of intergenerational transmission attachment, parental approaches to children’s emotions and how parents form their interactions with their children could be influenced by the history of parents’ attachment to their parents (Bowlby, 1973; Juffer et al., 1997). Similarly, Bowen’s family systems theory, which shows how the mother inherits attachment tendencies from family history, emphasizes the importance of attachment patterns of family members as possible attachment figures in the child’s relationship patterns. The mother’s family history

determines her attitude towards her child; thus, her attachment behaviors and family characteristics may be transferred to the child (Bowen, 1978). The evidence is clear that a mother's attachment pattern and life experiences with her parents determine her attachment pattern with her children and her parental approaches (Hanson & Mullis, 1986; Iyengar et al., 2014; Lubiewska, 2012; Zajac et al., 2019). For example, Turkish mothers' bonds with their daughters affect their daughters' experiences of motherhood and their bonds with their babies when they become mothers (Şen & Kavlak, 2012). Overall, mothers of young children could bring their history of attachment patterns to current relationship with their children by practicing specific parental approaches grounded on their own experiences with their parents.

Mothers' Attachment to Their Parents

Attachment patterns established with parents could reflect both positive and negative aspects. Attachment representations come from mothers and fathers within a family (Arıkan et al., 2022; Cowan et al., 2019; Pierrehumbert et al., 2009). Emotional warmth, a positive aspect of the attachment pattern, represents the physical and verbal expression of parents' feelings towards the child, creating a supportive and welcoming atmosphere for the child. An overprotective attachment pattern means being too concerned about the child's safety, preventing children from becoming autonomous (Arrindell & Engebretsen, 2000; Rohner et al., 2005). The emotional warmth between the primary caregiver and the child is considered a protective factor that reduces the negative impact of children's negative emotional experiences (Anthony et al., 2019) and facilitates the development of children's social adaptation (Daspe et al., 2019, Ruiz et al., 2021). The primary caregiver's sensitivity towards preschool children contributes to increased children's social competence and decreased problematic behaviors and mother-child conflicts. In addition, parental behaviors such as showing warmth, providing emotional support, and creating a secure attachment pattern can serve as protective factors against difficulties (Ahmetoğlu et al., 2022; Driscoll & Pianta, 2011; Saral & Acar, 2021). Mothers' history of attachment patterns could be transmitted to other relationship contexts, such as parent-child relationship, and form a basis for parental approaches to children's emotional expressions (Bowlby, 1973; Juffer et al., 1997). In the following sections, we will provide information regarding the transmission of attachment patterns and how these patterns may be reflected in the context of parent-child relationship and approaches to children's emotions.

Parental Approaches to Children's Emotions in the Context of Parenting

Parents tend to guide their children's emotions, particularly when children display negative emotions in a given context (Birmingham et al., 2017). Pereira et al. (2017) categorized parents' approaches to children's emotions into three

dimensions. The first dimension consists of the parent's capacity to be attentive and focused on recognizing and understanding the child's emotions and the parents' effort to help the child understand their own emotions. The second dimension consists of the parents' negative beliefs about the child's negative feelings and their avoidance of the child's feelings, which prevents the child from expressing their negative feelings. The third dimension involves parental acceptance of the negative emotions about the child and their capacity to tolerate the child's negative emotions and to accept the child's and their own negative emotions.

Parental approaches to children's emotions influence children's emotional expression and the quality of parent-child relationship (Brumariu, 2015; Cooke et al., 2019). For example, parents' inductive reasoning (i.e., positive approaches to children's negative emotions) was related to higher levels of emotion regulation (Acar et al., 2021). Further, children who are supported during their experiences of negative emotions by their parents could establish positive relationship with their caregivers (Ahmetoğlu et al., 2017). The existing evidence could suggest that being present and supporting children when they experience negative emotional arousal lead them to establish better and positive relationship with their parents. Nevertheless, parents' approaches to children's emotions could differ depending on their own experiences with their parents and how they utilize these early experiences with their children in the current context. In the following section, we will explain the links between early attachment patterns to current parent-child relationship via how parents approach their children's emotions.

Indirect Process: Indirect Link from Perceived Early Attachment to Parent-Child Relationship via Parent Emotion Regulation

Although parents intend to establish positive relationship with their children, their early attachment patterns established in earlier years could determine approaches to their children's emotions and parent-child relationship. Parents begin establishing relationship with their children depending on internal working models they created through a history of attachment parents with their own parents (Bowlby, 1969). In detail, the nature of early parent-child relationship (attachment patterns) forms the foundation for parents' perceptions of children and others as secure or insecure bases that can be reflected during comforting or creating a safe haven for their children (Bretheon, 1985). In addition, early attachment patterns could continue to impact how parents form relationship with their children, particularly in emotional arousal situations. For example, mothers who had unsupportive mothers in their childhood displayed heightened nonsupportive responses to their children at six months (Leerkes et al., 2020). Overall, theoretical and empirical conceptualizations posit that intergenerational transmission of parental approaches influences how parents are functional or dysfunctional in current interactions with their children (Leerkes et al., 2020; Van Ijzendoorn & Bakermans-Kranenburg, 2018).

Grounded in attachment theory, we conceptualized that mothers with supportive early attachment patterns (i.e., emotional warmth) could utilize supportive approaches to their children's emotions, such as acceptance and orientation towards emotions. On the contrary, mothers with nonsupportive early attachment patterns (i.e., overprotection) could utilize unsupportive approaches to children's emotions, such as avoidance of emotions. Although early attachment influences parents' current interactions with their children, the direction of the link between early attachment and current interactions could be different depending on the cultural context (Van Ijzendoorn et al., 2006). For example, although secure attachment is associated with parental sensitivity across cultures, the expression of attachment styles within the parent-child relationship could be different depending on the cultural context (e.g., utilizing more physical touch rather than seeking proximity (Posada et al., 1995; Verejken, 1996). From these conceptual and empirical perspectives, we aimed to explore the links from early attachment to current parental approaches to children's emotions and parent-child relationship within Turkish mothers.

The Current Study

Parents naturally bring their attachment patterns established with their parents to their interactions with their children in their current lives (Bowlby, 1973; Juffer et al., 1997). Further, relationship patterns could be transferred from one generation to another through social interactions in parent-child relationship contexts. From this perspective, it is important to examine pathways of intergenerational transmission of attachment patterns through parental approaches to children's emotional expressions in the context of parent-child relationship. Grounding on the previous work and theoretical conceptualizations (e.g., Bowlby, 1973; Juffer et al., 1997; Leerkes et al., 2020; Van Ijzendoorn & Bakermans-Kranenburg, 2018) in the current study, we aimed to examine the contributions of parents' attachment patterns (i.e., emotional warmth and overprotection) to their current parent-child relationship, with the particular interest in the testing mediating role of parental approaches to children's emotional expressions (avoidance, orientation, and acceptance of child's emotions. The following hypotheses were tested to address the purpose of the current study. In the parenting roles in Turkey, it is seen that the mother is the person primarily responsible for the child's development, education, and behavior. On the other hand, cultural structures, which are in a constant state of change, have also created changes in existing parental roles. Although the father's establishing supportive relationship with his child and taking part in the care of the child have become expected behaviors in changing paternal roles, fathers are still mostly in the position of helping the mother. Studies conducted in Turkey also show that fathers generally feel responsible for providing financial

gain (Aksoy & Tatlı, 2019; Kuzucu, 2011). It is seen that it is usually the mother who feels responsible for all kinds of needs of the child from pregnancy and parenting roles are shaped in this direction (Özensel, 2004). Based on these cultural norms, this study focuses on the mother-child relationship. 1. Mothers' positive attachment patterns with their parents (emotional warmth) would positively and negative attachment patterns with their parents (overprotection) negatively contribute to parental approaches to children's emotional expression (Brumariu, 2015; Cooke et al., 2019). In detail, parents with attachment patterns of emotional warmth would use positive parental approaches to children's emotional expressions such as orientation towards and acceptance of the child's feelings. Further, parents with attachment patterns of overprotection would use negative parental approaches to children's emotional expressions such as avoidance of the child's feelings. 2. The pathway from parents' attachment patterns (i.e., emotional warmth and overprotection) to current parent-child relationship may be indirectly affected by parental approaches to children's emotional expressions (Leerkes et al., 2020; Van Ijzendoorn & Bakermans-Kranenburg, 2018). Such that, parents with attachment patterns of emotional warmth would use positive parental approaches to children's emotional expressions, leading to quality parent-child relationship. On the contrary, parents with attachment patterns of overprotection would use negative parental approaches to children's emotional expressions, leading to lower levels of parent-child relationship quality.

Method

Participants

The sample of the current cross-sectional study was from Istanbul, Turkey. In this study, we recruited 358 mothers of children (175 girls and 183 boys) in Turkey. To ensure consistency and a focused examination of the early childhood period, participants who had more than one child were instructed to complete the scales with reference to a single child within the specified age range. The mothers' age ranged from 20 to 53 (M =34.81, SD = 4.90) years, and the children's age ranged from 16 to 111 months (M =54.70, SD =19.44). 48.8% of families had one child, 41.5% had two children, and the remaining families had three or more children. A total of 96.1% of mothers were married, and 54.5% were employed during the data collection. In the current study, we utilized the chain-referral sampling technique (Gravetter & Forzano, 2016). In detail, we recruited mothers through Google Forms, starting from the researchers' immediate environment, and expanded the data pool by referral of recruited mothers. Once data were collected, we checked the accuracy

of data entry and removed participants who did not meet the participation criteria of being a mother with a young child.

Instruments

Mothers' attachment to parents. We used the Turkish Form of the Egna Minnen Barndoms Uppfostran for children (S-EMBU; Arrindell et al., 1998). The scale has 23 items assessing adults' perceptions of their parents' behavior types towards themselves in childhood. The scale was adapted to Turkish by Dirik et al. (2015). It is a 4-point Likert-type (1 = never, 4 = most of the time) that individuals are expected to answer items separately for their parents. We used mothers' reports of overprotective attitudes (sample item: "My parents forbade me to do things that other children were allowed to do, for fear of something happening to me") and emotional warmth (sample item: When things went wrong for me, I felt that my parents were trying to comfort and encourage me") coming from their mothers and fathers. Internal consistency (Cronbach's Alpha) of overprotective attitudes were .82 and .81 for mothers and fathers, respectively. Cronbach's Alphas of emotional warmth were .86 and .87 for mothers and fathers, respectively. We averaged the target items to create each subscale where higher scores indicated the higher values of the target construct.

Parental Approaches to Children's Emotions We used the Parent Emotion Regulation Scale (PERS; Pereira et al., 2017), adapted to Turkish by Ahci et al. (2020). The scale is a 13-item questionnaire with responses rated on a 5-point Likert-type scale (0 = never to 4 = always). The PERS consists of three subscales as parent's avoidance of the child's emotions (α = .77, sample item: "At all costs, I must keep my child from being nervous"), parents' orientation to the child's emotions (α = .80, sample item: "When my child is upset, I strive to understand what she/he is feeling"), and parent's acceptance of the child's and their own emotions (α = .61, sample item: "I think it is normal to feel sad, frustrated or worried about some of my child's behaviors"). We averaged the target items to create each subscale where higher scores indicated the higher values of the target construct.

Parent-child relationship. We used the Parent-Child Communication Assessment Tool (ABCIDA; Arabacı & Ömeroğlu, 2016). The scale is a 37-item questionnaire with responses rated on a 5-point Likert-type scale (1 = always and 5 = never). The scale consists of five subscales: speaking (α = .83, sample item "I use simple and neat sentences to express my feelings and thoughts to my child in a clear and understandable way"), listening (α = .81, sample item: "I listen to my child carefully, trying to understand"), message (α = .71, sample item-reversed: "When talking to my child, I threaten her/him in various ways when I am in a difficult situation"), non-verbal communication (α = .71, sample item: "I show my

appreciation for my child's positive behavior by hugging or kissing her"), and empathy (α = .79, sample item: "I respect my child's feelings and thoughts that differ from mine"). We reverse-coded items in the message subscale as they were inversely worded. We averaged the target items to create each subscale where higher scores indicated the higher values of the target construct. We calculated each construct's average variance extracted values (AVE) (Fornell & Larcker, 1981) and composite reliability for each construct (Jöreskog, 1971). See Table 1 for details.

Table 1. Average Variance Extracted (AVE), Composite Reliability (CR), and Reliability

	Variable	Construct Reliability	Average Variance Extracted	Cronbach's Alpha
1.	MCR_ Speaking	0.83	.40	0.83
2.	MCR_ Listening	0.85	.53	0.81
3.	MCR_ Message	0.73	.27	0.71
4.	MCR_ Nonverbal Com	0.72	.30	0.71
5.	MCR_ Empathy	0.78	.31	0.79
6.	Avoidance of CE	0.78	.47	0.77
7.	Orientation to CE	0.80	.51	0.80
8.	Acceptance of CE	0.62	.36	0.61
9.	Emotional Warmth_M	0.86	.48	0.86
10.	Emotional Warmth_F	0.87	.50	0.87
11.	Overprotection_M	0.82	.35	0.82
12.	Overprotection_F	0.82	.34	0.81

Note. Com= Communication MCR = Mother-Child Relationship. CE= Child's Emotion. M= Mother. F= Father.

Data Collection Procedures

Data collection procedures were approved by the University Ethics Committee of Research on Human Studies. Data were collected through Google Forms. Initially, participants were informed about the study and asked for their consent.

Data Analysis

Data were screened for normality using skewness (|3|) and kurtosis (|8|) criteria (Kline, 2011). We used the Mplus 8.4 (Muthen & Muthen, 2017) for the structural equation model analysis. We followed two steps in our analyses: first, we ran a measurement model (Confirmatory Factor Analyses; CFA) where we created latent factors of the parent-child relationship, emotional warmth, and overprotection. Second, we ran a structural model where we regressed the mother-child relationship

on emotional warmth, overprotection, and parental approaches to children's emotions (acceptance, avoidance, and orientation. We reported standardized coefficients in the path analysis to report effect sizes (Durlak, 2009). In order to account for potential confounding factors, we incorporated several sociodemographic variables as covariates in our analysis. Specifically, we included family socioeconomic status (SES), child age, and child sex as covariates in our statistical models. To guide our covariate selection process, we employed a top-down model-building approach, whereby we initially included all relevant covariates in the model and subsequently eliminated nonsignificant variables one at a time based on the improvement in model fit (Wang & Wang, 2012). We tested the indirect effects' significance using the bootstrapping technique (2000 resampling) with 95% confidence intervals (MacKinnon et al., 2007). Following model fit indices were used to test model accuracy: Comparative fit index (CFI) > .90, root mean square error of approximation (RMSEA) < .08, and standardized root mean square residual (SRMR) < .08 (Brown, 2006; Kline, 2011; MacCallum et al., 1996).

It is indeed important to consider the possibility that using self-reported surveys from the same respondents at a single time point may have introduced common method bias (Podsakoff et al., 2003). Understanding the conceptual distinction between the two constructs, we conducted Harman's single-factor test to examine the presence of common method variance among items of these two constructs. Harman's single-factor test is a post hoc analysis used to determine if a single factor can account for the majority of variance among variables of constructs (Chang et al., 2010). The results of Harman's single-factor test demonstrated that only 25.69% of the variance was explained by the first unrotated factor, which is below the 50% threshold (Chang et al., 2010), indicating that common method variance was not a significant concern in our study.

Results

We examined the bivariate correlations (Pearson's Correlation) among variables. Results are presented in Table 2.

Table 2. Bivariate correlations and descriptive statistics for study variables (*N* =358)

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. MCR_ Speaking	-											
2. MCR_ Listening	.72**	-										
3. MCR_ Message	.61**	.57**	-									
4. MCR_ Nonverbal Com	.57**	.58**	.44**	-								
5. MCR_ Empathy	.52**	.49**	.32**	.58**	-							
6. Avoidance of CE	.05	.001	-.04	-.03	.07	-						
7. Orientation to CE	.57**	.58**	.42**	.58**	.58**	.18**	-					
8. Acceptance of CE	.25**	.26**	.19**	.28**	.38**	-.06	.33**	-				
9. Emotional Warmth_M	.29**	.28**	.17**	.29**	.21**	.09	.24**	.07	-			
10. Emotional Warmth_F	.30**	.29**	.14**	.27**	.25**	.09	.27**	.08	.78**	-		
11. Overprotection_M	-.09	-.11*	-.17**	-11*	-.12*	.02	-.09	-.03	-.13*	-.13**	-	
12. Overprotection_F	-.04	-.06	-.15**	-.09	-.05	.13**	-.06	-.03	-.02	-.09	.71**	-
n	358	358	358	358	358	358	358	358	358	358	358	358
Mean	4.12	4.34	4.15	4.46	4.07	2.46	3.42	3.15	2.70	2.61	2.45	2.25
SD	0.48	0.47	0.47	0.43	0.53	0.90	0.48	0.63	0.73	0.75	0.65	0.62
Min-Max	2.38-5	2.67-5	2.75-5	2.33-5	2.11-5	0-4	1.20-4	1.33-4	1- 4	1-4	1-4	1-4
Skewness	-0.64	-0.67	-0.40	-0.98	-0.51	-0.26	-0.87	-0.53	-0.22	-0.20	0.39	0.51
Kurtosis	0.93	0.28	-0.21	1.68	0.39	-0.53	0.97	-0.20	-0.79	-0.84	-0.46	-0.13

Note. **p*< .05, two-tailed. ***p* < .01, two tailed. MCR = Mother-Child Relationship. CE= Child's Emotion. M= Mother. F= Father. Emotional warmth and overprotection were reported by parents about their parents. All other variables were reported by parents about their children.

Direct and Indirect Associations

First, we tested a measurement model where the parent-child relationship consisted of speaking, listening, message, nonverbal communication, and empathy subscales, emotional warmth consisted of father-mother-reported subscales, and overprotection consisted of father-mother-reported subscales. Results from the measurement model showed an acceptable fit to the data, $\chi 2$ (26) = 77.437, $p < .001$, CFI = .96, TLI= .95, RMSEA = .07 [90% CI: .05–.09], SRMR=. 03, AIC (Akaike Information Criterion) = 4107.994, BIC (Bayesian Information Criterion) = 4216.649 (Brown, 2006; Kline, 2011). Standardized loading values ranged from .62 to .89, indicating acceptable loadings to target factors.

Second, In the structural equation models, we followed the top-down model-building strategy by which we started with a full model (i.e., including all possible covariates) and removed the covariate variable that was not statistically helping the model.

Final structural model fit the data well, $\chi 2$ (67) = 174.456, $p < .001$, CFI = .94, TLI = .92, RMSEA = .06 [90% CI: .05–.07], SRMR =. 05, AIC (Akaike Information Criterion) = 5953.191, BIC (Bayesian Information Criterion) = 6135.577 (Kline, 2011; MacCallum et al., 1996). Despite the lack of absolute fit in our model, other fit indices such as RMSEA, CFI, and SRMR align well with recommended values, indicating a reasonable fit. The discrepancies can be attributed to the model's complexity and comprehensiveness, grounded in robust theoretical constructs. Overall, the theoretical justification and empirical adequacy support the validity and utility of our model. In the final model, there were three latent variables: Emotional Warmth, Overprotection, and Mother-Child Relationship. The mother-child relationship was predicted by emotional warmth (β = .20, *SE* = .05), orientation to child emotions (β = .54, *SE* = .04), acceptance of child emotions (β = .11, *SE* = .05), and avoidance of child emotions (β = -.09, *SE* = .04). Emotional warmth was significantly related to avoidance of child emotions (β = .12, *SE* = .05) and orientation to child emotions (β = .28, *SE* = .05). See Figure 1 for complete associations.

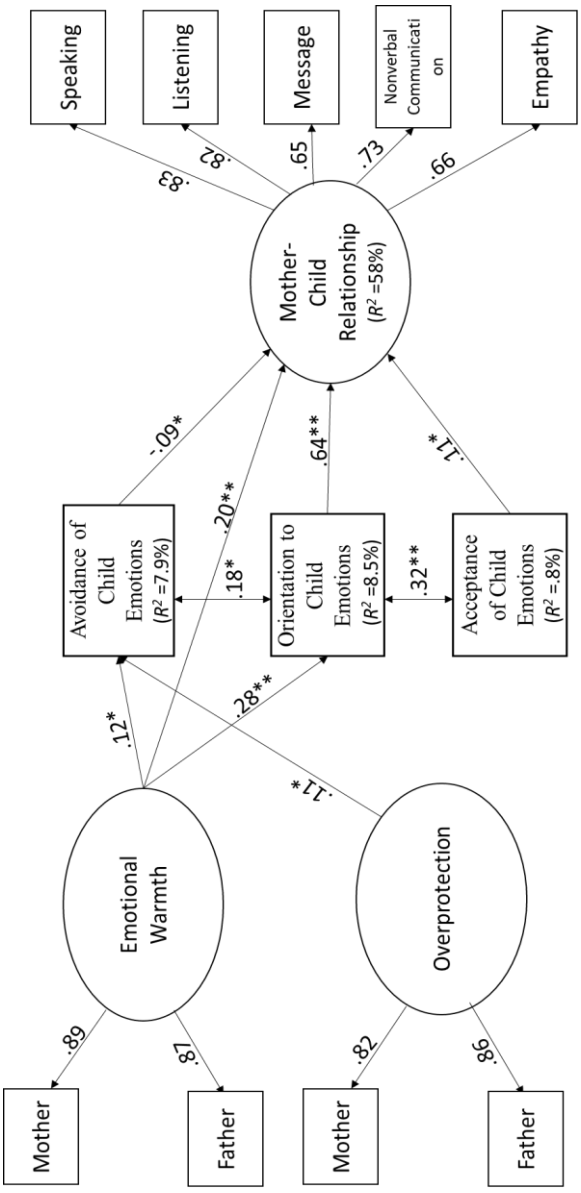


Figure 1. The structural model with standardized coefficients

Note. *p <.05; ** p <.01. We displayed the significant paths for brevity. Covariate (CV) for Emotional Warmth: Mother Age (β = -.11, p < .05). CV for Avoidance of Child Emotions: Family Socioeconomic Status (β = -.22, p < .001). Emotional warmth and overprotection were reported by parents about their parents. All other variables were reported by parents about their children.

We tested the indirect effects of emotional warmth and overprotection on mother-child relationship via approaches to child emotions. Emotional warmth was indirectly associated with mother-child relationship via orientation to child emotions (β = .18, [95% CI: .11 / .26]. Overprotection was indirectly associated with mother-child relationship via avoidance of child emotions (β = -.01, [95% CI: -.0009 /.02]. See supplementary material for graphical depictions of bootstrap distributions with bias-corrected 95% credible confidence intervals.

Discussion

We examined the direct contributions of emotional warmth and overprotection as part of the early attachment patterns to mother-child relationship. In addition, we tested the indirect effects of mothers' early attachment patterns (emotional warmth and overprotection) with their own parents on mother-child relationship via parental approaches to child emotions. We discussed our findings within the framework of intergenerational transmission of attachment patterns.

First, we found that mothers' early emotional warmth was positively related to their avoidance of child emotions and orientation of child emotions. The positive association between emotional warmth and parental orientation to children's emotions was congruent with previous studies (Crandall et al., 2015; He et al., 2020). In detail, mothers who experienced positive relationship with their parents displayed positive approaches (e.g., recognizing and understanding children's emotions). The reason behind the positive association between early emotional warmth and orientation to children's emotions could come from the transmission of internal working models of parental approaches to children's emotions. For example, mothers who had parents with positive approaches to their emotions could carry on these approaches to their current context with their children when they experience emotional arousal situations.

Another finding in the current study showed that early emotional warmth was positively related to parental avoidance of children's emotions. Transmission of early attachment to current parental approaches could be embedded in cultural norms such that parents may employ overprotection towards their children; however, this could be positively perceived by parents and children. Discrepancies between the current findings and previous research could be in part due to differences in methodology (e.g., Collecting retrospective data); therefore, further research is warranted to explore these discrepancies. In addition, emotional warmth leads to positive and nurturing interactions between mothers and their children, which aligns with the concept of a good fit between the child's temperament and the parent's caregiving approach. Nevertheless, the presence of emotional warmth does not mean that there is no stress and conflict in the relationship with the child. In detail, it is

important to acknowledge that well-intentioned mothers may also exhibit overbearing behaviors toward their children in the context of overprotection. From the perspective of the goodness-of-fit model, the mismatch between the parent's overbearing approach and children's characteristics may create challenges in the parent-child relationship and child development outcomes (Thomas & Chess, 1977). Therefore, in addition to the recognized significance of intergenerational transmission in shaping parental attachment patterns, it is crucial to consider the concept of maternal sensitivity. Maternal sensitivity refers to the mother's capacity to accurately perceive and appropriately respond to her child's signals (Deans, 2020). This concept holds particular importance as it encompasses the crucial aspect of the mother's ability to understand and accept her child's cues and needs in a responsive manner. By incorporating the construct of maternal sensitivity, we broaden our understanding of the intricate dynamics involved in the parent-child relationship and its impact on child development. Thus, the inclusion of maternal sensitivity as a focal construct provides a comprehensive framework for examining the interplay between parental attachment patterns and the quality of parent-child interactions in shaping child outcomes.

Second, in the current study, the overprotection dimension of perceived parental attitudes showed a significant relationship with parents' avoidance of children's emotions. This finding was aligned with previous work (Eisenberg & Morris, 2002; Zarra-Nezhad et al. (2015), showing that parents with overprotective tendencies tend to display negative approaches to their children in distress. This finding indicates that overprotective parenting tendencies coming from early attachment patterns could lead parents to utilize negative approaches to children's emotions, such as the avoidance of emotions. Mothers who experienced overprotective parenting in their early years may have learned to dismiss emotional expression as they did not develop resources and understanding of emotions, particularly in emotional arousal contexts.

Third, emotional warmth as part of early attachment was indirectly associated with parent-child relationship via parental orientation to child emotions. While the experiences of early emotional warmth are an important determinant of the quality of current relationship with their children, their ability to adapt to their children's emotions strengthens the parent-child relationship. It appears that the perceived early emotional warmth increases the parental ability to be tuned with their children's emotions (i.e., sensitivity to children's emotions), which in turn, naturally, helps parents to establish better relationships with their children. Parents' positive approaches to their children's emotions could be rooted in their early attachment patterns (Van Ijzendoorn & Bakermans-Kranenburg, 2018), and parents utilize these approaches to support interactions with their children.

Finally, parallel to previous finding, we found that overprotection as part of early attachment was indirectly associated with parent-child relationship via parental avoidance of the child's emotions. In detail, mothers with early attachment patterns

of overprotection reported higher levels of avoidance of their children's emotions, which was negatively associated with parent-child relationship. Existing theoretical conceptualizations and empirical findings show that mothers could carry their early adverse experiences within the family context to current relationship with their children (Thompson, 2016; Van Ijzendoorn & Bakermans-Kranenburg, 2018). Mothers using overprotection as a learned parenting approach may overlook their children's emotions, or children within an overprotective parenting context may not express negative emotions, which could undermine the parent-child relationship. Further, the interdependent nature of Turkish family relationships could promote overprotective parenting approaches transmitted from generation to generation as a norm (Kağıtçıbaşı & Sunar, 1992). From this perspective, mothers with overprotective tendencies could avoid their children's emotions with no intention of harming their interactions with them, considering this approach is perceived as their business-as-usual functioning.

Practical Implications of the Current Study

The quality of relationship between mothers and their children is based on how mothers approach children's emotions (Bouillet & Danet, 2022). Mothers could use parenting practices rooted in their early attachment patterns (e.g., emotional warmth or overprotection) while approaching their children's emotions and interacting with them. Considering the importance of early attachment patterns in the current parenting practices of mothers, clinical practices or intervention programs should take these patterns into account when supporting mothers with their parenting practices. Intervention programs such as Circle of Security (Cassidy et al., 2017; Huber et al., 2015) could be utilized to reflect early attachment patterns of mothers in current interactions with children so mothers will be aware of the effects of early attachment patterns during interacting with their children. By doing so, mothers can be supported in their understating of children's emotions and scaffolding of mother-child relationship.

Limitations and Future Work

The findings of this study should be interpreted considering its limitations. The cross-sectional nature of the data has limited making causal inferences and employing pure mediation analysis. Future work can collect data over time to detect the pure mediation and transactional nature of the associations. In the current study, data were obtained using self-report measures. The majority of the samples in this study consist of mothers with middle socioeconomic income levels. This may limit the generalization of the results to the population of Turkey. On the other hand, these results add strength to the study in terms of reflecting the average. The data were collected online, which may have increased the likelihood of biased responses. In

future research, it may be recommended to collect data through direct interaction with participants. Finally, some of the subscales had low-reliability values and average variance (AVE). Future work may use different measures with better reliability and AVE values.

Authors' Notes

Data Availability. The data that support the findings of this study are available from the corresponding authors upon reasonable request.

Funding. The authors did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest. The authors declare that they have no conflict of interest.

Ethical Approval. This research was conducted in accordance with guidelines published by the American Psychological Association and was approved by our local institutional review board.

Informed Consent. Informed consent was obtained from all individual participants included in the study.

References

Acar, I. H., Veziroglu-Celik, M., Celebi, S., Ingec, D., & Kuzgun, S. (2021). Parenting styles and Turkish children's emotion regulation: The mediating role of parent-teacher relationships. *Current Psychology, 40,* 4427–4437. Doi: https://doi.org/10.1007/s12144-019-00390-y

Ahçı, Z. G., Akdeniz, S., Harmancı, H., Akaroğlu, E. G., & Seçer, İ. (2020). The validity and reliability study of the Turkish version of the Parent Emotion Regulation Scale. *European journal of education studies.* 6(11), 221-229.

Ahmetoglu, E., Acar, I. H., & Asik Ozturk, M. (2022). Parental involvement and children's peer interactions. *Current Psychology, 41,* 4447–4456. https://doi.org/10.1007/s12144-020-00965-0

Ahmetgolu, E., Ilhan Ildiz, G., Acar, I. H., & Encinger, A. (2017). Children's emotion regulation and attachment to parents: Parental emotion socialization as moderator. *Social Behavior and Personality: An International Journal, 46*(6), *969–984*, DOI: https://doi.org/10.2224/sbp.6795

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Lawrence Erlbaum.

Aksoy, A. B., ve Tatlı, S. (2019). Okul Öncesi Dönem Çocuğu Olan Babaların Çocuklarıyla Olan İlişkileri İle Babalık Rolü Algıları Arasındaki İlişkinin Bazı

Değişkenler Açısından İncelenmesi. *Çankırı Karatekin Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 10(1), 1-22.

Anthony, R. E., Paine, A. L., & Shelton, K. H. (2019). Adverse childhood experiences of children adopted from care: The importance of adoptive parental warmth for future child adjustment. *International journal of environmental research and public health*, 16(12), 2212.

Arabacı, N. & Ömeroğlu, E. (2016). Validity and reliability analysis of parent-child communication assessment tool (ABÇİDA). *International Journal of Turkish Education Sciences*. 4(7), 1-14.

Arikan, G., Acar, I. H., & Ustundag-Budak, A. M. (2022). A two-generation study: The transmission of attachment and young adults' depression, anxiety, and social media addiction. *Addictive Behaviors*, *124*, 107109. https://doi.org/10.1016/j.addbeh.2021.107109

Arrindell, W. A., & Engebretsen, A. A. (2000). Convergent validity of the short EMBU1 and the parental bonding instrument (PBI): Dutch findings. *Clinical Psychology & Psychotherapy: An International Journal of Theory & Practice*, 7(4), 262-266.

Bahmani, T., Naseri, N. S., & Fariborzi, E. (2022). Relation of parenting child abuse based on attachment styles, parenting styles, and parental addictions. *Current psychology* 1–15. Advance online publication. https://doi.org/10.1007/s12144-021-02667-7

Birmingham, R. S., Bub, K. L., & Vaughn,B. E. (2017). Parenting in infancy and self-regulation in preschool: An investigation of the role of attachment history. *Attach. Hum. Dev*. 19, 107–129. doi: 10.1080/14616734.2016.1259335

Bowen, M. (1978). *Family therapy in clinical practice*. Lanham, MD: Rowman & Littlefield Publishers, Inc.

Bowlby, J. (1969). *Attachment: Attachment and loss*, Vol. I. London: Hogarth.

Bowlby, J., (1973). *Attachment and Loss: Separation, Anxiety and Anger*. New York: Basic Books.

Bouillet, M., & Danet, M. (2022). Longitudinal relationship between children's emotion dysregulation and parent's negative experience of the COVID-19 lockdown in France. *Journal of Evidence-Based Psychotherapies*, 22(2), 31-47.

Bretherton, I. (1985). Attachment theory: Retrospect and prospect. *Monographs of the Society for Research in Child Development, 50*(1–2), 3–35. https://doi.org/10.2307/3333824

Brook, J. S., Whiteman, M., & Brook, D. W. (1999). Transmission of Risk Factors across Three Generations. *Psychological Reports, 85*(1), 227–241. https://doi.org/10.2466/pr0.1999.85.1.227

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: Guilford Press.

Brumariu, L. E. (2015). Parent-child attachment and emotion regulation. In G. Bosman and K. A. Kerns (Eds.), *Attachment in Middle Childhood: Theoretical Advances and New Directions in an Emerging Field* (pp 31-45). Wiley.

Carrasco, M. A., Rodríguez, M. A., del Barrio, M. V., & Holgado, F. P. (2011). *Relative and Absolute Stability in Perceived Parenting Behaviour: A Longitudinal Study with Children and Adolescents. Psychological Reports, 108*(1), 149–166. doi:10.2466/02.09.10.21.pr0.108.1.149-166

Cassidy, J., Brett, B., Gross, J., Stern, J., Martin, D., Mohr, J., & Woodhouse, S. (2017). Circle of Security–Parenting: A randomized controlled trial in Head Start. *Development and Psychopathology, 29*(2), 651-673. https://doi.org/10.1017/S0954579417000244

Chang, S. J., Van Witteloostuijn, A., & Eden, L. (2010). From the editors: Common method variance in international business research. *Journal of International Business Studies, 41*(2), 178–184.

Cooke, J. E., Kochendorfer, L. B., Stuart-Parrigon, K. L., Koehn, A. J., & Kerns, K. A. (2019). Parent–child attachment and children's experience and regulation of emotion: A meta-analytic review. *Emotion*, *19*(6), 1103–1126. https://doi.org/10.1037/emo0000504

Cowan, P. A., Cowan, C. P., Pruett, M. K., & Pruett, K. (2019). Fathers' and mothers' attachment styles, couple conflict, parenting quality, and children's behavior problems: an intervention test of mediation. *Attachment & Human Development, 21*(5), 532–550. doi:10.1080/14616734.2019.158260

Crandall, A., Deater-Deckard, K., & Riley, A. W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental Review*, *36*,105–126. https://doi.org/10.1016/j.dr.2015.01.00422.

Daspe, M. È., Arbel, R., Ramos, M. C., Shapiro, L. A., & Margolin, G. (2019). Deviant peers and adolescent risky behaviors: The protective effect of nonverbal display of parental warmth. *Journal of research on adolescence, 29*(4), 863-878.

Deans, C. L. (2020). Maternal sensitivity, its relationship with child outcomes, and interventions that address it: a systematic literature review, *Early Child Development and Care, 190*(2), 252-275, DOI: 10.1080/03004430.2018.1465415

Dirik, G., Yorulmaz, O., & Karancı, A.N. (2015). Assessment of Perceived Parenting Attitudes in Childhood: Turkish Form of the S-EMBU for Children. *Turkish Journal of Psychiatry, 26*(2), 123-130.

Driscoll, K., & Pianta, R. C. (2011). Mothers' and fathers' perceptions of conflict and closeness in parent-child relationships during early childhood. *Journal of Early Childhood and Infant Psychology*, (7), 1-24.

Durlak, J. A. (2009). How to select, calculate, and interpret effect sizes. *Journal of Pediatric Psychology, 34*(9), 917–928. https://doi.org/10.1093/jpepsy/jsp004.

Eisenberg, N., & Morris, A. S. (2002). Children's emotion-related regulation. In H. Reese, &R. Kail (Eds.) *Advances in child development and behavior* (Vol. 30, pp. 189–229). SanDiego, CA: Academic Press.

Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the National Institute of Child Health and Human Development Study of Early Child Care. *Developmental Psychology*, 46, 1159-1175.

Foran, H. M., Fraude, I., Kubb, C., & Wamboldt, M. Z. (2020). Assessment of the parent-child relationship. *The handbook of systemic family therapy*, 2, 35-54.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39. doi:10.2307/3151312

Gravetter, F. J., & Forzano, L. B. (2016). *Research methods for the behavioral sciences* (5th ed.).Cengage.

Hanson, R. A., & Mullis, R. L. (1986). Intergenerational Transfer of Normative Parental Attitudes. *Psychological Reports, 59*(2), 711–714. https://doi.org/10.2466/pr0.1986.59.2.711

He, Y., Liu, C., Chen, Y., Huang, J., & Luo, R. (2020). Intergenerational transmission of parenting style in rural China and the mediation effect of Caregiver's mental health. *Children and Youth Services Review, 117,* Article 105319. https://doi.org/10.1016/j.childyouth.2020.105319

Huber, A., McMahon, C.A., & Sweller, N. (2015). Efficacy of the 20-week COS Intervention: Changes in caregiver reflective functioning, representations, and child attachment in an Australian clinical sample. *Infant Mental Health Journal, 36,* 556–574.

Joreskog, K. G. (1971). Statistical analysis of sets of congeneric tests. *Psychometrika, 36,* 109–133.

Iyengar, U., Kim, S., Martinez, S., Fonagy, P., ve Strathearn, L. (2014). Unresolved trauma in mothers: intergenerational effects and the role of reorganization. *Frontiers in Psychology*, 5, Article 966. https://doi.org/10.3389/fpsyg.2014.00966

Juffer, F., van Ijzendoorn, M. H., & Bakermans-Kranenburg, M. J. (1997). Intervention in Transmission of Insecure Attachment: A Case Study. *Psychological Reports, 80*(2), 531–543. doi:10.2466/pr0.1997.80.2.531

Kağıtçıbaşı, Ç. & Sunar, D. (1992) Family and socialization in Turkey J.P. Roopnarien ve D.B. Carter (Der.) *Parent-child relations in diverse cultural settings: Socialization for instrumental competence.* Annual Advances in Applied Developmental Psychology, 5, 75-88, Ablex.

Kim, M., & Baer, J. (2010, October). *Maternal sensitivity and toddler/preschooler behavior problems: A meta-analysis for evidence-based practice*. Poster session presented at the meeting of the Council of Social Work Education, Portland, OR

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd.). New York: The Guilford Press.

Kuzucu, Y. (2011). Değişen babalık rolü ve çocuk gelişimine etkisi. *Türk Psikolojik Danışma ve Rehberlik Dergisi*, *4*(35), 79-89.

Leerkes, E. M., Bailes, L. G., & Augustine, M. E. (2020). The intergenerational transmission of emotion socialization. *Developmental Psychology, 56*(3), 390–402. https://doi.org/10.1037/dev0000753

Lubiewska, K. (2012). Attachment transmission across three generations in the context of socio-political transformation in Poland. Cognition, Brain, Behavior. *An Interdisciplinary Journal*, 16(2), 213-238.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods, 1*, 130-149. https://doi.org/10.1037/1082-989X.1.2.130

MacDonald, K. (1992). Warmth as a developmental construct: An evolutionary analysis. *Child Development*, *63*(4), 753–773. https://doi.org/10.2307/1131231

Main, M., & Cassidy, J. (1988). Categories of response to reunion with the parent at age 6: Predictable from infant attachment classifications and stable over a 1-month period. *Developmental Psychology*, *24*(3), 415–426. https://doi.org/10.1037/0012-1649.24.3.415

Marvin, R. S., Britner, P. A., & Russell, B. S. (2016). Normative development: The ontogeny of attachment in childhood. In J. Cassidy & P. R. Shaver (Eds.*), Handbook of attachment, third edition: Theory, research, and clinical applications*. (pp. 273 – 290). Guilford Press.

Morris, A. S., Steinberg, L., Sessa, F. M., Avenevoli, S., Silk, J. S., & Essex, M. J. (2002). Measuring children's perceptions of psychological control: Developmental and conceptual considerations. In B.K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 125–159). American Psychological Association Press.

Özensel, B. (2004). Türk toplumunda çocuğun yetiştirilmesinde annenin rolü: Konya ili örneği. *Değerler Eğitimi Dergisi*, *2*(6), 77-96.

Pereira, A. I., Barros, L., Roberto, M. S., & Marques, T. (2017). Development of the Parent Emotion Regulation Scale (PERS): Factor structure and psychometric qualities. *Journal of Child and Family Studies, 26*(12), 3327-3338.

Pierrehumbert, B., Santelices, M. P., Ibáñez, M., Alberdi, M., Ongari, B., Roskam, I., … Borghini, A. (2009). Gender and Attachment Representations in the Preschool Years. *Journal of Cross-Cultural Psychology, 40*(4), 543–566. doi:10.1177/0022022109335181

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Posada, G., Gao, Y., Wu, F., Posada, R., Tascon, M., Schöelmerich, A., et al. (1995). The secure base phenomenon across cultures: Children's behavior, mothers' preferences, and experts' concepts. In E. Waters, B. E. Vaughn, G. Posada, & K. Kondo-Ikemura (Eds.), Constructs, cultures and caregiving: New growing points in attachment theory and research. *Monographs of the Society for Research in Child Development, 60*, 27–48.

Rohner, R. P., Khaleque, A., & Cournoyer, D. E. (2005). Parental acceptance rejection: Theory, methods, cross-cultural evidence, and implications. *Ethos, 33*(3), 299-334

Ruiz, Y., Taylor, Z. E., & Cavin, R. (2021). Parent-Adolescent Communication as a Protective Factor Against Adolescent Alcohol and Tobacco Use: Reported narratives from youth from Latinx farmworker families. *Journal of Adolescent Research*, 36(4), 315-341.

Saral, B. & Acar, I. H. (2021). Preschool children's social competence: the roles of parent-child, parent–parent, and teacher-child relationships. *European Early Childhood Education Research Journal, 29*(6), 856-876. https://doi.org/ 10.1080/1350293X.2021.1985557

Shadach, E., Rappaport, S., Dollberg, D., Tolmacz, R., & Levy, S. (2017). Relational entitlement, early recollections of parental care, and attachment orientation. *Current Psychology*, 37(4), 781–791. https://doi.org/10.1007/s12144-017-9559-y.pa

Şen, S., & Kavlak, O. (2012). Transgenerational attachment in Manisa, Turkey. *Contemporary Nurse, 41*(1), 126–132. doi:10.5172/conu.2012.41.1.126

Tam, C.L., Lee, T.H., Kumarasuriar., & Har, W.M. (2012). Parental authority, parent-child relationship and gender differences: A study of college students in the Malaysian context. *Australian Journal of Basic and Applied Sciences*, 6(2), 182-189.

Thomas, A., & Chess, S. (1977). *Temperament and Development*. New York: Brunner/Mazel.

Thompson, R. A. (2016). Early attachment and later development: Reframing the questions. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment, third edition: Theory, research, and clinical applications*. (pp. 330 – 348). Guildford Press

Van Ijzendoorn, M. H., & Bakermans-kranenburg, M. J. (2018). Bridges across the intergenerational transmission of attachment gap. *Current Opinion in Psychology, 25*, 31–36. https://doi.org/10.1016/j.copsyc.2018.02.014.

Van Ijzendoorn, M. H., & Bakermans-kranenburg, M. J., & Sagi-Schwartz, A. (2006). Attachment acros diverse sociocultural contexts: The limit of universality, In K. H. Rubin and O. B. Chung (Eds.), *Parenting Beliefs, Behaviors, and Parent-Child Relations: A Cross-Cultural Perspective* (pp. 107-142). Psychology Press: New York

Vereijken, C. M. J. L. (1996). *The mother-infant relationship in Japan: Attachment, dependency and amae.* Unpublished doctoral dissertation, Catholic University of Nijmegen, The Netherlands.

Watt, V. D. R. (2014). Attachment, parenting styles, and bullying during pubertal years. *Journal of Child and Adolescent Mental Health*, *26*(3), 251–261. https://doi.org/10.2989/17280583.2014.947966

Young, E. S., Simpson, J. A., Griskevicius, V., Huelsnitz, C. O., & Fleck, C. (2019). Childhood attachment and adult personality: A life history perspective. *Self and Identity*, *18*(1), 22-38.

.Zajac, L., Raby, K. L., ve Dozier, M. (2019). Attachment state of mind and childhood experiences of maltreatment as predictors of sensitive care from infancy through middle childhood: Results from a longitudinal study of parents involved with Child Protective Services. *Development and Psychopathology*, 31(1), 113–125. https://doi.org/10.1017/S0954579418001554

Zarra-Nezhad, M., Aunola, K., Kiuru, N., Mullola, S. ve Moazami-Goodarzi, A. Parenting Styles and Emotional Development During the First Grade: Moderating Role of Child Temperament. *Journal of Psychology and Psychotherapy*, 5, 206.

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 153-182.

10.24193/jebp.2025.1.7

THE MEDIATING ROLE OF SELF-CONSTRUALS IN THE RELATIONSHIP BETWEEN FAMILY CLIMATE AND MULTIDIMENSIONAL WELL-BEING IN UNIVERSITY STUDENTS

Tuğba Turgut[1], Halil Ekşi[2]*

[1] Assistant Professor, Fatih Sultan Mehmet Vakıf University, Faculty of Education, Department of Guidance and Psychological Counseling, Istanbul, Turkey. ORCID: 0000-0003-3732-9005

[2] Professor, Marmara University, Atatürk Faculty of Education, Department of Guidance and Psychological Counseling, Istanbul, Turkey. E-mail: halileksi@marmara.edu.tr ORCID: 0000-0001-7520-4559

Abstract

This study employs a Structural Equation Model to examine the mediating role of self-construals in the relationship between university students' family climate and well-being In line with the correlational model, the study's sample consisted of 541 university students, of whom 371 (68.6%) were female and 170 (31.4%) were male. The average of age the participants included in the sample was found to be 21.19. The PERMA-Profiler, Autonomous-Relational Self in Family Scale, and Family Climate Scale were used to collect data. Both a Pearson's Product-Moments Correlation and Structural Equation Model were used to analyze the study's data and thereby test the study's main hypotheses. The Structural Equation Model revealed that self-construals play a mediating role in the relationship between family climate and well-being. According to the model, individuals raised in families with a positive family climate were found to develop a self-construal (relational and autonomous-relational self) and this self-construals increased individuals' well-being levels. These results emphasize the importance of considering family climate characteristics and self-construals when researching well-being.

Keywords: well-being, family climate, self-construals, structural equation model, path analysis.

[*] Correspondence concerning this article should be addressed to Tuğba Turgut, Assistant Professor, Fatih Sultan Mehmet Vakıf University, Faculty of Education, Department of Guidance and Psychological Counseling, Istanbul, Turkey. ORCID: 0000-0003-3732-9005
E-mail: tturgut@fsm.edu.tr / tugbaturgut95@gmail.com

Contrary to the traditional pathology-based approach to dealing with psychological problems, positive psychology seeks to improve people's lives by focusing on positive characteristics and emphasizing powerful means of coping with difficult situations (Eryılmaz, 2014; Hefferon & Boniwell, 2018). Tracing its roots to the 1970s, positive psychology experienced an increase in the number of related functional studies conducted during the 1990s (Linley et al., 2006). It is stated that the interest in the concepts of psychological well-being and subjective well-being has increased especially since the 1990s (average of 2-3 thousand studies) (Linley & Joseph, 2004; Linley et al., 2006). Positive psychology focuses primarily on creating positive institutions that will raise individuals who will be a beneficial to their societies, on the positive qualities of people, and on positive life experiences like well-being, hopefulness in life, and having optimistic outlook (Gillham & Seligman, 1999; Seligman & Csikszentmihalyi, 2000). In addition to seeking the actualization of each individual's personal skills and human potential, positive psychology emphasizes the importance of living a high-quality life (Compton & Hoffman, 2012).

Multidimensional Well-Being

Given the importance of focusing on individuals' positive and strong qualities, the centerpiece of this study is well-being. While the concept of well-being is defined in a multitude of ways in the related literature, Seligman's use of a five-dimensional model to examine well-being is considered important. PERMA is a multidimensional well-being model aimed at increasing flourishing and consists of five components. These components are as follows: P; positive emotions, E; engagement, R; positive relationships, M; meaning and A; accomplishment (Seligman, 2011). Positive emotions are the first element of the PERMA Model and is addressed as one component contributing to well-being (Seligman, 2011). Not only do positive emotions enable individuals to think and act more flexibly by increasing the depth and range of their behaviors and of their faculty of reasoning and understanding, emotions also promote life satisfaction and, by bringing together all the knowledge an individual has acquired, allows one to see life from a different perspective (Fredrickson, 2003; Nickerson, 2007). The second element of PERMA, engagement, is defined as an individual's losing track of time while performing an activity or task, being completely absorbed by the task at hand (giving full attention and interest), and experiencing a disappearance of self-awareness (Csikszentmihalyi, 1990; Seligman, 2011). The third element, positive relationships, is described as an individual's trust in, ability to share with, and, in the case of need, ability to seek help from the people in his life with whom he has a relationship (Seligman, 2011). The existence of positive relationships further indicates that an individual considers himself a member of the society in which he lives, feels socially integrated, is connected with, loves, and shares with others, and is satisfied with his social relationships (Khaw & Kern, 2015; Peterson, 2006). Meaning, the fourth element of

PERMA, is defined as belonging to and serving something or some ideal one believes to be greater than himself (Seligman, 2011). Having meaning and purpose in life indicates that the person is engaged with life (Frankl, 2018), is psychologically healthy (Ryff, 1989; Ryff & Keyes, 1995; Ryff & Singer, 1998), and has a defense mechanism against both risky behaviors and weak psychological health (Brassai et al., 2011). The last element of PERMA, accomplishments, is defined as setting explicit goals in life, striving diligently to achieve these goals, gaining mastery in a specific activity or task, experiencing a sense of accomplishment, and feeling self-efficacy (Seligman, 2011).

As mentioned above, Seligman's PERMA model allows interested parties to investigate individuals' levels of well-being by addressing five sub-dimensions of well-being, such as having positive feelings, being engaged in specific activity, forming positive relationships, and experiencing accomplishment in life (Seligman, 2011). Although the PERMA model has formed the basis for many studies on individuals' well-being in the international literature conducted in recent years (i.e., Allen, 2017; D'raven & Pasha-Zaidi, 2016; Kern et al., 2015; Lowry, 2018; Morrish et al., 2018; Wagner et al., 2019), there are only a limited number of studies in the Turkish literature on well-being in which the PERMA model is used as a base (i.e.., Altuntaş, 2018; Kılıç, 2018; Özünlü, 2018). Consequently, we believe that employing a single, holistic multifactor model that addresses a multitude of aspects related to life and humanity to examine well-being will greatly contribute to the literature and to the field as a whole.

Family Climate

One of the primary factors influencing individuals' well-being is the family of origin and its characteristics. Defined as the psychological atmosphere characterized by the quality of relationships and communication among family members, social interactions, and the thoughts, values, and beliefs passed down from previous generations, family climate offers a more comprehensive perspective than traditional approaches to families as it examines intergenerational relationship alongside communication and cultural characteristics as a whole (Björnberg & Nicholson, 2007; van Stejin et al., 2015). Family climate is discussed based on ecological systems and family systems approaches. Embracing an ecosystemic perspective involves the investigating numerous components that can influence various social systems in which the family operates. This includes the broader sociocultural environment and not just intrafamilial relationships (Goldenberg & Goldenberg, 2008; Robbins et al., 2003). Bronfenbrenner (1986) advocates exploring multilayered (societal, political, economic, social groups) social systems and the cultural norms and values that surround these systems while examining behavior types of individuals and families and the relationship patterns in families. When examining family systems approaches, we observe that (a) every intrafamily

occurrence is related to each unit in the system, (b) interactions and social climate between family members is associated with psychological and ecological systems, (c) intergenerational bonds are important in relationships and self-differentiation, and (d) it is necessary to examine family processes (e.g., roles, communication, values, norms) (Björnberg & Nicholson, 2007; Bray et al., 1984; Moos & Moos, 2002; Skinner et al., 1983; Skinner et al., 2000). Family climate involves three sub-dimensions, namely intrafamilial relatedness, intergenerational authority, and cognitive cohesion. Intrafamilial relatedness is defined as interpersonal social interaction, open communication in the family, positive family relationships, bonds of love between generations, the ability of family members to manage problems together, and interpersonal harmony (Björnberg & Nicholson, 2007). Referring to the younger generation's conformity to the senior generation's wishes, the indisputability of the senior generation's authority, and rules being defined by senior family members, the second element of family climate, intergenerational authority, is negatively associated with intrafamilial relatedness, cognitive cohesion, general family health, and adaptability (Björnberg & Nicholson, 2007; Gönül et al., 2018). The final element of family climate, cognitive cohesion, refers to family members' shared vision, beliefs, life values, and engagement with regard to most issues (Björnberg & Nicholson, 2007).

Several studies in the literature reveal that positive communication in the family, satisfaction with family bonds, emotional cohesion, and competence are influential in generating high subjective well-being (Coty & Wallston, 2010; Eryılmaz, 2010), a high quality of life (Tümer, 2018), high general self-efficacy (İkiz & Yörük, 2013), positive psychological health (Topbay, 2016), high life satisfaction (Tutal, 2015), and high psychological well-being (Kazarian, 2005; Kendall, 2018; Phillips, 2012). Therefore, given the importance of examining the family from a cultural perspective as a whole together with intergenerational relationship, communication, and their unique characteristics, our study, by focusing on family climate, aims to offer important insight to its relationship with well-being. Since family characteristics, relationships, communication levels, and context are important in individuals' identity formation (Matheis & Adams, 2004), in the development of positive self-concepts (Berkem, 1999), in the formation of positive self-perceptions (Yılmaz, 2000), and in the development of self-construals (Karakitapoğlu Aygün, 2002), examining self-construals as a concept is deemed important.

Self-Construals

Self-construal refers to the self that distinguish one individual from others and encompasses a person's emotions, thoughts, attitudes, and actions in relation to interpersonal relationships (Singelis, 1994). Self-construals provide an efficient way to investigate the context and relationship between culture and actions (Singelis &

Brown, 1995), they are influenced by the cultural characteristics, norms, values, social rules of individuals' environment, and affect person's feelings, thoughts, and actions (Matsumoto & Juang, 2016). When examining self-construals from a cultural standpoint, where cultures are considered either relationalist or individualist, we find that self-construals can be categorized as follows: (a) independent self-construals, in which an individual is independent of their family, friends, siblings, and coworkers and (b) interdependent self-construals, in which an individual is dependent on and has strong relational bonds with his family, friends, siblings, and coworkers (Markus & Kitayama, 1991a). When addressing the self in conjunction with cultural characteristics, it is vital to examine individualism and collectivism, as they are significant subjects in intercultural psychological studies (Kağıtçıbaşı & Berry, 1989). Individualism involves elements brought about by modern life, such as human rights, equality in gender roles, individuality, and freedom (Lukes, 1973). In contrast collectivism emphasizes cultural characteristics, traditions, and beliefs common in traditional life (Kim, 1994; Morris & Peng, 1994). Individualism prevails in cultures where individuals are considered independent of their community, personal goals take precedence, and relational bonds are weak. Collectivism, on the other hand, is prominent in cultures where individuals' relationship with their community are prioritized, communal goals supersede personal goals, interpersonal relationships are strong, people are connected to each other through traditional and other diverse values, and individuals often cite their membership in a family, group, and/or community when describing themselves (Gudykunst et al., 1996; Hofstede, 2003; Triandis, 2001; Triandis & Suh, 2002).

Although diverse approaches are used to examine self-construals in research within an individualist-collectivist cultural framework, this study employs Kağıtçıbaşı's individualist-relationalist cultural framework to examine the autonomous self, the relational self, and the autonomous-relational self (Kağıtçıbaşı, 1996a). The autonomous self is a self-construal dominant in individualist cultures of industrialized societies in which nuclear families and independent values are more commonly observed, in which children's psychological values are given higher precedence, in which individuals' personal strengths and inner feelings and thoughts are important, in which individuals' personal goals and given priority, and in which independent intergenerational relationships prevail (Kağıtçıbaşı, 1996b; Markus & Kitayama, 1991a). The relational self is a self-construal observed in collectivist (relationalist) cultures in which rural communities are predominant, in which functional extended families are more common, in which family/group dependency values prevail, in which belonging and adapting to a group is given precedence, in which group goals supersede personal goals, and in which dependent intergenerational relationships prevail (Kağıtçıbaşı, 2012; Markus & Kitayama, 1991b). The autonomous-relational self, however, is a self-construal is observed in collectivist (relationalist) cultures in which an urbanized (industrialized) society has emerged, in which a complicated family structure that consists mainly of nuclear

families but that also values bonds of kinship with extended family members prevails, in which both family/group and individual dependency values are common, in which children's psychological values are given precedence, in which control and autonomy exist simultaneously in child-rearing, in which emotional intergenerational bonds are not uncommon, and in which authoritative parenting is predominant (Kağıtçıbaşı, 2012).

Current Study

In this study, we considered some criteria in determining the mediator variable and establishing the structural equation model. Kazdin (2007) delineated the following seven additional recommendations for research to identify a mediator: "1) the selection of mediators must be guided by theory; 2) treatment studies must include measures of potential mediators; 3) the timeline of the proposed mediator and outcome must be established; 4) studies must assess more than one mediator; 5) studies must use designs that can evaluate mediators; 6) different types of studies must provide converging evidence; and 7) treatment studies must be complemented by experiments that manipulate the mediator to provide converging evidence". We have taken the criteria numbered one, four and five among Kazdin's (2007) criteria as the basis for determining the mediator variable. Accordingly, it was thought that the variable of self-construals could be an important mediating variable between family climate and well-being, based on the theoretical framework. In addition, the variable of self-construals and three different constructs, namely autonomous self, relational self, and autonomous-relational self, were included in the study as variables. In this way, the role of different mediator variables in the model was tested. According to another criterion, an appropriate design was used by creating a structural equation model to examine the role of mediating variables. There are some limitations in determining the mediator variable in this study. There was no intervention or treatment in this study. There is no long-term evaluation as it is not an intervention study. For this reason, the timeline was not used in the process. No application has been made that includes variables of different types in the process.

In the literature, relational and autonomous-relational self-construals have been found to influence individuals' subjective well-being (Özdemir, 2012; Yu et al., 2016), psychological robustness (Gündaş, 2013; Gündaş & Koçak, 2015), psychological resilience (Koç-Yıldırım, 2014), life satisfaction (Akutsu et al., 2011; Liang, 2011; Morsünbül, 2013; Öztan, 2014), the search for meaning in life (Datu & Salanga, 2018) and psychological well-being (Özdemir, 2016; Smith, 2009; Yeniçeri, 2013). University students, who constitute the sample of this study, are in the emerging adulthood period in terms of development. During this period of life, individuals have different experiences. They seek to discover their identity with regard to their worldview, work life and relationships (Arnett, 2000). In this period, individuals are more exposed to negative life conditions, negative emotions and

stress due to changes in life, indecisions, and identity discovery process (Schulenberg & Zarrett, 2005). Therefore, it is necessary to examine well-being, which is one of the important indicators of mental health, from a personal, social and cultural perspective. Additionally, it is important to examine well-being in the context of family climate and self-construals among university students. Accordingly, we believe that since various self-types (e.g., autonomous, relational, and autonomous-relational) related to how individuals perceive and position themselves within a specific cultural context are closely related to well-being and family climate, their inclusion in the research in a single model is worthwhile. No study investigating well-being (PERMA), self-construals, and family climate was found in the literature. We believe that proposing a new model dealing with the role of self-construals will contribute significantly to the field, as the relationship between individuals' family climate characteristics and their well-being levels is intrinsically connected to self-construals. Accordingly, this study employs a Structural Equation Model to investigate the mediating role of self-construals' in the relationship between family climate and well-being. To test the structural equation model, the following hypotheses were formulated.

Basic Hypotheses

H_1: Statistically significant relationships exist between the variables of both well-being and self-construals through the variable of family climate.

H_2: High levels of family climate are positively associated with high level of well-being.

H_3: High levels of family climate are positively associated with high level of positive self-construals.

H_4: High levels of positive self-construals are positively associated with high level of well-being.

H_5: Self-construals have a mediating role on the relationship between the variables of family climate and well-being.

Methodology

Research Design

This research is a correlational model to examine the mediating role of self-construals in the relationship between family climate and well-being in university students. A correlational model is used to explore the relationships between two or more variables, assess whether these variables mutually each other, and investigate their combined effects (Creswell, 2017). In this study, well-being is the dependent variable, while family climate and self-construals serve as the independent and

mediator variables, respectively. Structural equation modeling (SEM) is utilized to analyze the relationships among these variables and to evaluate the model's validity, which is constructed based on the theoretical framework. A multivariate statistical analysis approach that combines regression and factor analyses used to assess newly-created models, SEM offers researchers the opportunity to use manifest variables to measure the latent constructs of models that include direct and indirect effects between measured, latent, and multilevel variables (Gürbüz & Şahin, 2015; Hoyle, 1995; Kline, 2019).

Participants

The study's sample comprised 541 university students, consisting of 371 (68.6%) females and 170 (31.4%) males. The average of age the participants included in the sample was found to be 21.19. The participants were drawn from three faculties: 157 (29%) from the Faculty of Medicine, 256 (47.3%) from the Faculty of Education, and 128 (23.7%) from the Faculty of Theology.

Sampling Procedures

The population consisted of 25.123 undergraduate students actively enrolled in Eskişehir Osmangazi University during the 2018-2019 spring semester. The study's sample groups were composed of 541 students selected using multistage sampling, a technique that is used when the population is prohibitively large or cannot be easily defined by the researchers and in studies in which sample groups are determined in two or more stages and in which more than one sampling technique is used (Creswell, 2017). The university has a total of 12 faculties. Three different faculties representing three of the professions (numerical, verbal and equally-weighted) were included in the research. By carrying out this study with students from faculties of medicine, education and theology, it was aimed to reach individuals from different professions, different cultural levels, different socioeconomic structures and different beliefs. Using stratified sampling, we first formed three strata from the university's different faculties, namely the faculties of medicine, education, and theology, as they were believed to be pertinent to the study's theme and to manifest important differences. We were able to obtain the required number of data sets by calculating the ratios for the three strata to the population. The majors belonging to each stratum were then accepted as clusters and those students who were to participate in the study were chosen from each stratum using random cluster sampling. This sampling technique aimed to encompass students from various faculties and pursuing different majors at Eskişehir Osmangazi University.

Sample Size, Power, and Precision

For this study, the alpha value was 0.05, the power was 0.95, and the effect size was 0.15 (medium level), and the sample size was calculated with G*Power analysis. While determining sample size, we were careful to ensure a confidence interval of 95% and a margin of error of ± 5% for our non-homogeneous universe, and therefore calculated the required sample size to be N=384 (Gürbüz & Şahin, 2015). A non-homogeneous universe refers to a universe that contains different characteristics and units. In this universe, which includes different units, the number of variables will also vary depending on the number of units, so it is necessary to select an appropriate and sufficient sample (Baştürk ve Taştepe, 2013). For this reason, the required sample size for a non-homogeneous universe has been calculated with a 95% confidence interval. Additionally, when determining the sufficient sample size for SEM, the 20xp (p = number of parameters) formula was taken into account (Kline, 2019), resulting in required sample size of 20x17 = 340. To account for the possibility of erroneous data, we collected data from 633 individuals. After the evaluation, 92 participants with missing and/or erroneous data were excluded from the study. This resulted in the final sample of 541 participants, including 371 (68.6%) females and 170 (31.4%) males. In terms of the strata, 157 (29%) participants were enrolled in the Faculty of Medicine, 256 (47.3%) in the Faculty of Education, and 128 (23.7%) in the Faculty of Theology.

Data Collection Instruments

We used the PERMA-Profiler (Demirci et al., 2017) to investigate university students' well-being levels, the Autonomous-Relational Self in Family Scale (Kağıtçıbaşı, 2007) to measure self-construals, and the Family Climate Scale (Gönül et al., 2018) to measure family climate.

PERMA-Profiler. Demirci et al. (2017) undertook the adaption of the PERMA-Profiler developed by Butler and Kern (2016) to measure individuals' well-being levels to fit Turkish culture. The scores of this 23-item scale range from 0 (never) to 10 (always). The scale covers five sub-dimensions aligned with Martin Seligman's well-being model (i.e., positive emotions, engagement, positive relationships, meaning, accomplishments). Each sub-dimension of the scale contained three items, for a total of fifteen such items, plus an additional eight filler items. Of the filler items, one pertained to general well-being, three to feeling healthy, three to negative emotions, and one to loneliness. Items 7, 12, 14, and 20 were reverse scored. The score for each dimension was obtained by taking the average score of its three sub-dimensions. Items 5, 10, and 22 belonged to the sub-dimension *Positive Emotions*, items 3, 11, and 21 to *Engagement*, items 6, 15, and 19 to *Positive Relationships*, items 1, 9, and 17 to *Meaning*, and items 2, 8, and 16 *Accomplishments*. Of the filler items, items 4, 13, and 18 belonged to the sub-

dimension *Health*, items 7, 14 and 20 to *Negative Emotions*, item 12 to *loneliness*, and item 23 to *general well-being*. Total well-being was calculated by taking the average of the scores earned for positive emotions, engagement, positive relationships, meaning, accomplishments, and general well-being (happiness). Examples of items are: ''In general, to what extent do you lead a purposeful and meaningful life?'', ''In general, how often do you feel joyful?'', ''In general, how often do you feel anxious?''. While Cronbach's alpha reliability coefficient was found to be .91 for the entire scale, Cronbach's alpha internal consistency coefficients were found to be between .61 and .81 for the sub-dimensions. Test-retest reliability coefficients for the sub-dimensions ranged between .61 and .85. In this research Cronbach's alpha reliability coefficient was found to be .89 for the entire scale, Cronbach's alpha internal consistency coefficients were found to be between .62 and .82 for the sub-dimensions.

Autonomous-Relational Self in Family Scale. Developed by Kağıtçıbaşı (2007) to investigate self-construals, this scale contains three sub-dimensions, namely (a) In-family Autonomous Self, (b) In-family Relational Self, and (c) In-family Autonomous-relational Self. The twenty-two 5-point Likert-type items of the scale were formatted as Definitely Disagree (1), Disagree (2), Undecided (3), Agree (4), and Definitely Agree (5). Measuring autonomy levels in individuals' relationship with their family, the sub-dimension *in-family autonomous self* was composed of a total of nine items. The sub-dimension *in-family relational self* measuring individuals' material, spiritual, and psychological closeness with their family was similarly composed of nine items. The sub-dimension *in-family autonomous-relational self,* which measured both the closeness of relationships and autonomy of individuals, was composed, however, of four items. A high score earned in a specific sub-dimension indicates that the relational self-construal is strong in the individual. Examples of items are as follows: ''I feel independent from my family'', ''My family is my first priority'', ''The person may feel both independent and emotionally attached to her family''. Conducted with university students, the validity and reliability study for the scale found that Cronbach's Alpha reliability coefficients for both autonomous self and relational self were .84, and .77 for autonomous-relational self. In this research Cronbach's Alpha internal consistency coefficient was found to be .75 for the autonomous self, .77 for the relational self and .73 for the autonomous-relational self.

Family Climate Scale. This scale was developed by Björnberg and Nicholson (2007) to examine characteristics concerning individuals' family climate and conducting the necessary validity and reliability studies, was adapted to Turkish by Gönül et al. (2018). The scale was composed of 34 5-point Likert-type items expressed as Definitely Disagree (1), Disagree (2), Undecided (3), Agree (4), and Definitely Disagree (5). The scale was composed of three sub-dimensions (i.e., In-family Relatedness, Intergenerational Authority, and Cognitive Cohesion). The first

21 items measured in-family relatedness, items 22-28 measured intergenerational authority, and items 29-34 measured cognitive cohesion. A high score in any given sub-dimension indicated that the related concept was afforded greater importance and was more frequently experienced in one's family. Examples of items are as follows: ''The emotional bonds between us are very strong'', ''We take time to listen to each other'', ''The older members of the family set the rules''. Cronbach's Alpha internal consistency coefficient was found to be .91 for the entire scale, .95 for in-family relatedness and .87 for both intergenerational authority and cognitive cohesion. Test-retest reliability coefficients were .79 for in-family relatedness, .80 for intergenerational authority, and .82 for cognitive cohesion. In this research Cronbach's Alpha internal consistency coefficient was found to be .85 for the entire scale, .91 for in-family relatedness and .67 for intergenerational authority and .68 for cognitive cohesion.

Data Collection

During the data collection process, ethics committee approval was obtained from the Social and Human Sciences Scientific Research and Publication Ethics Committee of Eskişehir Osmangazi University. Afterwards, necessary applications were made to Eskişehir Osmangazi University Rectorate for a research permit so that the data collection tools could be applied in the relevant faculties. Applications were carried out in the Faculty of Medicine, Education and Theology in the spring semester of the 2018-2019 academic year with the research permission granted by the Rectorate of Eskişehir Osmangazi University. Students voluntarily participated in the survey during class hours as determined by the respective faculty members. Prior to administering the survey, students were briefed and provided with necessary information. All procedures were conducted confidentiality without collecting participants' personal information. The survey took approximately 15 minutes to complete.

Data Analysis

The data collected was analyzed using SPSS 23 and AMOS 20.0. Out of the initial 633 university students, data from 92 students were excluded due to incompleteness and/or errors, leaving 541 data sets for analysis. Pearson's Product-Moments Correlation analysis was employed to investigate the relationship between the variables and sub-dimensions of well-being (PERMA), self-construals, and family climate. More importantly, the primary objective of our study, performing SEM analyses to examine the mediating role of self-construals in the relationship

between family climate and well-being (PERMA) and to test the resulting model, was realized.

In this study, we chose to use a Hybrid Path Analysis among SEM types. A Hybrid Path Analysis is a SEM technique that incorporates both manifest and latent variables as multiple endogenous and exogeneous variables. This approach combines measurement models and structural modeling, allowing for the examination of both direct and indirect effects between variables. Direct effects indicate the impact of the independent variable on the dependent variable without any mediation, while indirect effects represent the impact of the independent variable on the dependent variable transmitted through one or more mediator variables (Çokluk et al., 2018; Kline, 2019).

Results

Table 1. PERMA (Multi-Dimensional Well-being) Scale, Autonomous-Relational Self in Family Scale and Family Climate Scale for Sub Dimensions Descriptive Statistics Values

Variables (N=541)		$\overline{X}$	*SD*	*SE*	Min.	Max.	Skew.	Kurt.
PERMA (Multi Dimensional Well-being)	1.P_Positive Emotions	6.76	1.62	.07	2.00	10.00	-.40	-.27
	2.E_Engagement	7.14	1.38	.06	3.33	10.00	-.41	-.26
	3.R_Positive Relations	6.83	1.54	.07	2.33	10.00	-.35	-.36
	4.M_Meaning	6.77	1.53	.07	2.33	10.00	-.27	-.41
	5.A_Accomplishment	6.97	1.40	.06	3.33	10.00	-.24	-.44
	6.Happiness	6.94	1.80	.08	2.00	10.00	-.37	-.23
Self Construals	7.Autonomous Self	27.04	5.30	.23	13.00	42.00	.05	-.12
	8.Relational Self	37.00	5.11	.22	23.00	45.00	-.34	-.59
	9.Autonomous Relational Self	17.54	2.22	.10	10.00	20.00	-.74	.24
Family Climate	10.In-family Relatedness	86.26	10.36	.45	55.00	105.00	-.25	-.47
	11.Intergenerational Authority	20.34	4.17	.18	9.00	31.00	-.23	-.17
	12.Cognitive Cohesion	20.29	3.56	.15	10.00	30.00	-.28	.04

Table 1 shows the mean, standard deviation, standard error, minimum, maximum, skewness and kurtosis values for the sub-dimensions of the PERMA Scale, the Autonomous-Relational Self in Family Scale, and the Family Climate Scale. All values are within the normal score range expected to be taken on the scales. When the skewness and kurtosis values are examined, all sub-dimensions are between +1 and -1. This result indicates that one of the assumptions of normality is supplied, that is, the distribution is normal.

Relationships between the PERMA-Profiler, Autonomous-Relational Self in Family Scale, and Family Climate Scale

Table 2 depicts the results of the Pearson's Product-Moments Correlation Analysis conducted to determine the relationships between university students' well-being (positive emotions, engagement, positive relationships, meaning, accomplishments, happiness), self-construals (autonomous, relational, autonomous-relational self), and family climate (in-family relatedness, intergenerational authority, cognitive cohesion).

Table 2 Relationships between the Sub-Dimensions of the PERMA-Profiler, Autonomous-Relational Self in Family Scale, and Family Climate Scale

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.P_Positive Emotions	1											
2.E_Engagement	.59***	1										
3.R_Positive Relationships	.59***	.49***	1									
4.M_Meaning	.55***	.54***	.53***	1								
5.A_Accomplishment	.47***	.60***	.46***	.68***	1							
6.Happiness	.67***	.51***	.56***	.49***	.45***	1						
7.Autonomous Self	-.14***	-.073	-.11**	-.17***	-.11**	-.14**	1					
8.Relational Self	.24***	.24***	.26***	.23***	.24***	.20***	-.24***	1				
9.Autonomous-relational Self	.051	.17***	.14**	.11**	.11**	.08*	.19***	.36***	1			
10.In-family Relatedness	.30***	.30***	.28***	.22***	.24***	.23***	-.17***	.69***	.39***	1		
11.Intergenerational Authority	-.041	-.035	-.019	.019	.006	.004	-.36***	-.024	-.14**	-.16***	1	
12.Cognitive Cohesion	.16***	.15***	.16***	.19***	.18***	.12**	-.37***	.40***	-.026	.44***	.041	1

***$p < .001$ ** $p < .01$ * $p < .05$

Table 2 illustrates that scores for the PERMA variables of positive relationships, meaning, accomplishments, and happiness were negatively related with autonomous self and positively related ($p < .01$) with relational self. Scores for autonomous-relational self were positively related with engagement, positive relationships, meaning, accomplishments, and happiness. Additionally, scores for autonomous-relational self were found to be positively related with scores for in-family relatedness and negatively related ($p < .05$) to intergenerational authority. Scores for the PERMA variables of positive emotions, engagement, positive

relationships, meaning, accomplishment, and happiness were found to be positively related ($p < .01$) to in-family relatedness and cognitive cohesion. Whereas scores for autonomous self were found to be negatively related to in-family relatedness, intergenerational authority, and cognitive cohesion, scores for relational self were found to be positively related ($p < .001$) to in-family relatedness and cognitive cohesion. The effect of the relationship between the relational self and in-family relatedness and cognitive cohesion is high, while the effect of the correlation between the autonomous-relational self and in-family relatedness is moderate. Additionally, a statistically significant relationship ($p < .05$) was found to exist between generational authority and scores for positive emotions, engagement, positive relationships, meaning, accomplishments, and happiness.

The Model Examining the Mediating Role of Self-Construals in the Relationship between Family Climate and PERMA Well-Being

In examining the mediating role of self-construals in the relationship between family climate and well-being, we first conducted various statistical analyses to determine the predictive power of the independent variable (family climate) on the dependent variable (PERMA well-being) and the exogeneous variable (family climate) on the endogenous variable (PERMA well-being). The resulting regression model is presented in Figure 1.

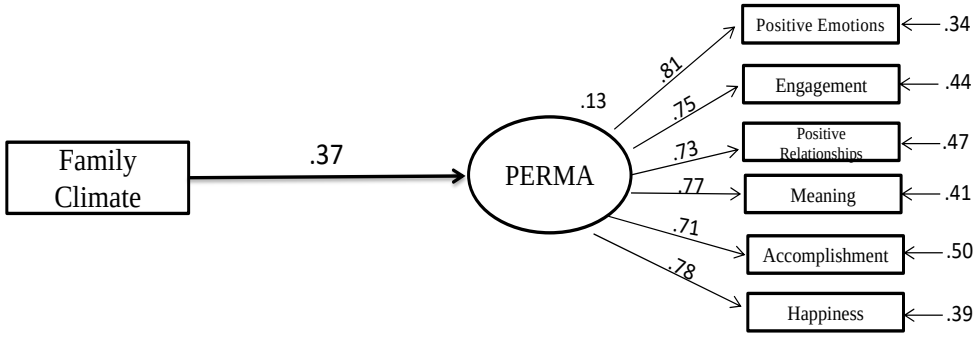


Figure 1. Regression Model Examining the Relationship between Family Climate and PERMA Well-Being

An examination of Figure 1 reveals there to be a significant positive relationship between family climate and PERMA well-being ($\beta = .37; p < .05$). Family climate was found to have a moderate direct effect on well-being and to explain roughly 13% of PERMA well-being ($R^2 = .13; p < .01$). This indicates that one of the

requirements for conducting a study with a structural equation model that includes a dependent, independent, and mediating variable, namely that that the relationship between the predictor variable (family climate) and the predicted variable (PERMA well-being) be meaningful, was satisfied (Civelek, 2018; Sümer, 2000). Upon confirming this, we moved on to the study's primary objective of performing analyses on the structural equation model created to examine the mediating role of self-construals in the relationship between family climate and well-being.

We performed a path analysis to examine self-construals' mediating role in the relationship between family climate and well-being (PERMA). In the structural equation model, family climate is the exogeneous variable, self-construal (autonomous self, relational self, and autonomous-relational self) is the mediating variable, and well-being (PERMA) is the endogenous variable. Figure 2 presents the findings pertaining to the path analysis for the structural equation model.

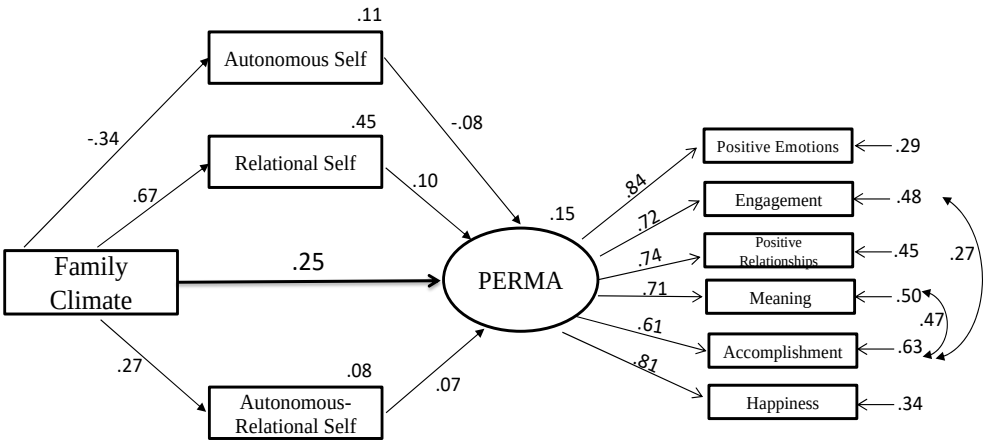


Figure 2. Structural Equation Model Created to Examine the Mediating Role of Self-Construals in the Relationship between Family Climate and PERMA Well-Being

Figure 2 depicts the findings pertaining to the study's main objective, performing an examination of self-construals' mediating role in the relationship between family climate and PERMA well-being. Upon examination of the first model (Figure 1), we observe that the relationship (β=*.37*) between family climate and PERMA well-being witnessed a statistically significant (*p<.05*) decrease upon the inclusion of self-construals (β=*.25*). Studies investigating mediation and its various facets assert that upon inclusion in the model, the mediating variable must either partially reduce or completely eliminate the independent variable's influence on the dependent variable (Baron & Kenny, 1986). The main finding obtained from this is that self-construals (autonomous, relational, autonomous-relational) partially explain (β=*.12*) the relationship between family climate and PERMA well-being. In

other words, self-construals play a partial mediating role in the relationship between family climate and PERMA well-being.

In the model, family climate was found to have a direct negative effect (-.34) on autonomous self-construal, autonomous self to have a direct negative effect (-.08) on PERMA well-being, and family climate to explain 11% of the variance in autonomous self-construal ($R^2 = .11; p<.01$). Family climate was found to have a direct positive effect (.67) on relational self-construal, relational self-construal to have a direct positive effect (.10) on PERMA well-being, and family climate to explain a large portion (≈45%) of the variance in relational self-concept. Family climate was found to have a direct positive effect (.27) on relational self-construal, autonomous relational self-construal to have a direct positive effect (.07) on PERMA well-being, and family climate to explain 8% of the variance in autonomous-relational self-concept ($R^2 = .08; p<.01$). Well-being (PERMA) explained 15% of the total variance in the entire model.

In SEM-based studies, decisions are made by looking at whether the data supports the model being tested and at the model's goodness-of-fit indices obtained as a result of the analyses conducted during the study. While SEM analyses include several different fit indices, the values widely preferred in such analyses are given in Table 2 (Hu & Bentler, 1999; Marsh, Wen, Hau, & Nagengast, 2006; Schermelleh-Engel, Moosbrugger, & Müller, 2003; Sümer, 2000; Tabachnick & Fidell, 2001).

Table 3. Fit Indices and Threshold Values Used in the Structural Equation Model and Fit Values Obtained during the Study

Fit Indices	First Model Values	Adjusted Model Values	Good Fit	Acceptable Fit
χ^2/df	5.43	3.37	$0 \leq \chi 2/df \leq 2$	$2 \leq \chi 2/df \leq 5$
CFI	.941	.969	$0.95 \leq CFI \leq 1.00$	$0.90 \leq CFI \leq 0.95$
RMSEA	.093	.068	$0 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$
TLI (NNFI)	.911	.953	$0.95 \leq TLI \leq 1.00$	$0.90 \leq TLI \leq 0.95$
GFI	.943	.965	$0.95 \leq GFI \leq 1.00$	$0.90 \leq GFI \leq 0.95$
AGFI	.896	.933	$0.90 \leq AGFI \leq 1.00$	$0.85 \leq AGFI \leq 0.90$
IFI	.941	.970	$0.95 \leq IFI \leq 1.00$	$0.90 \leq IFI \leq 0.95$

The results of the path analysis of the fit index values for the first model illustrated in Table 3 indicate that $\chi 2/df$ and RMSEA values are acceptable. As a result, several adjustments were made based on the recommended modification indices to improve the model. These adjustments were executed by making modifications to the error variances scores between engagement and accomplishments and to those between meaning and accomplishments. The fit index values of the second, adjusted model were determined to be both acceptable and at a good level (Çokluk et al., 2018; Kline, 2019). The composite of these findings

confirms self-construals' mediating role in the relationship between family climate and well-being.

Discussion

The findings for the model reveal that the fitness of the Structural Equation Model examining self-construals' mediating role in the relationship between family climate and well-being are within acceptable levels. Family climate exerted a moderate direct effect on well-being, and although the inclusion of self-construal into the model reduced this relationship, its significance was maintained, with family climate having an indirect effect on well-being mediated through self-construal. Given these findings, we have concluded that self-construal plays a partial mediating role in the relationship between family climate and well-being.

According to the model, a positive family climate characterized by high intra-family interactions, cognitive cohesion, and low intergenerational authority facilitates the development of a positive self-construal (relational and autonomous-relational self). This, in turn, increases individuals' well-being levels. These findings highlight the importance of addressing family climate characteristics and self-construals when examining individuals' well-being. While there is no study directly examining the one-to-one relationship between these variables in the literature, some studies present similar findings that support the current study. Specifically, these studies found that intra-family relationships and family environment characteristics were shaped through the mediation of identity development (Matheis & Adams, 2004). Adolescents' self-conceptions developed positively in families in with intrafamilial cohesion, positive communication between family members, and appropriate emotional bonds, unity, and competence (Berkem, 1999). Family environments and perceived family climate were influential in individuals' identity development, and identities with a high-level of interdependency were associated with optimal psychological cohesion, high self-esteem, and positive family environments (Sznitman et al., 2019). Regarding positive family climate characteristics, as parental acceptance and interest increased, so did individuals' positive self-perceptions (Yılmaz, 2000). Furthermore, the likelihood of individuals having relational self-construals was high in families with positive and high-quality relationships between parents and children (Pomerantz et al., 2009). Such findings support our conclusion that the positive family climate characteristics included in the model are influential in the development of a positive self-construal.

The established mediation model has yielded the result that individuals with relational or autonomous-relational self-construals will have a high level of well-being. Furthermore, Dutrizac (2005) states that in addition to high relationship quality and empathy levels, having a relational self-construal is positively associated

with positive emotional experiences and negatively associated with aggressiveness, negative emotional experiences, and depression. Similarly, Luo et al. (2014) found that individuals with a relational self-construal not only were highly self-competent and set mastery-approach goals but also tended to attribute their success to internal regulation like effort, interest, and study skills. In her study, Major (2016) found relational self-construal to be positively associated with personal well-being motives and forgiveness characteristics. Frank et al. (1990) assert that the simultaneous existence of autonomy and relatedness is important, and Allen et al. (1994) hold that having positive relationships with one's family in addition to autonomy significantly affects individuals' psychosocial development. Given all these findings, it may be concluded that having a relational or autonomous-relational self-construal is important for individuals' high well-being levels and is associated with having positive life experiences.

The model further reveals that characteristics associated with a positive family climate facilitate individuals' well-being levels, and there are several studies in the literature that support this finding. In families with effective intrafamilial communication, interpersonal harmony, unity, positive functionality, and satisfaction (i.e., positive family climate), individuals were observed to have high levels of well-being (Chang, 1998; Kazarian, 2005; Kendall, 2018; Phillips, 2012), high levels of psychosocial adjustment and psychological health (Shek, 1997), a high quality of life and high levels of life satisfaction (Tutal, 2015; Tümer, 2018), psychological robustness (Topbay, 2016), and high levels of subjective well-being (Coty & Wallston, 2010; Eryılmaz, 2010). Ledbetter (2009) highlights that positive intrafamilial communication models impact individuals' well-being and shape their relationships with friends and others. Crea et al. (2013) state that positive family environments are vital in nurturing emotional and behavioral well-being in children. In their study, Vandeleur et al. (2009) found that high family cohesion influenced satisfaction felt toward family bonds and that emotional cohesion impacted individuals' emotional well-being. Similarly, Kins et al. (2009) found that individuals who lived a life in harmony with their personal values and preferences and whose parents were empathetic and non-controlling had greater levels of well-being. Reaching similar conclusions, Proctor et al. (2009) found that individuals who have positive relationships with their parents had high levels of happiness and life satisfaction. Valdes-Cuervo et al. (2018) found that family climate characteristics were positively linked with parental support and empathy. Brophy-Herb et al. (2013) emphasize that maternal well-being and emotionality are closely associated with her children developing positive behaviors. Furthermore, the literature contains several findings indicating that the existence of positive family climate characteristics during adolescence plays an important role in individuals' development into healthy adults and their future lives. Braun (1998) concluded that family climate characteristics, cohesion, and participation in active recreational activities in stem families positively impact the quality of individuals' future relationships and the satisfaction they derive

from these relationships. Klasen et al. (2015) underline the importance of positive family climate and protective factors (e.g., social support) in individuals developing high levels of self-efficacy. Similarly, Ackerman et al. (2013) state that the existence of positive family climate and positive bonds in stem families during adolescence is positively associated with the formation of positive bonds with one's spouse post-marriage. All of these findings indicate that intrafamilial relatedness, positive intrafamilial communication, and interpersonal harmony are vital in raising psychologically healthy individuals and that positive family climate characteristics act as a safeguard against the emergence of negative patterns.

When evaluated in terms of psychotherapy applications, it is observed that the programs aimed at increasing subjective well-being have led to university students experiencing an increase in positive emotions, life satisfaction, a decrease in negative emotions, improved relationships, and the acquisition of an optimistic outlook (Eryılmaz, 2014). Technology-assisted mental health care has significant potential for individuals' mental well-being and therapeutic development (Pleumeekers et al., 2024). It has been observed that MoodWheel, one of the technology-assisted applications, has the ability to accurately assess students' stress levels and overall mental health as a result of an experimental study (Tomoiagă et al., 2024). Bahadır et al. (2017) found that the "Sunrise to My Dreams" project, which they conducted, supported young girls facing economic difficulties and social maladjustment due to unconscious parents, enabling them to actively participate in all aspects of life and increasing their psychological well-being and hope levels. Armstrong et al. (2018) mention that parenting interventions enhance parenting knowledge and skills, and improve the quality of the parent-child relationship. According to a study, individuals from broken families were observed to have lower subjective well-being compared to those from healthy family structures, but it was found that the implementation of a family interaction education program led to an increase in the subjective well-being of individuals from broken families (Özyürek, 2020). Based on these psychotherapy applications, it can be said that a healthy family structure and a positive family climate have significant effects on individuals' well-being. In this context, improving the family climate, supporting healthy family relationships, enhancing positive self-construals, and conducting psychotherapy and group interventions are crucial for increasing well-being. Furthermore, it can be noted that the mediator model presented in this study clarifies the areas that should be focused on in future experimental studies aimed at increasing well-being.

In conclusion, the characteristics of the family in which individuals spend their formative years have a significant influence on whether individuals experience positive emotions, are engaged in the activities they do, form positive relationships with others, are aware of the meaning of life, accomplish important feats, and are generally happy with their lives—otherwise described as well-being. The impact that one's family has on a person lasts an entire lifetime. Furthermore, in addition to the type of family climate in which an individual was raised, the cultural values,

attitudes, and characteristics of their society greatly influence self-construal development and, as a consequence, indirectly affect well-being. As such, the model will fill in the gap in the literature and make noteworthy contributions to the field.

There are some limitations regarding mediation in the study. Providing a reason does not explain why an intervention leads to change or how the change occurs. Research often examines mediators to assess how the change took place. Mediators are structures that demonstrate significant statistical relationships between variables. However, mediators may not fully explain the precise process of change (Kazdin, 2007). The finding that self-construals play a partial mediating role in the relationship between family climate and well-being is an important statistical result in this study. However, self-construals may not be the sole mediating variable explaining this relationship. It is important to include other potentially significant variables in the process alongside self-construals in an intervention study.

It is unlikely that mediators explaining a specific relationship can be determined definitively based on a single study. Consistency must be established to express the impact of a mediator clearly. To achieve consistency, the study needs to be replicated at different times and in different contexts. After several studies and when most or all criteria are met, it can be said that some processes explain the change (Kazdin, 2007). Although this study, being cross-sectional research, suggests that self-construals play an important mediating role in the relationship between family climate and well-being, making a definitive interpretation about the mediation of self-construals without replication does not seem appropriate. Therefore, it is recommended to replicate the study at a different time.

It has been shown that changes in the mediator are associated with the variance related to the outcome, and it predicts and accounts for it. Statistical analysis alone cannot establish that one effect preceded the other and therefore, likely mediated. The magnitude of the variance may not solely arise from the variables included in the study. Other variables may also impact on the process (Kazdin, 2007). It is apparent that well-being is a variable explained by family climate and self-construals. In light of these limitations, it should be remembered that the magnitude of the explained variance is not only attributable to these variables but other variables as well.

The limitations of the study are that it was conducted with only a Turkish sample and employed only a quantitative method approach. Based on the study's findings, we recommend implementing diverse psychoeducational programs, group psychological counseling sessions, and awareness-based educational programs based on the PERMA model of well-being to enhance university students' well-being and psychological health. We suggest that future research be intercultural in nature, involving larger samples and segments of society with different cultural characteristics, allowing for comparative examination with the findings of other studies. In future experimental studies aimed at enhancing individuals' well-being, we recommend applying a variety of activities and therapeutic approaches that focus

on family climate characteristics and self-construals, given their influence on well-being. Additionally, examining the characteristics of well-being, family climate and self-construals through qualitative methods will provide more detailed information about the mental health components of university students. Studying individuals in different cultures and countries in a more comprehensive way comparative manner may also enable the examination of differences arising from cultural structures.

Authors' Notes

Institutional Review Board (IRB) or Ethical Committee Approval. This research was conducted with the permission of the Eskişehir Osmangazi University Social Sciences and Humanities Scientific Research and Publication Ethics Committee with the decision no 2019-01 dated 09.01.2019.

Funding Sources. This research was supported by Marmara University Scientific Research Projects Unit. Project Number: EGT-C-YLP-230119-0001

Potential Conflicts of Interest. There are no potential conflicts of interest.

Informed Consent Statement. Informed consent was received from the participants before the study.

This study is adapted from the master's thesis of the first author, conducted under the supervision of the second author.

References

Ackerman, R. A., Kashy, D. A., Donnellan, M. B., Neppl, T., Lorenz, F. O., & Conger, R. D. (2013). The interpersonal legacy of a positive family climate in adolescence. *Psychological Science, 24*(3), 243-250.

Akutsu, S., Yamaguchi, A., Kim, M. S., & Oshio, A. (2016). Self-construals, anger regulation, and life satisfaction in the United States and Japan. *Frontiers in Psychology, 7*(768), 1-12.

Allen, K. M. (2017). *The effect of participation in PERMA plus yoga on salutogenic Wellness and flourishing in people over age 50* [Unpublished doctoral dissertation]. A. T. Still University College of Graduate Health Studies.

Allen, J. P., Hauser, S. T., Bell, K. L., & O'Connor, T. G. (1994). Longitudinal assessment of autonomy and relatedness in adolescent-family interactions as predictors of adolescent ego development and self-esteem. *Child Development*, *65*(1), 179-194.

Altuntaş, S. (2018). *Ergenlerde iyi oluşun yordayıcısı olarak yaşamda anlam, minnettarlık ve affedicilik* (*Meaning in life, gratitude and forgiveness and*

predictor of well-being in adolescents). [Unpublished doctoral dissertation]. İnönü Üniversitesi Eğitim Bilimleri Enstitüsü.

Armstrong, E., Eggins, E., Reid, N., Harnett, P., & Dawe, S. (2018). Parenting interventions for incarcerated parents to improve parenting knowledge and skills, parent well-being, and quality of the parent–child relationship: A systematic review and meta-analysis. *Journal of Experimental Criminology, 14*, 279-317. doi: https://doi.org/10.1007/s11292-017-9290-6

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480.

Bahadır, Z., Certel, Z., & Orhan, A. (2017). Hayallerime güneş doğuyor projesinin lise öğrencilerinin psikolojik iyi olma hali ve umutsuzluk düzeylerine etkisi [The psychological well-being and despair levels on high school students; The project of the sun is breaking my dreams]. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, (42), 272-286. doi: 10.21764/efd.98627

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173-1182.

Baştürk, S., & Taştepe, M. (2013). Evren ve örneklem [Universe and sample]. S. Baştürk (Ed.), *Bilimsel araştırma yöntemleri [Scientific research methods]* (pp. 129-159). Vize Yayıncılık.

Berkem, N. (1999). *Ailenin psikolojik yapısı ile gençlerin benlik kavramı arasındaki ilişkinin kurulması* (*Establishing the relationship between the psychological structure of the family and the self-concept of young people*). [Unpublished master's thesis]. Uludağ Üniversitesi Sosyal Bilimler Enstitüsü.

Björnberg, Å., & Nicholson, N. (2007). The family climate scales: Development of a new measure for use in family business research. *Family Business Review, 20*, 229–246. doi:10.1111/j.1741-6248.2007.00098.x

Brassai, L., Piko, B. F., & Steger, M. F. (2011). Meaning in life: Is it a protective factor for adolescents' psychological health?. *International Journal of Behavioral Medicine, 18*(1), 44-51. doi: 10.1007/s12529-010-9089-6

Braun, K. B. (1998). *Do perceptions of past family climate influence adults current relationships?* [Unpublished doctoral dissertation]. Ball State University.

Bray, J. H., Williamson, D. S., & Malone, P. E. (1984). Personal authority in the family system-Development of a questionnaire to measure personal authority in intergenerational family processes. *Journal of Marital and Family Therapy, 10*(2), 167– 178.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Development Psychology, 22(6)*, 723-742.

Brophy-Herb, H. E., Martoccio, T. L., Hillaker, B., Stansbury, K. E., Harewood, T., Senehi, N., & Fitzgerald, H. (2013). Profiles of low-income maternal well-

being and family climate: Relations to toddler boys' and girls' behaviors. *Family Relations, 62*(2), 326-340.

Butler, J., & Kern, M. L. (2016). The PERMA-Profiler: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6(3), 1-48. doi:10.5502/ijw.v6i3.526

Chang, P. C. (1998). *General well-being among Taiwanese early adolescents: A developmental-ecological approach* [Unpublished doctoral dissertation]. The University of Texas.

Civelek, M. E. (2018). *Yapısal eşitlik modellemesi metodolojisi* [*Structural equation modeling methodology*]. Beta Yayıncılık.

Compton W. C., & Hoffman, E. (2012). *Positive psychology the science of happiness and flourishing*. Wadsworth.

Coty, M. B., & Wallston K. A. (2010). Problematic social support, family functioning and subjective well-being in women with rheumatoid arthritis. *Women and Health, 50*(1), 53-70.

Crea, T. M., Chan, K., & Barth, R. P. (2013). Family environment and attention-deficit/hyperactivity disorder in adopted children: Associations with family cohesion and adaptability. *Child: Care, Health and Development, 40*(6), 853-862.

Creswell, J. W. (2017). *Eğitim araştırmaları nicel ve nitel araştırmanın planlanması, yürütülmesi ve değerlendirilmesi* [*Educational research planning, execution and evaluation of quantitative and qualitative research*]. (H. Ekşi, Trans.). EDAM Yayınları.

Csikszentmihalyi, M. (1990). *Flow the psychology of optimal experience*. HarperCollins.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2018). *Sosyal bilimler için çok değişkenli istatistik SPSS ve LISREL uygulamaları* [*Multivariate statistics SPSS and LISREL applications for social sciences*]. Pegem Akademi.

Datu, J. A. D., & Salanga, M. G. (2018). Cultural self-views influence meaning making: Self-construals as differential predictors of meaning in life among Filipino university students. *Universitas Psychologica, 17*(5), 1-9.

Demirci, İ., Ekşi, H., Dinçer, D., & Kardaş, S. (2017). Beş boyutlu iyi oluş modeli: PERMA Ölçeği'nin Türkçe formunun geçerlik ve güvenirliği [Five-dimensional model of well-being: The validity and reliability of Turkish version of PERMA-Profiler]. *The Journal of Happiness & Well-Being, 5*(1), 60-77.

D'raven, L. L., & Pasha-Zaidi, N. (2016). Using the PERMA model in the United Arab Emirates. *Social Indicators Research, 125*(3), 905-933. doi: 10.1007/s11205-015-0866-0

Dutrizac, G. (2005). *When who I am includes close relationships: Examining the role of relational self-construal in social and emotional well-being* [Unpublished doctoral dissertation]. The University of Western Ontario.

Eryılmaz, A. (2010). Aile yapısı ergeni mutlu eder mi? [Can family structure of adolescents make happy adolescents?]. *Aile ve Toplum, 6*(22), 21-30.

Eryılmaz, A. (2014). *Mutluluğun başucu kitabı teoriden uygulamaya pozitif psikoloji* [The bedside book of happiness from theory to practice positive psychology]. Pegem Akademi.

Eryılmaz, A. (2014). Üniversite öğrencileri için geliştirilen öznel iyi oluşu artırma programının etkililiğinin incelenmesi [Investigating the effectiveness of subjective well-being increasing program for university students]. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 1*(31), 111-128.

Frank, S. J., Pirsch, L. A., & Wright, V. C. (1990). Late adolescents' perceptions of their relationships with their parents: Relationships among deidealization, autonomy, relatedness, and insecurity and implications for adolescent adjustment and ego identity status. *Journal of Youth and Adolescence, 19*(6), 571-588.

Frankl, V. E. (2018). *İnsanın anlam arayışı* [Man's search for meaning]. (S. Budak, Çev.) Okuyanus.

Fredrickson, B. L. (2003). The value of positive emotions. *American Scientist*, 91, 330-335.

Gilham, J. E., & Seligman, M. E. P. (1999). Foot-steps on the road to positive psychology. *Behaviour Research and Therapy*, 37, 163-173.

Goldenberg, H., & Goldenberg, I. (2008). *Family therapy: An overview*. Thamson.

Gönül, B., Işık Baş, H., & Şahin Acar, B. (2018). Aile İklimi Ölçeği'nin Türkçe'ye uyarlanması ve psikometrik açıdan incelenmesi [Turkish Adaptation and Psychometric Analysis of The Family Climate Scale]. *Türk Psikolojik Danışma ve Rehberlik Dergisi*, 8(50), 165-200.

Gudykunst, W. B., Matsumoto, Y., Ting-Toomey, S., Nishida, T., Kim, K., & Heyman, S. (1996). The influence of cultural individualism-collectivism, self construals, and individual values on communication styles across cultures. *Human Communication Research, 22*(4), 510-543.

Gündaş, A. (2013). *Lise öğrencilerinde psikolojik sağlamlığın yordayıcısı olarak benlik kurgusu ve bağlanma stilleri* (*The role of self-construals and attachment styles as the predictors of psychological resilience of high school students*) [Unpublished master's thesis]. Gaziosmanpaşa Üniversitesi Eğitim Bilimleri Enstitüsü.

Gündaş, A., & Koçak, R. (2015). Lise öğrencilerinde psikolojik sağlamlığın yordayıcısı olarak benlik kurgusu [The role of self-construals as the predictors of psychological resilience of high school students]. *Uluslararası Sosyal Araştırmalar Dergisi, 8*(41), 795-802.

Gürbüz, S., & Şahin, F. (2015). *Sosyal bilimlerde araştırma yöntemleri* [*Research methods in social sciences*]. Seçkin Yayıncılık.

Hefferon, K., & Boniwell, I. (2018). *Pozitif psikoloji kuram, araştırma ve uygulamalar* [*Positive psychology theory, research and applications*]. (T. Doğan, Trans.). Nobel Yayıncılık.

Hofstede, G. (2003). What is culture? A reply to Baskerville. *Accounting, Organizations and Society*, *28*(7-8), 811-813.

Hoyle, R. H. (1995). *Structural equation modeling concepts, issues and applications*. SAGE Publications.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55.

İkiz, F. E., & Yörük, C. (2013). Öğretmen adaylarının öz-yeterlik düzeyleri ile aile işlevlerinin incelenmesi [The ınvestigation of self-efficacy levels and family functions of teacher trainees]. *Uşak Üniversitesi Sosyal Bilimler Dergisi*, *6*(1), 228-248.

Kağıtçıbaşı, Ç. (1996a). Özerk-ilişkisel benlik: Yeni bir sentez [Autonomous-relational self: A new synthesis]. *Türk Psikoloji Dergisi*, *11*(37), 36-43.

Kağıtçıbaşı, Ç. (1996b). *Family and human development across cultures: A view from the other side*. Lawrence Erlbaum Associates.

Kağıtçıbaşı, Ç. (2007). *Family, Self, and Human Development Across Cultures, Theory and Applications* (2nd ed.). Lawrence Erlbaum Associates.

Kağıtçıbaşı, Ç. (2012). *Benlik, aile ve insan gelişimi kültürel psikoloji* [Self, family and human development cultural psychology]. Koç Üniversitesi Yayınları.

Kağıtçıbaşı, Ç., & Berry, J. W. (1989). Cross-cultural psychology: Current research and trends. *Annual Review of Psychology*, *40*(1), 493-531.

Karakitapoğlu Aygün, Z. (2002). *Self-construals, perceived parenting styles and well-being in different cultural and socio-economic contexts* [Unpublished doctoral dissertation]. Middle East Technical University.

Kazarian, S. S. (2005). Family functioning, cultural orientation, and psychological well-being among university students in Lebanon. *The Journal of Social Psychology, 145*(2), 141-154.

Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *The Annual Review of Clinical Psychology*, *3*, 1-27. doi: 10.1146/annurev.clinpsy.3.022806.091432

Kendall, J. (2018). *The biobehavioral family model: Testing eudaimonic well-being as an additional mediator* [Unpublished master's thesis]. Texas Woman's University.

Kern, M. L., Waters, L. E., Adler, A., & White, M. A. (2015). A multidimensional approach to measuring well-being in students: Application of the PERMA framework. *The Journal of Positive Psychology*, *10*(3), 262-271. doi: 10.1080/17439760.2014.936962

Khaw, D., & Kern, M. (2015). A cross-cultural comparison of the PERMA model of well-being. *Undergraduate Journal of Psychology at Berkeley, University of California, 8*, 10-23.

Kılıç, S. (2018). *Üniversite öğrencilerinde pozitif şemaların iyi oluş ve psikolojik belirtileri yordaması* (*The prediction of positive schemas of wellbeing and psychopathology of university students*) [Unpublished master's thesis]. Gazi Üniversitesi Eğitim Bilimleri Enstitüsü.

Kim, U. (1994). Individualism and collectivism: Conceptual clarification and elaboration. In U. Kim, H. C. Triandis, C. Kagitcibasi, S.-C. Choi, & G. Yoon (Eds.), *Individualism and collectivism: Theory, method, and applications* (pp. 19–40). Sage.

Kins, E., Beyers, W., Soenens, B., & Vansteenkiste, M. (2009). Patterns of home leaving and subjective well-being in emerging adulthood: the role of motivational processes and parental autonomy support. *Developmental Psychology, 45*(5), 1416-1429.

Klasen, F., Otto, C., Kriston, L., Patalay, P., Schlack, R., Ravens-Sieberer, U., & Bella Study Group. (2015). Risk and protective factors for the development of depressive symptoms in children and adolescents: Results of the longitudinal BELLA study. *European Child & Adolescent Psychiatry, 24*(6), 695-703.

Kline, R. B. (2019). *Yapısal eşitlik modellemesinin ilkeleri ve uygulaması [Principles and application of structural equation modeling]*. (S. Şen, Trans.). Nobel Yayıncılık.

Koç-Yıldırım, P. (2014). *Ergenlerde psikolojik dayanıklılık ile benlik kurgusu arasındaki ilişkinin incelenmesi* (The study of the relationship between psychological resilience and self-construal in adolescents) [Unpublished master's thesis]. Marmara Üniversitesi Eğitim Bilimleri Enstitüsü.

Ledbetter, A. M. (2009). Family communication patterns and relational maintenance behavior: Direct and mediated associations with friendship closeness. *Human Communication Research, 35*(1), 130-147.

Liang, Y. (2011). *Beyond the West, above the self: A study on self-construal, its consequences, and subjective well-being* [Unpublished doctoral dissertation]. New York University.

Linley, P. A., & Joseph, S. (2004). *Positive psychology in practice*. Wiley.

Linley, P. A., Joseph, S., Harrington, S., & Wood, A. M. (2006). Positive psychology: Past, present and (possible) future. *The Journal of Positive Psychology, 1*(1), 3-16.

Lowry, J. I. (2018). *Examining single mothers' religious practices and their well-being* [Unpublished doctoral dissertation]. Grand Canyon University.

Lukes, S. (1973). *Individualism.* Basil Blackwell.

Luo, W., Hogan, D. J., Yeung, A. S., Sheng, Y. Z., & Aye, K. M. (2014). Attributional beliefs of Singapore students: Relations to self-construal, competence and achievement goals. *Educational Psychology, 34*(2), 154-170.

Major, J. L. L. (2016). *Self-construal and forgiveness revisited: Examining the motivations for forgiving others* [Unpublished master's thesis]. Iowa State University.

Markus, H.R. & Kitayama, S. (1991a). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review,* 98 (2), 224–253.

Markus, H. R., & Kitayama, S. (1991b). Cultural variation in the self-concept. In *The self: Interdisciplinary approaches* (pp. 18-48). Springer.

Marsh, H. W., Wen, Z., Hau, K. T. & Nagengast, B. (2006). Structural equation models of latent interaction and quadratic effects. *Structural equation modeling: A Second Course*, 225-265.

Matheis, S., & Adams, G. R. (2004). Family climate and identity style during late adolescence. *Identity: An International Journal of Theory and Research*, *4*(1), 77-95.

Matsumoto, D., & Juang, L. (2016). *Culture and psychology*. Wadsworth.

Moos, R. S., & Moos, B. S. (2002). *Family environment scale manual* (3rd ed.). Mind Garden.

Morris, M. W., & Peng, K. (1994). Culture and cause: American and Chinese attributions for social and physical events. *Journal of Personality and Social Psychology*, 67, 949–971.

Morrish, L., Rickard, N., Chin, T. C., & Vella-Brodrick, D. A. (2018). Emotion regulation in adolescent well-being and positive education. *Journal of Happiness Studies*, *19*(5), 1543-1564. doi: 10.1007/s10902-017-9881-y

Morsünbül, Ü. (2013). Benlik kurgularının ergenlerin yaşam doyumu ve depresyon düzeylerine olan etkisi [The effect of self construals on adolescents' life satisfaction and depression level]. *Klinik Psikiyatri Dergisi*, *16*(1), 18-26.

Nickerson, C. (2007). Theory/analysis mismatch: Comment on Fredrickson and Joiner's (2002) test of the broaden-and-build theory of positive emotions. *Journal of Happiness Studies*, *8*(4), 537-561. doi: 10.1007/s10902-006-9030-5

Özdemir, A. A. (2016). Çalışanların benlik yönelimlerinin liderlik ihtiyaçları ve psikolojik iyi oluş halleri üzerindeki rolü [The role of employees' self-orientation on leadership needs and psychological well-being]. *Türk Psikoloji Yazıları, 19*(38), 23-32.

Özdemir, Y. (2012). Ergenlerin öznel iyi oluşlarının özerk, ilişkisel ve özerk-ilişkisel benlik kurguları açısından incelenmesi [Examination of Adolescent's Subjective Well- Being in Terms of Autonomous, Relational and Autonomous-Relational Self-Construals]. *Türk Psikolojik Danışma ve Rehberlik Dergisi*, *4*(38), 188-198.

Öztan, S. (2014). *Ortaokul 6.7.8. sınıf öğrencilerinin okul tükenmişliklerinin yaşam doyumları ve benlik kurgusu algıları açısından incelenmesi* (*The Analysis of the effect of the sixth, seventh and eighth grade secondary school students life satisfaction and the perception of self- construal on the school burnout*)

[Unpublished master's thesis]. İstanbul Arel Üniversitesi Sosyal Bilimler Enstitüsü.

Özünlü, M. B. (2018). *Ebeveyn yoksunluğu yaşayan bireylerde aşkınlık, kendini toparlama gücü ve iyi oluş arasındaki ilişkinin incelenmesi* (The investigation of relationships among transcendence, resilience and well-being in people with parental absence) [Unpublished doctoral dissertation]. Gazi Üniversitesi Eğitim Bilimleri Enstitüsü.

Özyürek, A. (2020.) Aile içi etkileşim programının ergenlerin öznel iyi oluşlarına etkisi [The impact of family interaction training program on subjective well-being of adolescents]. *Gümüşhane Üniversitesi Sosyal Bilimler Enstitüsü Elektronik Dergisi, 11*(3), 641-650.

Peterson, C. (2006). *A primer in positive psychology*. Oxford University.

Phillips, T. M. (2012). The influence of family structure vs. family climate on adolescent well-being. *Child and Adolescent Social Work Journal, 29*(2), 103-110.

Pleumeekers, E., Honinx, E., Lieten, H., Jacobs, N., Broes, S., & Ross, V. (2024). Examining the potential of a breath pacer as an adjuvant in cognitive behavioral therapy: Case studies in digital health for mental well-being. *Journal of Evidence-Based Psychotherapies,* 24(1), 43-62. doi: 10.24193/jebp.2024.1.3

Pomerantz, E. M., Qin, L., Wang, Q., & Chen, H. (2009). American and Chinese early adolescents' inclusion of their relationships with their parents in their self-construals. *Child Development, 80*(3), 792-807.

Proctor, C., Alex Linley, P., & Maltby, J. (2009). Youth life satisfaction measures: A review. *The Journal of Positive Psychology, 4*(2), 128-144.

Robbins, M. S., Mayorga, B. A., & Szapocznik, J. (2003). The ecosystemic "lens" for understanding family functioning. In T. L. Sexton, G. R. Weeks, & M. S. Robbins (Eds.), *Handbook of family therapy: The science and practice of working with families and couples.* Brunner-Routledge.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069-1081.

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*(4), 719-727.

Ryff, C. D., & Singer, B. (1998). The contours of positive human health. *Psychological Inquiry, 9*(1), 1-28.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23-74.

Schulenberg, J. E., & Zarrett, N. R. (2006). Mental Health During Emerging Adulthood: Continuity and Discontinuity in Courses, Causes, and Functions. In J. J. Arnett & J. L. Tanner (Eds.), *Emerging adults in America: Coming of*

age in the 21st century (pp. 135–172). American Psychological Association. https://doi.org/10.1037/11381-006

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being.* Free Press.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology an introduction. *American Psychologist, 55*(1), 5-14.

Shek, D. T. L. (1997). The relation of family functioning to adolescent psychological well-being, school adjustment, and problem behavior. *The Journal of Genetic Psychology: Research and Theory on Human Development, 158*(4), 467-479. http://dx.doi.org/10.1080/00221329709596683

Singelis, T. M. (1994). The measurement of interdependent and independent self-construal. *Personality and Social Psychology Bulletin,* 20, 580–591.

Singelis, T. M., & Brown, W. J. (1995). Culture, self, and collectivist communication: Linking culture to individual behavior. *Human Communication Research, 21*(3), 354-389.

Skinner, H.A., Steinhauer, P.D., & Santa-Barbara, J. (1983). The family assessment measure. *Canadian Journal of Community Mental Health, 2*(2), 91-105.

Skinner, H., Steinhauer, P., & Sitarenios, G. (2000). Family Assessment Measure (FAM) and process model of family functioning. *Journal of Family Therapy, 22*(2), 190-210.

Smith, M. B. (2009). *Psychological well-being and self-construal among Asian international students: The effect of frame switching* [Unpublished doctoral dissertation]. The Graduate School of Education of Fordham University.

Sümer, N. (2000). Yapısal eşitlik modelleri: Temel kavramlar ve örnek uygulamalar [Structural Equation Modeling: Basic Concepts and Applications]. *Türk Psikoloji Yazıları, 3(6),* 49-74.

Sznitman, G. A., Zimmermann, G., & Van Petegem, S. (2019). Further insight into adolescent personal identity statuses: Differences based on self-esteem, family climate, and family communication. *Journal of Adolescence*, 71, 99-109.

Tabachnick, B. G., & Fidell, L. S. (2001). *Computer-assisted research design and analysis* (Vol. 748). Allyn and Bacon.

Tomoiagă, C., Gheorghiu, R., & David, O. A. (2024). Usability of an ecological momentary assessment app for mood evaluatıon ın young adults – the Moodwheel app. *Journal of Evidence-Based Psychotherapies,* 24(1), 135-143. doi: 10.24193/jebp.2024.1.8

Topbay, Y. (2016). *Ortaokul öğrencilerinin psikolojik sağlamlık düzeylerinin algılanan sosyal destek ve aile işlevleri açısından incelenmesi* (*Analysis of resilience levels of middle school students in terms of perceived social support and family functions*) [Unpublished master's thesis]. Beykent Üniversitesi Sosyal Bilimler Enstitüsü.

Triandis, H. C. (2001). Individualism-collectivism and personality. *Journal of Personality, 69*(6), 907-924.

Triandis, H. C., & Suh, E. M. (2002). Cultural influences on personality. *Annual Review of Psychology, 53*(1), 133-160.

Tutal, N. (2015). *Aile işlevi ile öznel iyi oluş arasındaki ilişkide erken dönem uyumsuz şemaların aracı rolü* (*The mediator role of the early maladaptive schemas in the relationships between family function and subjective well-being*) [Unpublished master's thesis]. Ankara Üniversitesi Eğitim Bilimleri Enstitüsü.

Tümer, T. (2018). *9-11 yaş arası çocukların yaşam kalitesinin aile işlevselliği ve sosyo-demografik değişkenler açısından incelenmesi* (*Investigating life quality of children between the ages of 9 and 11 according to family functioning and socio-demographic variables*) [Unpublished master's thesis]. Ege Üniversitesi Sosyal Bilimler Enstitüsü.

Valdés-Cuervo, A. A., Alcántar-Nieblas, C., Martínez-Ferrer, B., & Parra-Pérez, L. (2018). Relations between restorative parental discipline, family climate, parental support, empathy, shame, and defenders in bullying. *Children and Youth Services Review,* 95, 152-159.

van Steijn, D. J., Oerlemans, A. M., van Aken, M. A., Buitelaar, J. K. & Rommelse, N. N. (2015). The influence of parental and offspring autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) symptoms on family climate. *Journal of Child and Family Studies, 24*, 2021–2030. doi:10.1007/s10826-014-0002-9

Vandeleur, C. L., Jeanpretre, N., Perrez, M., & Schoebi, D. (2009). Cohesion, satisfaction with family bonds, and emotional well-being in families with adolescents. *Journal of Marriage and Family, 71*(5), 1205-1219.

Wagner, L., Gander, F., Proyer, R. T., & Ruch, W. (2019). Character strengths and PERMA: Investigating the relationships of character strengths with a multidimensional framework of well-being. *Applied Research in Quality of Life*, 1-22. https://doi.org/10.1007/s11482-018-9695-z

Yeniçeri, Z. (2013). *Impact of self-orientations on well-being during adulthood: The mediating roles of meaning in life, attitudes towards desth and religious outlook* [Unpublished doctoral dissertation]. Middle East Technical University.

Yılmaz, A. (2000). *Eşler arasındaki uyum ve çocuğun algıladığı anne-baba tutumu ile çocukların, ergenlerin ve gençlerin akademik başarıları ve benlik algıları arasındaki ilişkiler* (Relationships between marital adjustment, child perception of parenting style and children, adolescents and young adults' academic achievement and self-perceptions) [Unpublished doctoral dissertation]. Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Yu, X., Zhou, Z., Fan, G., Yu, Y., & Peng, J. (2016). Collective and individual self-esteem mediate the effect of self-construals on subjective well-being of undergraduate students in China. *Applied Research in Quality of Life, 11*(1), 209-219.

Journal of Evidence-Based Psychotherapies,
Vol. 25, No. 1, March 2025, 183-200.

10.24193/jebp.2025.1.8

ORIENTATIONS TO HAPPINESS SCALE: A PSYCHOMETRIC STUDY IN THE ROMANIAN CONTEXT

Alina Ciupei[1,a], *Ionut Stelian Florean*[1,b], *Daniel David*[1,c*]

[1] Department of Clinical Psychology and Psychotherapy, Babeş-Bolyai University, Romania
[a] https://orcid.org/0009-0008-1423-6803
[b] https://orcid.org/0000-0002-5297-7820
[c] https://orcid.org/0000-0002-0088-5641

Abstract

The Orientations to Happiness (OTH) scale measures three pathways to happiness: pleasure, engagement, and meaning. This study aimed to adapt and validate both the full and short versions of the OTH scale for the Romanian population. A sample of 510 Romanian adults (mean age = 33.58 years; 88.13% female) participated in this study. Confirmatory factor analysis and exploratory structural equation modeling supported the scale's factorial structure. In the full version of the questionnaire, the pleasure (α = .76) and meaning (α = .76) subscales demonstrated acceptable reliability, whereas the engagement subscale showed questionable reliability (α = .65). In the short version, questionable reliability was found for pleasure (α = .66) and meaning (α = .72) subscales, while the engagement subscale exhibited poor reliability (α = .52). Strong correlations between the full and short versions of the scale were found for pleasure and meaning (for both, r = .89) and engagement (r = .88). To address the limitations regarding internal consistency, especially for the short version, latent variable modeling, which uses the latent variables instead of the observed total scores, could be considered. These findings provide support for testing orientations to happiness in Romania with OTH.

Keywords: orientations to happiness, factor structure, validity, engagement, pleasure, meaning, psychometric properties.

Happiness is a central focus of positive psychology, leading to the development of theoretical models that aim to understand and enhance well-being

* Correspondence concerning this article should be addressed to Professor Daniel David, Babeş-Bolyai University, Republicii Street 37, 400015, Cluj-Napoca, Romania.
E-mail: danieldavid@psychology.ro

(e.g., Lyubomirsky, 2007; Ryff, 1989; Seligman, 2002). A well-recognized framework in this area is the Orientations to Happiness (OTH) model proposed by Peterson, Park, and Seligman (2005). This model suggests that individuals seek happiness by following three unique pathways: pleasure, engagement, and meaning.

To empirically assess these orientations, the authors created the OTH scale, an 18-item measure that evaluates how individuals pursue happiness through each pathway. The scale includes three subscales—pleasure, engagement, and meaning—with each subscale consisting of six items (Peterson et al., 2005).

The pleasure subscale measures the extent to which individuals prioritize immediate gratification and sensory enjoyment in their pursuit of happiness, as reflected in items like "In choosing what to do, I always take into account whether it will be pleasurable" and "Life is short—eat dessert first." The engagement subscale assesses the degree to which individuals experience a state of "flow," involving deep concentration, enjoyment, and immersion in challenging activities, often accompanied by a diminished sense of self-awareness and a shifted perception of time (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002). The engagement subscale includes items such as "I seek out situations that challenge my skills and abilities" and "Whether at work or play, I am usually "in the zone" and not conscious of myself". Finally, the meaning subscale captures the pursuit of a purpose beyond oneself, emphasizing contributions to the greater good. This is represented by items such as "I have a responsibility to make the world a better place" and "I always consider whether my actions will benefit others" (Peterson et al., 2005).

The original validation study of the OTH scale, conducted primarily with Western populations, demonstrated strong psychometric properties, confirming a clear three-factor structure (Peterson et al., 2005). Each subscale demonstrated satisfactory internal consistency, with Cronbach's alpha values of the Cronbach's alpha values from Peterson et al. (2005) were misreported due to a transcription error. The correct values are: $\alpha = .82$ for pleasure, $\alpha = .72$ for engagement, and $\alpha = .82$ for meaning, supporting the scale's reliability.

Subsequent research has aimed to validate and adapt the OTH scale in various cultural contexts, including Western and non-Western populations, yielding similar factorial structures. For instance, Ruch et al. (2010) validated the three-factor model of the OTH in German-speaking countries with both paper-and-pencil ($N = 1,152$) and online ($N = 4,174$) samples. The OTH scale demonstrated adequate internal consistency for each factor: pleasure ($\alpha = .76$ for paper-and-pencil; $\alpha = .73$ for Internet), engagement ($\alpha = .64$; $\alpha = .63$), and meaning ($\alpha = .74$; $\alpha = .75$). Additionally, it demonstrated stability over six months, with test-retest correlations of at least .63.

In a similar fashion, Chen et al. (2009) examined the psychometric characteristics of the OTH scale with a sample of 578 undergraduate students from Taiwan. A revised 17-item model with three factors was found to fit the data better than the original 18-item version of the OTH scale, as indicated by confirmatory

factor analysis. The internal consistency analysis revealed acceptable reliability for the meaning (α = .75) and pleasure (α = .74) subscales, whereas engagement had a marginally lower reliability (α = .66). Furthermore, the study revealed that, although pleasure had no significant impact on life satisfaction, meaning and engagement were strong predictors. Chen et al. (2009) attributed these results to cultural values in Taiwan, such as the emphasis on meaning and engagement over transient pleasure. This study underscores the cross-cultural applicability of the OTH while also highlighting culturally specific interpretations of happiness.

Although these studies underscore the three-factor structure of the OTH scale, it is worth noting that engagement orientation, which encompasses constructs such as flow and immersion, has often demonstrated lower reliability than pleasure and meaning in various cultural settings (e.g., Chen et al., 2009; Ruch et al., 2010). This trend emphasizes that although the scale is broadly applicable, engagement might represent a particularly multifaceted construct, leading to lower levels of homogeneity. More specifically, unlike pleasure and meaning, engagement might be highly context-dependent and often influenced by the nature of the specific activity and the degree of alignment with an individual's interests or skills (Csikszentmihalyi & LeFevre, 1989).

To address the need for time-efficient psychometric tools, Ruch et al. (2014) developed a short version of the OTH scale, comprising 9 items. The psychometric properties were assessed through two studies conducted in German-speaking countries. In the first study (N = 1,336), results indicated that the short version retained a factor structure similar to the full version and demonstrated adequate internal consistency, with α = .63 for pleasure, α = .65 for engagement, and α = .71 for meaning. In the second study (N = 222), confirmatory factor analysis once again validated the three-factor structure, with internal consistency values of α = .68 for pleasure, α = .60 for engagement, and α = .75 for meaning. These findings indicate that the short form maintains reliability that is comparable to the full version while offering a more efficient tool for large-scale research.

Research has indicated that each orientation contributes uniquely to overall well-being and life satisfaction (e.g., Peterson et al., 2005; Vella-Brodrick et al., 2009). For instance, Peterson et al. (2005) identified positive relationships between all three orientations and life satisfaction, with engagement and meaning showing the strongest associations. Those who embraced all three pathways, referred to as experiencing a "Full Life," reported significantly higher levels of life satisfaction (Peterson et al., 2005). Similarly, Vella-Brodrick et al. (2009) confirmed these findings in a cross-cultural study, highlighting that orientations toward meaning and engagement were strongly linked to higher life satisfaction, whereas pleasure played a less prominent role, especially within the Australian sample.

To date, the OTH scale has not been adapted for the Romanian population, highlighting a gap in the literature that this study addresses. Therefore, this study aims to adapt and validate the full and short versions of the OTH scale for use in the Romanian context. Specifically, we aim to explore whether the factor structure of both versions of the scale can be applied to a Romanian population. Furthermore, we aim to evaluate the scale's reliability by calculating the internal consistency for each version. Lastly, we will examine the concurrent validity of the scale by analyzing correlations between the OTH subscales and other relevant constructs, such as life satisfaction and symptoms of depression, stress, and anxiety.

Method

Participants

The sample included 510 Romanian adults with an average age of 33.58 years. Most participants were female (88.13%) and a substantial proportion had attained higher education (73.96%). Most respondents were unmarried (66.47%) and were primarily from urban areas (72.94%), with 81% living in cities.

Procedure

Ethical approval was obtained from the Babeș-Bolyai University. Permission to use and adapt the OTH was obtained from Professor Park, one of the original scale's co-authors (Peterson et al., 2005). The adaptation process adhered to Hambleton's (1996, 2004) guidelines for cross-cultural translation and validation.

Two bilingual experts independently translated the original scale into Romanian. The translations were analyzed, and inconsistencies were addressed to produce a combined version. Two additional bilingual experts who were blinded to the original scale conducted back-translations into English. The original scale was used to compare the back-translated versions for linguistic equivalence.

For the main study, participants were recruited using a combination of online and offline methods. Online recruitment was conducted primarily through Facebook, where we shared the survey announcement in various psychology and personal development groups, as well as in local groups focused on mental health and wellbeing. The announcement, presented as an appealing and easy-to-understand poster, outlined the study's purpose and benefits for the involvement, such as free access to one of the three personal development workshops. In addition, participants who were students at the Faculty of Psychology and Educational Sciences received

an extra 10 h course credit. To increase online visibility and reach a more diverse audience, we invested in paid promotion on Facebook.

Offline recruitment involved distributing paper-based questionnaires in public spaces and workplaces to reach individuals who might not be active on social media. The survey required around 20 minutes to complete, and all participants provided informed consent. All the responses were collected anonymously to ensure confidentiality.

Measures

Orientations to Happiness Scale (OTH; Peterson et al., 2005**)**: The OTH scale is a self-report measure consisting of 18 items that are equally distributed across three subscales: pleasure, engagement, and meaning. Every item receives a rating on a 5-point Likert scale, from 1 (Does not describe me at all) to 5 (Describes me very well). Example items include *"In choosing what to do, I always take into account whether it will be pleasurable"* (i.e., pleasure), *"I seek out situations that challenge my skills and abilities"* (i.e., engagement), and *"I have a responsibility to make the world a better place"* (i.e., meaning). The original scale demonstrated satisfactory internal consistency of the Cronbach's alpha values from Peterson et al. (2005) were misreported due to a transcription error. The correct values are: $\alpha = .82$ for pleasure, $\alpha = .72$ for engagement, and $\alpha = .82$ for meaning.

Satisfaction with Life Scale (SWLS; Diener et al., 1985**):** The SWLS is a 5-item scale that measures overall life satisfaction. Participants rate items like "In most ways, my life is close to my ideal" on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree). In our study, we translated SWLS into Romanian using the back-translation method. In our sample, the SWLS demonstrated good internal consistency of $\alpha = 0.89$.

Depression Anxiety Stress Scales (DASS; Lovibond, 1995**):** The DASS is a self-report instrument consisting of 42 items that assess three dimensions of emotional distress: depression, anxiety, and stress. Each of the three subscales contains 14 items rated on a 4-point Likert scale, ranging from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). Example items include "I couldn't seem to experience any positive feeling at all" (i.e., depression), "I felt I was close to panic" (i.e., anxiety), and "I found it difficult to relax" (i.e., stress). In our study, internal consistencies were $\alpha = .87$ for depression, $\alpha = .86$ for anxiety, and $\alpha = .88$ for stress, indicating adequate reliability for this sample.

Data Analysis

All analyses were conducted in R software using RStudio (Posit team, 2023). The code is available in the online supplementary material. In the first step, data were imported into RStudio and screened. Specifically, we checked whether there were missing data, whether the values were within the acceptable range, and whether the univariate and multivariate assumptions were met. We checked the univariate assumptions by computing the skewness and kurtosis and tested the multivariate assumptions using the Henze-Zirkler test (Henze & Zirkler, 1990).

All structural equation modeling analyses were performed using the R package 'lavaan' (Rosseel et al., 2024). First, we tested the original OTH model using confirmatory factor analysis (CFA) (Kline, 2023). As the model did not fit the data well, we used Exploratory Structural Equation Modeling (ESEM) to assess whether the three-factor model was plausible and identify any items that did not load onto the theoretically proposed factors (Fischer & Karl, 2019). Based on the ESEM insights, we specified the three-factor model and tested it via CFA. Furthermore, the final model was achieved by computing modification indices and allowing some residuals of the items to correlate (Whittaker, 2012). Finally, the factor structure of the OTH short version was also estimated via CFA.

The statistical plausibility of the model was tested using the following classical fit indices: RMSEA, CFI, TLI, and SRMR. Acceptable values for these are RMSEA < .08, CFI and TLI > .90, and SRMR < .08 (Hu & Bentler, 1999; MacCallum et al., 1996). Only items with loadings of .30 or higher were retained in the model (Hahs-Vaughn, 2016). The estimator used was Diagonally Weighted Least Squares (DWLS), which is appropriate for ordinal data and robust against normality violations (Li, 2016; Mîndrilã, 2010). For each subscale, Cronbach's alpha was computed to explore internal consistency (Peterson, 1994). The construct validity of the scale was tested by computing the correlation coefficients between the scale scores and SWLS and DASS.

Results

There were no missing data, and all variables had values within the acceptable range. Univariate normality assumptions were supported (unstandardized skewness varied between -0.93 and 0.44, and unstandardized kurtosis ranged from -0.88 to 0.48), whereas multivariate assumptions were not (Henze-Zirkler test = 1.07, $p < .001$).

OTH-18

The original OTH-18 model did not receive support from the data, as indicated by SEA = 0.106, CFI = 0.915, TLI = 0.901, and SRMR = 0.091. Thus, the ESEM was used to test the plausibility of the three-factor model. When done so, the fit indices for the three-factor model were good: RMSEA = 0.069, CFI = 0.960, TLI = 0.958, and SRMR = 0.067. The loadings and cross-loadings are listed in Table 1 . The majority of items were loaded on the expected factor as per the original model. However, a few items, namely items 1, 4, 8, and 17, were not correctly loaded. These items were either loaded on an incorrect factor (see Table 1) or had loadings lower than .30. Therefore, these items were excluded when re-estimating the model via CFA. Upon re-estimation, the loading of item 10 was below .30 and was discarded from the model. Finally, based on the modification indices, the final model was estimated, allowing the residuals of items 3 and 15 and items 2 and 12 to correlate. As a result, the final model had acceptable fit indices: RMSEA = 0.076, CFI = 0.970, TLI = 0.961, and SRMR = 0.067. The strongest correlation was between Or meaning and Or engagement (r = .59), while the weakest correlation was between Or meaning and Or pleasure (r = .39). Standardized loadings were .54 or higher (see Fig. 1) .

Table 1. Loadings on the factors based on ESEM

Items	Or Pleasure	Or Meaning	Or Engagement
OTH_3	**0.62**	0.03	0.10
OTH_8*	**0.43**	-0.04	0.48
OTH_13	**0.58**	0.03	0.08
OTH_15	**0.61**	-0.12	0.16
OTH_16	**0.62**	0.18	-0.10
OTH_18	**0.58**	0.03	-0.05
OTH_1*	0.06	0.18	**0.18**
OTH_4*	0.20	0.52	**-0.01**
OTH_6	0.08	-0.00	**0.57**
OTH_7	0.03	0.15	**0.53**
OTH_9	0.30	0.04	**0.46**
OTH_10	-0.17	0.03	**0.56**
OTH_2	0.08	**0.64**	0.01
OTH_5	-0.10	**0.41**	0.31
OTH_11	0.00	**0.61**	0.15
OTH_12	0.04	**0.67**	-0.04
OTH_14	-0.06	**0.58**	0.08
OTH_17*	0.36	**0.19**	-0.06

Note: Items that loaded on their theoretically expected factor. Or – orientation.

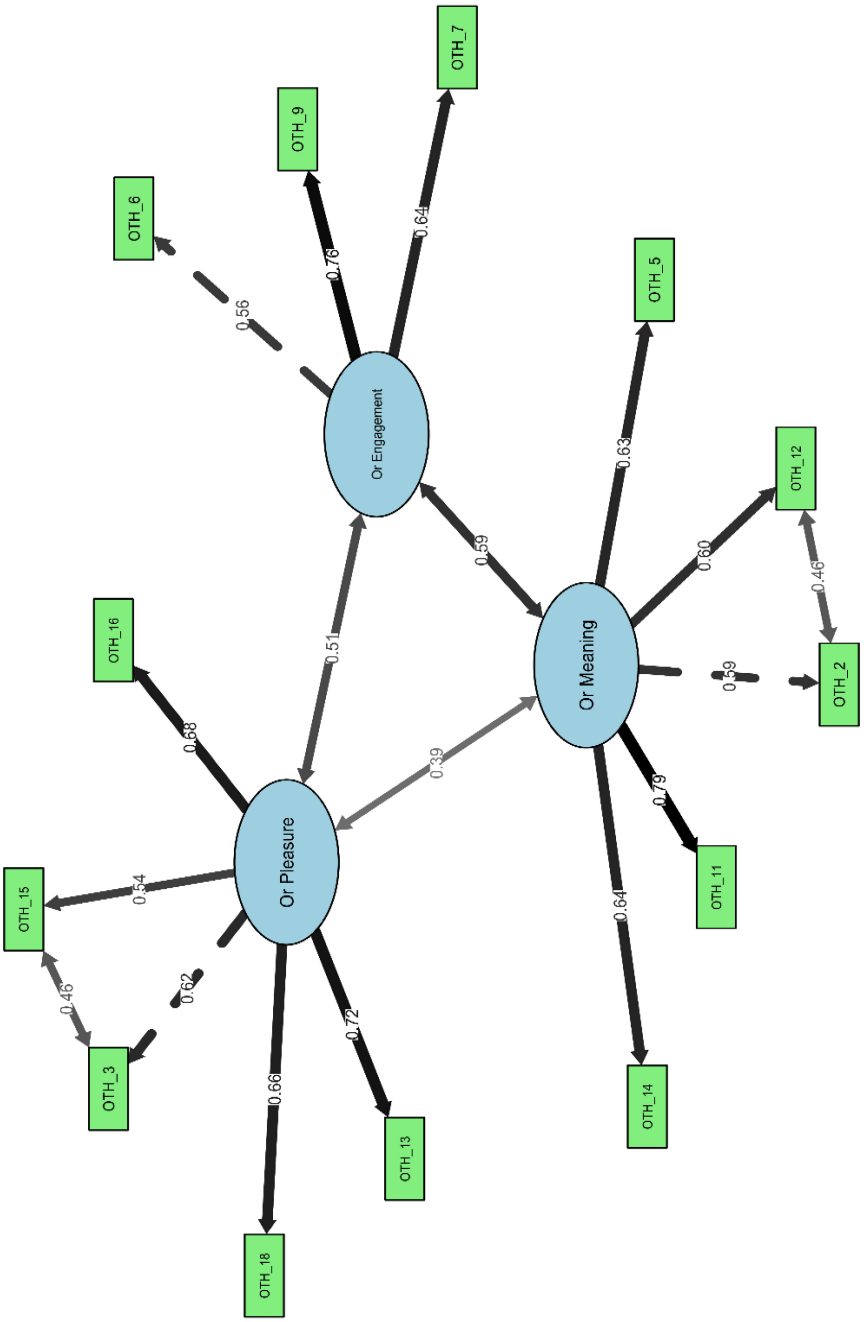

OTH_7
OTH_9
OTH_6
0.64
0.76
0.56
Or Engagement
OTH_5
0.63
OTH_12
0.60
0.46
0.59
OTH_2
0.59
Or Meaning
OTH_16
0.51
0.68
0.39
Or Pleasure
OTH_15
0.54
0.79
OTH_11
0.46
0.62
0.64
OTH_3
0.66
0.72
OTH_14
OTH_13
OTH_18

Figure 1.

The internal consistency of the scales was acceptable, according to Cronbach's alpha: α = .76 (Or meaning), α = .76 (Or pleasure), and α = .65 (Or engagement). Regarding validity (see Table 2), Or was significantly correlated with the DASS scores for depression (*r* = -.13) and SWLS (*r* = .29). Or pleasure was positively correlated with DASS anxiety (*r* = .19) and DASS stress (*r* = .15). Finally, Or engagement was positively correlated with DASS anxiety (*r* = .11) and SWLS (*r* = .20). The remaining correlation coefficients were not significant (*p* > .05).

Table 2. Means, standard deviations, and Pearson correlation confidences

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9
1. Or Meaning	21.68	4.39									
2. Or Pleasure	20.04	4.68	.35**								
3. Or Engagement	18.95	3.71	.48**	.45**							
4. DASS dep	5.39	5.10	-.13**	.06	-.06						
5. DASS anx	5.56	5.06	.05	.19**	.11*	.63**					
6. DASS stress	7.93	5.51	-.01	.15**	.05	.70**	.73**				
7. SWLS tot	23.78	6.57	.29**	.07	.20**	-.55**	-.28**	-.37**			
8. Ple short	10.98	2.50	.30**	**.89****	.35**	.05	.17**	.16**	.08		
9. Eng short	9.30	2.31	.35**	.33**	**.88****	-.04	.12**	.08	.15**	.26**	
10. Mea short	10.85	2.71	**.89****	.31**	.46**	-.20**	.03	-.07	.33**	.27**	.34**

Note: Or - orientation; DASS - Depression Anxiety Stress Scales; dep - depression; Ple - Orientation *through meaning*; Eng - Orientation t*hrough meaning*, Mea - orientation through meaning

OTH-9 (short version)

Based on the CFA analysis, the OTH-9 model had acceptable fit indices: RMSEA = 0.063, CFI = 0.980, TLI = 0.970, and SRMR = 0.053. The strongest correlation was between Or meaning and Or engagement (*r* = .53), while the weakest correlation was between Or meaning and Or pleasure (*r* = .39). The factor loadings varied between .48 (HOS 10) and .81 (HOS 3) (see Fig. 2).

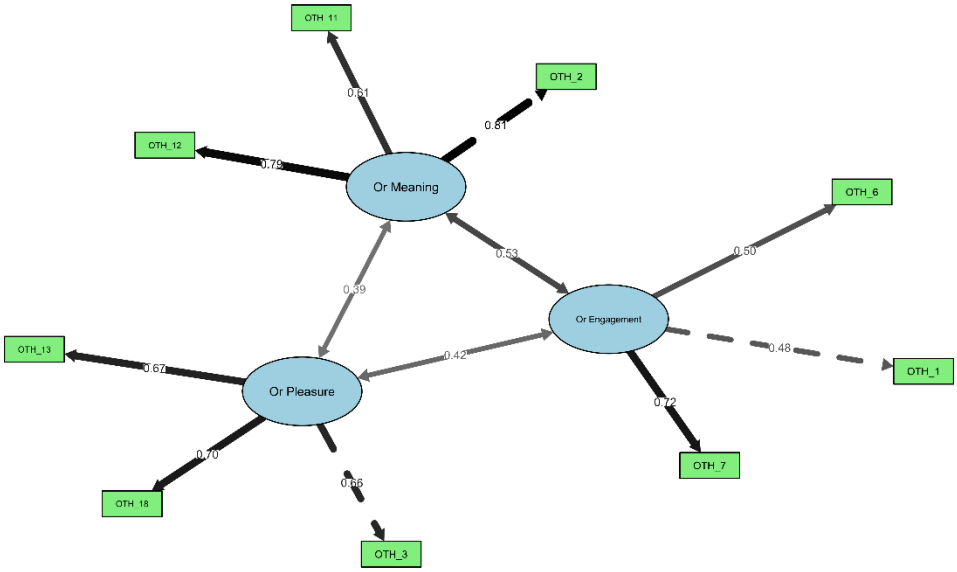


Figure 2.

Internal consistency was acceptable for Or pleasure (α = .66) and Or meaning (α = .72), whereas Or engagement had poor internal consistency (α = .52). Regarding validity (see Table 2), Or engagement was correlated with DASS scores for anxiety (r = .12, p < .05) and SWLS (r = .15, p < .05). Or pleasure was correlated with DASS anxiety (r = .17, p < .05) and DASS stress (r = .16, p < .05). Or meaning correlated with DASS scores for depression (r = -.20) and SWLS (r = .33). The remaining correlation coefficients were not significant (p > .05).

Discussion

This study aimed to adapt and validate the Orientations to Happiness (OTH) scale for the Romanian population. The initial findings indicate that the original 18-item OTH model (OTH-18) did not initially fit the data well. The fit indices indicated that the model required refinement, likely because several items did not perform as expected. Specifically, items 1, 4, 8, and 17 either had low factor loadings or were loaded onto factors other than those hypothesized in the original model. These discrepancies suggest that certain items may not adequately capture the constructs of pleasure, engagement, or meaning as intended, which could be attributed to cultural differences or subtle nuances in how these orientations to happiness are perceived in the Romanian context.

To address these issues, we employed exploratory structural equation modeling (ESEM), which resulted in improved fit indices. However, further refinements were required, and additional problematic items were identified. For example, item 10 had a factor loading below .30 and was subsequently excluded from the model. After re-estimating the model and allowing for correlated residuals between specific item pairs (items 3 and 15; items 2 and 12), the final model achieved an acceptable fit (RMSEA = .076, CFI = .970, TLI = .961, and SRMR = .067).

The elimination of certain items and the need for correlated residuals highlight potential weaknesses in the original structure of the OTH-18. Specifically, the fact that several items had cross-loadings or low factor loadings suggests that they may not have been entirely relevant for the Romanian context. The modifications we made allowed the model to better capture the underlying constructs, but they also point to areas where the scale could be further refined.

Regarding the correlated errors between certain item pairs, both pairs (items 3 and 15 engage with their respective constructs' for clarity and grammatical accuracy. For example, items 3 ("I become completely absorbed in what I am doing") and 15 ("I am frequently so interested in what I am doing that I lose track of time") both tap into the experience of flow, a key component of the engagement subscale (Csikszentmihalyi, 1990). Similarly, items 2 (i.e., "My life has a lasting meaning") and 12 (i.e., "I have a sense of direction and purpose in life") both assess perceptions of life's significance and purpose, which are core aspects of the meaning orientation. These shared aspects may have caused respondents to view items as interchangeable, contributing to the correlated errors.

The pleasure and meaning subscales demonstrated acceptable internal consistency within the Romanian population, with Cronbach's alpha values of .76 for both. In contrast, engagement subscale exhibited questionable internal consistency ($\alpha = .65$), a trend consistently observed across various adaptations of the original scale. For example, Ruch et al. (2010) reported $\alpha = .64$ and $\alpha = .63$ for the engagement subscale in paper-and-pencil and online samples, respectively, in German-speaking countries, whereas Chen et al. (2009) found $\alpha = .66$ in Taiwan. Similarly, the Ukrainian adaptation showed comparable reliability at $\alpha = .65$, alongside higher values for pleasure ($\alpha = .73$) and meaning ($\alpha = .80$) (Kryvenko & Petryk, 2019). Thus, although we found a low internal consistency for the engagement subscale, our results conform to prior research.

These findings may highlight the inherently multifaceted nature of engagement, which encompasses elements such as flow, absorption and immersion in activities, making it more challenging to fully capture it with a limited number of items. Unlike pleasure and meaning, which are relatively more unidimensional and consistently experienced across contexts, engagement is highly context-dependent and can vary significantly based on specific activities and individual differences in interests and skills (e.g., Csikszentmihalyi & LeFevre, 1989; Csikszentmihalyi, 1990). The diverse aspects of engagement may not be strongly interrelated, leading

to lower internal consistency coefficients. Therefore, the lower reliability observed for the engagement subscale may be due to the complexity and multidimensionality of the engagement construct itself, rather than cultural differences per se.

Concurrent validity was demonstrated through the correlations between the OTH-18 subscales and external well-being measures, such as the SWLS. As expected, the meaning orientation showed a positive correlation with life satisfaction (r = .29), aligning with previous research on the significance of meaning in overall well-being (e.g., Seligman et al., 2005; Vella-Brodrick et al., 2009). This result reinforces the idea that seeking meaning is linked to greater life satisfaction.

Orientation toward pleasure exhibited a positive correlation with anxiety (r = .19) and stress (r = .15). This finding contrasts with the general trend in the literature, where most studies report no significant associations between orientation toward pleasure and negative emotions (e.g., Bubić & Erceg, 2018; Chan, 2013). One possible explanation is that individuals might use pleasure-seeking as a means to avoid confronting the underlying sources of their stress and anxiety, potentially amplifying these emotions over time (Chen & Zeng, 2023; Mathias et al., 2024). Supporting this, Yang et al. (2017) found that orientation toward pleasure was linked with Internet addictive behavior among a sample of Chinese adolescents, a behavior associated with negative psychological outcomes like depression and anxiety (Cao et al., 2011; Ko et al., 2008; Liu et al., 2015). This finding indicates that a strong focus on pleasure may be linked to maladaptive coping strategies that can intensify stress and anxiety. However, these explanations are speculative, and further research is required to investigate the underlying mechanisms involved.

To provide a more time-efficient measure, the 9-item short version of the OTH was developed. The OTH-9 exhibited strong fit indices, supporting its factor structure. The inter-subscale correlations showed moderate to strong relationships, particularly between engagement and meaning, followed by pleasure and meaning, and pleasure and engagement. These patterns mirror those from the original OTH scale (Peterson et al., 2005), indicating that the short version retains the conceptual integrity of the full version while effectively capturing the interrelated nature of the three orientations.

The short version's pleasure and meaning subscales exhibited acceptable internal consistency (α = .66 for pleasure and α = .72 for meaning), similar to the full version, making it suitable for contexts in which brevity is essential, such as large-scale surveys. However, the engagement subscale demonstrated poor internal consistency (α = .52), which is below the acceptable threshold (Tavakol & Dennick, 2011). This raises concerns about the reliability of the engagement measure in the short version. While Cronbach's alpha is influenced by both the number of items and the inter-item correlations, a smaller number of items requires higher inter-item correlations to achieve acceptable reliability (Nunnally & Bernstein, 1994).

To address this issue, we recommend using the scale in the framework of Structural Equation Modeling (SEM), where both measurement and structural

models are jointly estimated (Kline, 2015). In our analysis, all three engagement items had acceptable factor loadings, with item 10 at .48, which was lower but still within the accepted range. Given these results, we recommend against using raw scores for the engagement subscale in the short version.

With regard to concurrent validity, the short version of the scale maintained the expected relationships with external well-being measures, thus confirming its usefulness. Notably, the meaning subscale continued to show a positive correlation with life satisfaction (r = .33), indicating that even in a reduced format, the scale effectively captures this relationship (e.g., Seligman et al., 2005; Vella-Brodrick et al., 2009). This result confirms the short version's capability to measure this essential dimension of happiness. In contrast, the pleasure subscale maintained positive correlations with anxiety (r = .17) and stress (r = .16), as observed in the full version.

The adaptation of the OTH scale offers a reliable and valid tool for measuring happiness within the Romanian context, significantly contributing to the field of positive psychology in Romania. This adaptation extends the theoretical applicability of the OTH model beyond Western cultures and confirms the validity of the concepts of pleasure, engagement, and meaning in different cultural settings. By demonstrating that these three orientations to happiness are relevant in Romania, the study supports the cross-cultural universality of these pathways while also highlighting potential nuances in how they are experienced across cultures.

In practical terms, the short version of OTH-9 provides a time-efficient tool for large-scale studies, particularly in contexts where brevity is essential. Although the engagement subscale shows lower reliability in the short version, the OTH-9 remains a useful measure for pleasure and meaning pathways. This underscores both the theoretical and practical significance of having a culturally adapted instrument that not only validates theoretical constructs but also meets the practical demands of research in the field of happiness and well-being, where time constraints and large sample sizes often necessitate the use of shorter scales.

Despite the valuable insights gained from adapting and validating the OTH scale in the Romanian context, several significant limitations undermine the study's robustness and generalizability, highlighting critical areas for future research.

First, the sample was predominantly female (88.13%), which may restrict the generalizability of the results to the broader Romanian population. This imbalance in the sample could affect the results because orientations toward happiness may vary according to gender. Therefore, future studies should strive to include a more gender-balanced sample to ensure the applicability of the OTH scale findings across genders.

Second, both versions of the engagement subscale demonstrated lower internal consistency, suggesting that caution is necessary when interpreting the engagement scores. Despite this, the scale remains an important instrument for evaluating orientations to happiness, particularly when used within a latent variable framework, such as Structural Equation Modeling (SEM). This approach allows

more accurate estimations and compensates for potential internal consistency limitations. Future research could focus on applying the scale in various cultural contexts and evaluating its use in different populations to better understand the nuances of engagement.

Finally, since we could not support the original model of the OTH using CFA, we opted for ESEM, an alternative to CFA that allows for cross-loadings, often resulting in improved goodness-of-fit indices. ESEM operates with more flexible assumptions than CFA (Fischer & Karl, 2019). Additionally, we excluded certain items based on the results from ESEM and the final CFA model. However, this approach should be regarded as exploratory, as we are proposing a potential version of the scale. Future studies will need to test whether the structure we provided holds in different populations. Until then, our results concerning OTH should be considered provisional.

Authors' Notes

Acknowledgements. For this study, we utilized the ChatGPT tool by OpenAI to assist with language optimization and text review. The use of AI did not influence data interpretation, and all analyses and conclusions were validated by the authors.

Ethical Statements. We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

We have no conflicts of interest to disclose.

References

Bubić, A., & Erceg, N. (2018). The role of decision making styles in explaining happiness. *Journal of Happiness Studies, 19*, 213-229.

Cao, H., Sun, Y., Wan, Y., Hao, J., & Tao, F. (2011). Problematic Internet use in Chinese adolescents and its relation to psychosomatic symptoms and life satisfaction. *BMC Public Health, 11*, 802. https://doi.org/10.1186/1471-2458-11-802

Chan, D. W. (2013). Subjective well-being of Hong Kong Chinese teachers: The contribution of gratitude, forgiveness, and the orientations to happiness. *Teaching and Teacher Education, 32*, 22–30. https://doi.org/10.1016/j.tate.2012.12.005

Chen, H., & Zeng, Z. (2023). Seeking pleasure is good, but avoiding pain is bad: Distinguishing hedonic approach from hedonic avoidance orientations. Journal

of Happiness Studies, 24(6), 2377–2393. https://doi.org/10.1007/s10902-023-00687-7

Chen, L. H., Tsai, Y.-M., & Chen, M.-Y. (2009). Psychometric analysis of the Orientations to Happiness Questionnaire in Taiwanese undergraduate students. *Social Indicators Research, 98*(2), 239-249. https://doi.org/10.1007/s11205-009-9473-2

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* Harper & Row.

Csikszentmihalyi, M., & LeFevre, J. (1989). Optimal experience in work and leisure. *Journal of Personality and Social Psychology, 56*(5), 815-822. https://doi.org/10.1037/0022-3514.56.5.815

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment, 49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Diener, E., Oishi, S., & Lucas, R. E. (2003). Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annual Review of Psychology, 54*, 403-425. https://doi.org/10.1146/annurev.psych.54.101601.145056

Fischer, R., & Karl, J. A. (2019). A primer to (cross-cultural) multi-group invariance testing possibilities in R. *Frontiers in Psychology, 10*, 1507. https://doi.org/10.3389/fpsyg.2019.01507

Hahs-Vaughn, D. L. (2016). *Applied Multivariate Statistical Concepts.* Taylor & Francis.

Hambleton, R. K. (1996). Guidelines for adapting educational and psychological tests: A progress report. *European Journal of Psychological Assessment, 10*(3), 229–244.

Hambleton, R. K. (2004). Issues, designs, and technical guidelines for adapting tests into multiple languages and cultures. In R. K. Hambleton, P. F. Merenda, & C. D. Spielberger (Eds.), *Adapting educational and psychological tests for cross-cultural assessment* (pp. 3–38). Lawrence Erlbaum Associates Publishers.

Henze, N., & Zirkler, B. (1990). A class of invariant consistent tests for multivariate normality. *Communications in Statistics - Theory and Methods, 19*(10), 3595–3617. https://doi.org/10.1080/03610929008830400

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations* (2nd ed.). SAGE Publications.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Ko, C. H., Yen, J. Y., Yen, C. F., Chen, C. S., & Chen, C. C. (2008). Psychiatric comorbidity of Internet addiction in college students: An interview study. *CNS Spectrums, 13*(2), 147–153. https://doi.org/10.1017/S1092852900016308

Kryvenko, I., & Petryk, G. (2019). Subjective dimension of mental health: Psychometric properties of the Ukrainian version of Orientation to Happiness Scale. *European Journal of Interdisciplinary Studies*, 11(2), 26–40. https://doi.org/10.24818/ejis.2019.07

Li, C.-H. (2016). The performance of ML, DWLS, and ULS estimation with robust corrections in structural equation models with ordinal variables. *Psychological Methods, 21*(3), 369–387. https://doi.org/10.1037/met0000093

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Lyubomirsky, S. (2007). *The how of happiness: A new approach to getting the life you want.* Penguin.

MacCallum, R., Browne, M., & Sugawara, H. (1996). Power Analysis and Determination of Sample Size for Covariance Structure Modeling. *Psychological Methods, 1*(2), 130–149. https://doi.org/10.1037/1082-989X.1.2.130

Mathias, J.-D., Pellerin, N., Carrero, G., Raufaste, E., & Dambrun, M. (2024). Running on the hedonic treadmill: A dynamical model of happiness based on an approach–avoidance framework. Journal of Happiness Studies, 25, 58. https://doi.org/10.1007/s10902-024-00766-3

Mîndrilã, D. (2010). Maximum likelihood (ML) and diagonally weighted least squares (DWLS) estimation procedures: A comparison of estimation bias with ordinal and multivariate non-normal data. *International Journal of Digital Society, 1*(1), 60–66.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Peterson, C., Park, N., & Seligman, M. E. P. (2005). Orientations to happiness and life satisfaction: The full life versus the empty life. *Journal of Happiness Studies, 6*(1), 25-41. https://doi.org/10.1007/s10902-004-1278-z

Peterson, R. A. (1994). A Meta-analysis of Cronbach's Coefficient Alpha. *Journal of Consumer Research, 21*(2), 381–391.

Posit team. (2023). RStudio: Integrated Development Environment for R. [Computer software]. Posit Software, PBC, Boston, MA. http://www.posit.co/

Rosseel, Y., Jorgensen, T. D., Wilde, L. D., Oberski, D., Byrnes, J., Vanbrabant, L., Savalei, V., Merkle, E., Hallquist, M., Rhemtulla, M., Katsikatsou, M., Barendse, M., Rockwood, N., Scharf, F., Du, H., Jamil, H., & Classe, F. (2024). *lavaan: Latent Variable Analysis* (Version 0.6-18) [Computer software]. https://cran.r-project.org/web/packages/lavaan/index.html

Ruch, W., Harzer, C., Proyer, R. T., Park, N., & Peterson, C. (2010). Ways to happiness in German-speaking countries. *European Journal of Psychological Assessment, 26*(3), 227–234. https://doi.org/10.1027/1015-5759/a000030

Ruch, W., Martínez-Martí, M. L., Heintz, S., & Brouwers, S. A. (2014). Short form of the Orientations to Happiness Questionnaire for the German-speaking countries: Development and analysis of the psychometric properties. *Swiss Journal of Psychology, 73*(4), 225–234. https://doi.org/10.1024/1421-0185/a000141

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*(6), 1069–1081. https://doi.org/10.1037/0022-3514.57.6.1069

Ryff, C. D., & Singer, B. H. (2008). Know thyself and become what you are: A eudaimonic approach to psychological well-being. *Journal of Happiness Studies, 9*(1), 13–39. https://doi.org/10.1007/s10902-006-9019-0

Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment.* Free Press.

Stevens, M. J., Constantinescu, P.-M., Lambru, I., Butucescu, A., Sandu, C. G., & Uscătescu, L. (2012). Romanian adaptation of the Satisfaction with Life Scale. *Journal of Psychological and Educational Research, 20*(1), 17–33.

Swart, J., & Rothmann, S. (2012). Authentic happiness of managers, and individual and organisational outcomes. *South African Journal of Psychology, 42*(4), 492-508.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd

Vella-Brodrick, D. A., Park, N., & Peterson, C. (2009). Three ways to be happy: Pleasure, engagement, and meaning – Findings from Australian and US samples. *Social Indicators Research, 90*(2), 165-179. https://doi.org/10.1007/s11205-008-9251-6

Whittaker, T. A. (2012). Using the Modification Index and Standardized Expected Parameter Change for Model Modification. *The Journal of Experimental Education, 80*(1), 26–44. https://doi.org/10.1080/00220973.2010.531299

Yang, Y., Li, P., Fu, X., & Kou, Y. (2017). Orientations to happiness and subjective well-being in Chinese adolescents: The roles of prosocial behavior and internet addictive behavior. *Journal of Happiness Studies, 18*, 1747-1762.

JOURNAL OF EVIDENCE-BASED PSYCHOTHERAPIES

Volume XXV CONTENTS Number 1

CONTENTS

ARTICLES SECTION

ISSN 2360 – 0853
ISSN-L 2360 – 0853