North Clin Istanb 2025;12(1):111–120
doi: 10.14744/nci.2024.61224

Original Article BASIC MEDICAL SCIENCES

Mediating effect of psychological resilience in the relationship between cognitive emotion regulation and emotional well-being of medical students

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ABSTRACT

OBJECTIVE: Medical students try to cope with challenging emotional experiences caused by stress factors specific to medical education during their education. In this process, students' cognitive emotion regulation (CER) strategies and psychological resilience (PR) act as protective mechanisms to alleviate the impact of challenging emotions. Therefore, it is important for medical students to use adaptive emotion regulation strategies and demonstrate psychological resilience in the face of challenging emotional experiences. This study aimed to reveal the effects of CER strategies and PR on the emotional well-being (EWB) of medical students and the mediating effect of PR in the relationship between CER strategies and EWB.

METHODS: In this study, Structural Equation Modeling (SEM) was used to determine the mediating effect of PR in the relationship between CER strategies and EWB. The sample of the study consisted of 210 students who were randomly selected from the 1st and 4th year medical students and volunteered to participate in the study. Cognitive Emotion Regulation Scale, Psychological Resilience Scale and Emotional Well-Being Scale, which are the data collection tools of the study, were administered to the participants face-to-face by the researchers. Descriptive statistics and correlations were analyzed with SPSS 26. The SEM was analyzed with Jamovi 2.3.19 SEM module and R 4.1.1 Iavaan package.

RESULTS: 54.8% (n=115) of the participants were 1st-grade and 45.2% (n=95) were 4th-grade students; 54.8% were male and 45.2% were female. The results of SEM analysis showed that the relationship between adaptive CER strategies in the two sub-scales (refocusing on plan; β=0.088, p=0.011 and positive reappraisal; β=0.175, p<0.001) and EWB was found to be mediated by the commitment sub-scale of PR.

CONCLUSION: This study showed that the relationship between positive reappraisal and refocusing on a plan, which are adaptive CER strategies, and EWB was mediated by PR-commitment. These results indicate that CER and PR stand out as concepts that support students' EWB in medical education.

Keywords: Cognitive emotion regulation; emotional well-being; medical students; resilience.

Cite this article as: *Yurtsever Gurkan S, Akdeniz E, Gulpinar MA. Mediating effect of psychological resilience in the relationship between cognitive emotion regulation and emotional well-being of medical students. North Clin Istanb 2025;12(1):111–120.*

Medical students undergo a stressful educational process due to the challenging nature of medical education [1–3]. The difficulty of the medical education program, competitive environment, workload, high performance expectation, lack of free time, ethical dilemmas, financial difficulties, challenging exams and clinical experiences are stress factors that strain students' personal resources and emotional well-being [4–6]. An important dimension of difficult and stressful experiences is emotional experiences. In this process, individuals may experience negative emotions such as anger, anxiety, sadness, grief, helplessness, disappointment, and guilt,

Received: October 01, 2024 *Revised:* November 11, 2024 *Accepted:* November 20, 2024 *Online:* February 04, 2025

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and they try to regulate their emotions to alleviate the impact of these emotions [7, 8]. Studies show that medical students prefer to use cognitive emotion regulation strategies to regulate their emotions in their educational and professional lives [9]. Cognitive emotion regulation strategies (CER) are defined as conscious mental processes that individuals use to regulate their emotions. Garnefski and Kraaij [10] classified cognitive emotion regulation strategies as adaptive and maladaptive strategies. Adaptive CER strategies consist of acceptance, refocusing on a plan, positive refocusing, positive reappraisal, and putting into perspective. Maladaptive CER strategies include components of self-blame, blaming others, rumination, and catastrophizing. Although medical students are generally thought to use adaptive emotion regulation strategies, some studies show that these students do not have sufficient psychological resilience (PR) against the effects of negative emotions [7].

Psychological resilience, which consists of commitment, challenge, and control components, is an individual's capacity to adapt to and resist stressors in environments with risky and uncertain conditions [11]. Individuals with high resilience with positive cognitive appraisal generally use adaptive CER strategies against stress. Furthermore, research shows that PR is a mechanism that increases emotional well-being (EWB) through its interaction with cognitive emotion regulation [12–16]. EWB is defined as an individual's emotional evaluation of the frequency of experiencing positive and negative emotions and the balance between them [17]. According to Sonika et al. [5], positive EWB is an important personality element for a medical student in terms of professional and personal satisfaction.

When considered in the complex context of medical education, emotion regulation skills and psychological resilience are seen as sources of strength that enhance students' emotional well-being. Integration of these concepts will improve students' ability to cope with stress and increase both academic achievement and professional competence, which will enable them to be more effective in healthcare delivery. At this point, it is important to provide evidence in this direction through quantitative and qualitative studies focusing on learner characteristics in the context of the key concepts of this study, namely CER, PR and EWB.

The number of studies addressing the mechanisms of influence between these concepts is insufficient in the literature. In this study, whose conceptual framework is drawn within the scope of cognitive and positive psychology theories, it is aimed to reveal the relationship between CER strategies, psychological resilience and emotional well-being of medical students and the mediating effect of PR in the relationship between CER strategies and EWB. In this direction, the research hypotheses were formed as follows:

Highlight key points

- There was a positive relationship between adaptive CER strategies and PR and EWB, and a negative relationship between maladaptive CER strategies and EWB.
- There was a strong positive relationship between the "commitment" sub-scales of PR and EWB and a weak positive relationship with the other two sub-scales.
- The relationship between CER- refocusing on the plan and CER- positive reappraisal and EWB is mediated by PR-commitment.

H.1. There is a significant positive relationship between the sub-scales of adaptive cognitive emotion regulation strategies and emotional well-being and psychological resilience sub-scales.

H.2. There is a significant negative relationship between maladaptive cognitive emotion regulation strategies and emotional well-being and psychological resilience sub-scales.

H.3. There is a significant positive relationship between psychological resilience sub-scales and emotional well-being.

H.4. The relationship between cognitive emotion regulation strategies sub-scales and emotional well-being is mediated by psychological resilience sub-scales.

MATERIALS AND METHODS

Research Model

In this study designed in a relational survey model, structural equation modeling (SEM) was used to determine the mediating role of psychological resilience in the relationship between students' cognitive emotion regulation strategies and emotional well-being. SEM is a comprehensive statistical approach that aims to reveal complex relationships and direct and indirect effects between multiple variables more clearly and is used to test hypotheses about "causal" relationships [18]. In this model, the exogenous variable (X = predictor) was CER strategies and the endogenous variable (Y = predicted) was EWB. PR was de-

fined as the mediating variable (M). All main variables were defined as latent variables and the sub-dimensions of the main variables were defined as observed variables (Fig. 1). The sample of the study consisted of 210 students who were randomly selected from the 1st (n=115) and 4th (n=95) year medical students of Marmara University Faculty of Medicine in the 2021-2022 academic year. This study was conducted in accordance with the 1989 Declaration of Helsinki and was approved by the Ethics Committee of Marmara University Faculty of Medicine (date: 06.12.2019, protocol no: 09.12.1092).

Data Collection Tools

Simsek's [17] "Emotional Well-Being Scale" was used to determine the EWB of the students, Onat and Otrar's [19] "Cognitive Emotion Regulation Scale" to determine their CER strategies, and Isik's [14] "Psychological Hardiness Scale" to determine their PR. Before the application, an explanation was made about the purpose and importance of the research, the principle of confidentiality and volunteerism was taken as a basis, and data were collected between April and May 2022 with a face-to-face application lasting 15–20 minutes.

Emotional Well-Being Scale (EWBS)

EWBS developed by Simsek [17] consists of two subscales, positive and negative well-being, and 14 items. In the five-point Likert-type scale, each item is graded as 1-very little or none, 2-somewhat, 3-medium, 4-somewhat more, 5-very much. As a result of confirmatory factor analysis (CFA) of the scale, goodness of fit indices values were found to be good [χ^2=153.6, df=75, χ^2/df=2.02, CFI=0.97, GFI=0.94, RMSEA=0.056, SRMR=0.043]. In addition, the Cronbach-Alpha's internal consistency coefficient for reliability was 0.89 and 0.88 for the two factors.

Cognitive Emotion Regulation Scale (CERS)

This scale was developed by Garnefski and Kraaij [10] to determine the CER strategies used by individuals in the face of stressful life events and was adapted to Turkish culture by Onat and Otrar [19]. The scale consists of nine sub-scales and 36 items in total: "self-blame", "acceptance", "rumination", "positive refocusing", "refocusing on plan", "positive reappraisal", "putting into perspective", "catastrophizing" and "blaming others". In the five-point Likert-type scale, each item is rated as 1-almost never, 2-rarely, 3-sometimes, 4-frequently, 5-almost always. The Turkish adaptation, validity and reliability studies of the scale were conducted by Onat and Otrar [19] and the Cronbach Alpha's value was 0.784 and the test-retest reliability coefficient was 1.00.

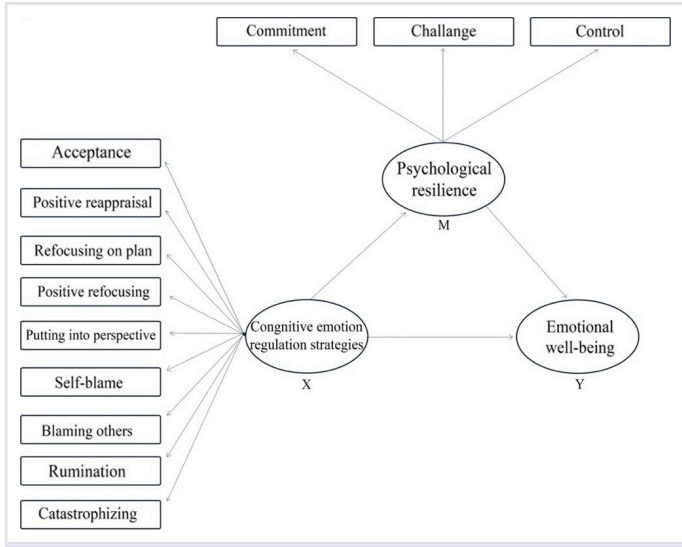

FIGURE 1. The conceptual model of the study.

Psychological Hardiness Scale (PHS)

This scale was developed by Isik [14] consists of 21 items and 3 sub-scales (challenge, commitment, and control). In the five-point Likert-type scale, each item is graded as 0-strongly disagree, 1-disagree, 2-neither agree nor disagree, 3-agree, 4-strongly agree. As a result of CFA of the scale, goodness of fit index values were found to be good [χ^2=226.32, df=82, χ^2/df=2.76, CFI=0.91, RMSEA=0.06, SRMR=0.06]. In addition, the Cronbach-Alpha's internal consistency coefficient for reliability varies between 0.62 and 0.76.

Data Analysis

The data set consisted of 210 observations. The normality of the variables was checked using QQ plots, Shapiro Wilk's test, skewness and kurtosis coefficients. The variables are summarized using mean and standard deviation if they met the normality assumption.

Structural equation model (SEM) was used to test the mediating role of psychological resilience (hardiness) in the relationship between CER strategies and EWB of medical students. The conceptual model of the study is shown in Figure 1.

Table 1. Descriptive statistics for the scales

	Mean	Standard deviation	Minimum–Maximum
1. Cognitive emotion regulation strategies (CERS)			
1.1. Adaptive CERS			
1.1.1 Acceptance	3.32	0.74	1.5–5.00
1.1.2 Refocusing on plan	3.7	0.73	1.75–5.00
1.1.3 Positive refocusing	3.05	0.87	1.00–5.00
1.1.4 Positive reappraisal	3.51	0,8	1.00–5.00
1.1.5 Putting into perspective	3.06	0.76	1.00–5.00
1.2. Maladaptive CERS			
1.2.1 Self–blame	3.1	0.82	1.00–5.00
1.2.2 Blaming others	2.46	0.77	1.00–4.75
1.2.3 Rumination	3.72	0.85	1.00–5.00
1.2.4 Catastrophising	2.26	0.85	1.00–5.00
Total	3.13	0.4	1.83–4.4
2. Psychological resilience			
2.1 Commitment	2.34	0.66	0.17–3.83
2.2 Challenge	3.01	0.55	1.17–4.00
2.3 Control	2.57	0.58	1.00–4.00
Total	2.66	0.48	1.33–3.72
3. Emotional well-being	3.41	0.74	1.3–4.93

Table 2. The goodness of fit indices values for the SEM

Fit index	Value	Result	Range
χ^2/sd	1.989 (5967/3)	Good fit	0≤ χ^2/sd≤2 (good fit); 2≤ χ^2/sd≤3 (acceptable fit)
RMSEA	0.069	Good fit	0≤RMSEA≤0.05 (good fit); 0.05≤RMSEA≤0.08 (acceptable fit)
SRMR	0.021	Good fit	0≤SRMR≤0.05 (good fit); 0.05≤SRMR≤1.00 (acceptable fit)
NFI	0.994	Good fit	0,95≤NFI≤1,00 (good fit); 0.90≤NFI≤0.95 (acceptable fit)
CFI	0.997	Good fit	0.95≤CFI≤1,00 (good fit); 0.90≤CFI≤0.95 (acceptable fit)
TLI	0.911	Acceptable fit	0.95≤GFI≤1.00 (good fit); 09.0≤GFI≤0.95 (acceptable fit)
IFI	0.997	Good fit	0.95≤IFI≤1.00 (good fit); 0.90≤IFI≤0.95 (acceptable fit)

RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized-Root Mean Square Residual; CFI: Comparative Fit Indices; TLI: Tucker-Lewis Index; IFI: Incremental Fit Index; NFI: Normed Fit Index.

The SEM analysis pre-process consisted of three stages. In the first step, Cronbach's alpha (α) and McDonald's omega (ω) were calculated to assess the inter-item internal consistency of the constructs; average variance error (AVE) and composite reliability (CR) were calculated for convergent validity. Cronbach Alpha's, McDonald's omega and CR ≥0.70, the AVE ≥0.50 are considered acceptable [20]. In the second step, the scales were summarized using descriptive statistics (Table 1) and Pearson correlation analysis was conducted to measure the strength of relation between the scales within the scope of the first, second and third research hypotheses. In the third step, measurement model goodness-of-fit indices were calculated, and items with factor scores lower than 0.3 were removed (13^{th} item of the CER scale and the 3^{rd}, 12^{th}, and 15^{th} items of the PR scale) and modification indices larger than 10 were corrected due to their negative impact on the model's goodness-of-fit indices [21]. SEM fit indices were evaluat-

TABLE 3. Path analysis results of the mediation model

Effect	Paths	Indirect effect coefficient (β)	95% confidence interval	
			Lower	Higher
Refocusing on plan — Commitment — Emotional well-being				
Direct	axb	0.088	0.021	0.160
Indirect	c	-0.109	-0.239	0.016
Total	c+axb	-0.008	-0.149	0.133
Positive reappraisal — Commitment — Emotional well-being				
Direct	axb	0.175	0.079	0.247
Indirect	c	0.121	-0.031	0.255
Total	c+axb	0.307	0.135	0.436

ed according to the range criteria in Table 2 [22]. Within the scope of the fourth research hypothesis, SEM analysis was conducted by using the diagonally weighted least squares (DWLS) estimation parameter. Finally, a 95% confidence interval and 5000 resampling methods were selected in the "bootstrapping" analysis to determine the significance of the values in the model in larger samples. The significant SEM analysis results are shown in Table 3.

Descriptive statistics and correlations were calculated with SPSS 26 (Armonk, New York: IBM Corp.), whereas Jamovi 2.3.19 SEM module (Sydney, Australia) was used to fit the SEM.

RESULTS

The results of the scales used in the study were calculated with the guidance of the original assessment guidelines of the scales. Correlations and SEM analysis were conducted by calculating the arithmetic mean of the scores obtained from all items in the sub-dimensions of each scale.

Internal Consistency

For the EWBS, Cronbach's alpha internal consistency coefficient was 0.89 and 0.86 for both factors, McDonald's omega was 0.89 and 0.87, AVE was 0.62 and 0.68, and CR was 0.92–0.94. In the sub-scales of CERS, Cronbach's alpha internal consistency coefficient ranged between 0.64–0.81, McDonald's omega 0.65–0.81, AVE between 0.30–0.52, CR 0.92–0.81. The Cronbach's alpha internal consistency coefficient of the PR sub-scales ranged between 0.49–0.75, McDonald's Omega ranged between 0.51–0.76, AVE 0.17–0.31, CR 0.51–0.76.

Descriptives and Correlations

As seen in Table 1, the averages of all sub-scales of adaptive CER strategies and the sub-scales of maladaptive CER-self-blame and rumination were calculated above three, while the averages of maladaptive CER-blame others and - catastrophizing sub-scales were calculated below three. In all three sub-scales of the PR, the values are close to or below three, and in the EWB, they are above three.

Pearson correlation analysis results show that, within the scope of the first research hypothesis, there was a weak positive correlation (r=0.2) between adaptive CER-refocusing on plan and EWB; and a moderate positive correlation between PR sub-scales of commitment (r=0.43), challenge (r=0.39) and control (r=0.41). Among the adaptive CER strategies, a weak positive relationship was found between "positive refocusing" and EWB (r=0.27), while a moderate positive relationship was found between "positive reappraisal" and EWB (r=0.45), a moderate positive relationship with the PR-commitment (r=0.49) and PR-control (r=0.37) and a strong positive relationship with PR-challenge (r=0.51). There was a weak positive relationship between CER-putting into perspective" and the PR sub-scales of commitment (r=0.2) and challenge (r=0.3).

Within the scope of the second research hypothesis, while there was a moderate negative relationship between self-blame (r=-0.35) and catastrophizing (r=-0.39) subscales of maladaptive CER strategies and EWB, and a weak negative relationship between blaming others (r=-0.26) and EWB; a weak positive relationship was found between CER-rumination and PR-challenge (r=0.25); the relationships between the others were very weak or negligible.

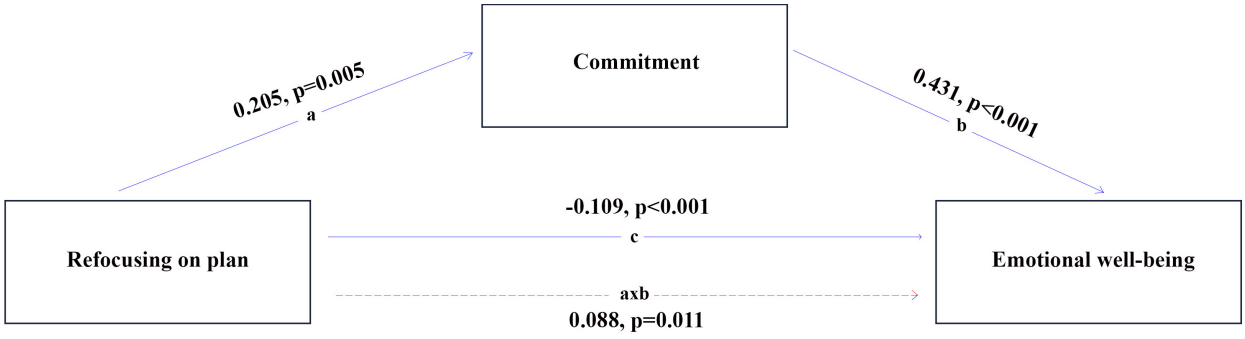

Figure 2. SEM analysis results for the mediating effect of PR-commitment on the relationship between CER-refocusing on plan and EWB.

The effect of the CER-refocusing on plan sub-scales on the EWB (β=-0.109, p<0.001) and PR-commitment (β=0.205, p<0.001), and the effect of PR-commitment on the EWB (β=0.431, p<0.001) is significant. The results of the mediation analysis indicate that the relationship between refocusing on plan and EWB is mediated by the PR-commitment (β=0.088, p=0.011).

Figure 3. SEM analysis results for the mediating effect of PR-commitment on the relationship between CER-positive reappraisal and EWB.

The effects of CER-positive reappraisal on EWB (β=-0.121, p<0.001) and PR-commitment (β=0.406, p<0.001) and PR-commitment on EWB (β=0.431, p<0.001) are significant. The results of the mediation analysis indicate that the relationship between positive reappraisal and EWB is mediated by the PR-commitment (β=0.175, p<0.001).

Finally, within the scope of the third research hypothesis, there was a high positive correlation between EWB and PR sub-scales of commitment (r=0.53) and a weak positive correlation between challenge (r=0.26) and control (r=0.32). In this case, it was determined that hypotheses H1 and H3 were confirmed and hypothesis H2 was partially confirmed.

Measurement Model Goodness-of-fit Indices

As a result of the CFA the scales in the study showed good and acceptable fit (EWBS [χ^2=607.69, df=523, χ^2/df=1.161, CFI=0.97, TLI=0.97, IFI=0.97, RMSEA=0.028, SRMR=0.073]; for the CERS [χ^2=160.14, df=72, χ^2/df=2.22, CFI=0.94, TLI=0.92, IFI=0.94, RMSEA=0.076, SRMR=0.05]; for PHS [χ^2=271.68, df=185, χ^2/df=1.47, CFI=0.94, TLI=0.94, TLI=0.93, IFI=0.94, RMSEA=0.0047, SRMR=0.081]). The goodness of fit indices values for the SEM are shown in Table 2.

SEM Analysis Results

Within the scope of the fourth research hypothesis, the findings and path coefficients of the variables with significant mediation effect as a result of the SEM are shown in detail in Table 3, Figure 2 and Figure 3. The relationship between adaptive CER strategies of refocusing on plan (β=0.088, p=0.011) and positive reappraisal (β=0.175, p<0.001) and EWB was found to be mediated by the PR-commitment (Table 3). The relationship between other adaptive CER strategies and all maladaptive CER strategies and EWB was not mediated by the three sub-scales of PR.

DISCUSSION

In the present study, the first findings of the correlation analyses were that there was a positive relationship between adaptive CER strategies and PR and EWB and a negative relationship between maladaptive CER strategies and EWB. These findings are consistent with "the broaden and build" theory [23]. According to the theory, positive emotional structures contribute to the expansion and development of cognitive processes and enable the individual to gain resilience and well-being. This draws attention to the importance of the cognitive system in the regulation of emotions. It also emphasizes the relationship between PR and positive EWB. Howe et al. [13] stated that adaptive coping mechanisms increase PR in medical students.

In our study, there is evidence that the relationship between maladaptive CER and EWB is negative. Considering the related literature, negative emotional constructs may narrow the attention and focus of the individual and direct them to danger and threat situations. This situation may negatively affect the individual's creativity, effective problem solving and coping skills and may be negatively related to PR and EWB [23, 24]. In this study, the relationship between maladaptive CER strategies and PR was found to be very weak/negligible. The weak relationship between maladaptive CER strategies and PR can be explained by various cultural or situational factors. However, since there is not enough research in medical education in this direction, it would be early to make such explanations. There is a need to strengthen research and evidence in this direction, including cross-cultural studies, for a more concrete explanation. When considered together with the literature, it is important to reveal the positive effects of adaptive emotion regulation strategies on PR and EWB, and this study has provided evidence to the literature in this direction. However, at this point, it is useful to consider the positive effects of negative emotional constructs on cognitive processes and PR within the framework of the holistic perspective on well-being brought by second-wave positive psychology researchers such as Wong [25]. David [26] also acknowledges the importance of positive emotional constructs in terms of well-being with the concept of "emotional agility" but emphasizes that attributing excessive importance to positive emotional constructs may prevent a person from facing negative emotions and living a life in line with goals. From this perspective, considering emotional constructs as a whole will enable us to make a more explanatory assessment of the continuity of medical students' well-being and psychological resilience. At this point, it is possible to say that the determinant of EWB is not only the positive or negative emotional experiences but also the combination of these experiences with compatible and maladaptive CER strategies. In parallel with our research, although there are various studies that show that the use of adaptive cognitive coping strategies increases PR in medical school students [13, 27]; there are not enough studies investigating the direct effects of CER strategies on PR and EWB in the context of medical school.

In our study, in line with the third hypothesis, the relationship between PR and EWB was analyzed, and it was revealed that there was a strong positive relationship between the "commitment" sub-scales of PR and EWB and a weak positive relationship with the other two subscales. Again, in line with the fourth hypothesis, in the analysis conducted to determine the mediating effect of PR in the interaction between CER strategies and EWB, it was determined that the PR-commitment mediated the effect between two sub-scales of adaptive CER strategies (refocusing on plan and positive reappraisal) and EWB. These findings are supported by the studies conducted by Shakarami et al. [28] and Souri and Hasanirad [29] found that PR predicted psychological well-being in their study with medical students. Other studies [4, 6, 30] also emphasized the positive relationship between PR and well-being. However, Sonika et al. [5] did not find a significant relationship between PR levels and psychological well-being of medical students but showed that there was a significant relationship between high levels of resilience and finding purpose in life. Finding purpose in life is one of the components of well-being and commitment, one of the sub-scales of PR, is related to finding purpose in life.

Another well-being component associated with commitment is life satisfaction [31]. Commitment strengthens individuals' determination and self-efficacy perception in achieving life purpose and satisfaction [16]. Self-efficacy refers to individuals' beliefs about their ability to accomplish a specific task and this belief can increase their ability to cope with stressful situations. High self-efficacy strengthens PR by improving individuals' emotion regulation skills, and this increases individuals' EWB [32]. Combined with the findings of our study, it is seen that PR-commitment has a positive effect on EWB as a predictor of components such as finding purpose in life, life satisfaction, and self-efficacy, and mediates the effect between adaptive CER strategies and EWB. The

mediating effect of PR-commitment in the relationship between adaptive CER strategies and EWB is supported by the studies conducted by Sonika et al. [5] and Ursu and Măirean [15]. Gumus and Ornek [33] also found that CER such as positive reappraisal and refocusing on plan strengthened the relationship between proactive coping and psychological resilience. In general, these findings, including our study, indicate that adaptive CER strategies can make students more resilient by psychologically empowering them.

In the present study, the two emotional regulation strategies in terms of EWB were refocusing on plan and positive reappraisal, and the PR component mediating their effect on EWB was identified as commitment. The related literature indicates that through positive reappraisal, individuals can expand their perspectives and improve in the face of difficulties and thus increase psychological resilience [6]. Refocusing on the plan involves one's thoughts about the steps to be taken to solve the problem and represents more proactive coping methods [33]. Positive reappraisal has also been shown to increase positive emotional well-being by reducing trauma-induced depression over time [34]. It is argued that people who use positive reappraisal and refocusing on plan strategies more intensively in the face of stressful situations experience less anxiety and depression and thus strengthen their psychological resilience. These effects of positive reappraisal and refocusing on plan on PR and positive EWB may enable medical students to balance their reactions to stress and use positive coping strategies with higher levels of psychological resilience [5]. Erguner [31] found that PR-commitment reduces the negative effects of stress on life satisfaction by changing physicians' perception of stress. Due to the intense stress exposure in medical students, these sub-scales can directly reduce the effects of perceived stress as a source of personal strength.

There are studies investigating the mediating role of psychological resilience among various variables in medical school. For example, Shi et al. [4] emphasized the mediating role of resilience in the relationship between strong personal traits such as agreeableness, extraversion, conscientiousness, and anxiety. Yu and Chae [35] emphasized the mediating effect of resilience on the relationship between academic burnout and psychological well-being in medical students. Aydin [36] determined that resilience mediated the relationship between learning approaches and psychological well-being. These findings draw attention to the fact that the effects of PR on EWB are multifaceted/component and interactive/possibility.

Limitations

This study is limited by the nature, scope and dimensions of the instruments used. Data collected from a single institution and student participation representing only two-year groups limit the representativeness of the sample. Collecting data only in one semester and towards the end of the year may lead to ignoring the effects of seasonal effects and other factors that change over time. Therefore, repeating similar studies with students in the following years will provide a more detailed and holistic picture of all years. Again, by using different scales related to CER, PR and EWB, limitations related to the structure of the scale can be reduced, different components and interactions between components can be revealed, and in this way, the conceptual and theoretical framework of students' EWB can be strengthened.

Conclusion

This study was conducted within the framework of a theoretical model focusing on the relationship mechanisms between CER strategies, PR, and EWB. The results revealed the relationships between adaptive and maladaptive CER, PR, and EWB; in particular, the relationship between adaptive CER strategies, positive reappraisal and refocusing on plan, and EWB was mediated by the PR-commitment. These results indicate that CER and PR stand out as concepts that support students' EWB in medical education. Interventions that increase PR can reduce the negative effects of stress and burnout in medical students and help students cope with difficult experiences.

To the extent that we were able to access through our literature review, this is the first study in the literature to examine the relationship between medical students' CER strategies, PR, and EWB. Although our findings provide evidence for practitioners to increase the EWB and PR of medical students through various training and counseling practices, the evidence needs to be strengthened with new research to be conducted in this direction. In this way, the quality of psycho-education programs and group counseling activities that aim to improve the well-being of learners and develop life skills such as coping with stress, self-regulation, self-efficacy, emotion regulation, mindfulness, and group counseling activities can be strengthened. Multi-component medical education programs can be designed, and practices such as reflection sessions and peer discussions, which are known to increase the well-being of learners, can be included

more in the education program. An institutional culture that supports interventions to increase learners' PR and EWB and facilitates access to mental health services for students in need may become more possible. Learners' PR and EWB can be supported by creating a learning environment where learners can establish social relationships, have positive role models, monitor psychological well-being and provide effective mentoring support.

Ethics Committee Approval: The Marmara University Clinical Research Ethics Committee granted approval for this study (date: 06.12.2019, number: 09.12.1092).

Authorship Contributions: Concept – MAG, SYG; Design – MAG, EA, SYG; Supervision – MAG, EA; Data collection and/or processing – EA, SYG; Analysis and/or interpretation – MAG, EA, SYG; Literature review – SYG; Writing – MAG, SYG; Critical review – MAG, EA.

Conflict of Interest: No conflict of interest was declared by the authors.

Use of AI for Writing Assistance: This study did not use artificial intelligence (AI) assisted technologies (such as Large Language Models [LLMs], chatbots or image generators).

Financial Disclosure: The authors declared that this study has received no financial support.

Peer-review: Externally peer-reviewed.

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