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The Relationship between Resilience and Mindfulness with Mental toughness by the Mediating Role of Self-Compassion in Cancer Patients

Maryam Abedini[1*], Ali Yaghobi Joibari[2]

1. Department of psychology, Payam Noor University, Tehran, Iran
2. Department of Radiation Oncology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

*Corresponding Author:
Maryam Abedini
Department of psychology
Payam Noor University
Tehran, Iran

Email: abedini@pnu.ac.ir

ABSTRACT

Object: The aim of this study was to evaluate the relationship between resilience and mindfulness with mental toughness mediated by self-compassion in cancer patients.
Method: The method of this research is descriptive and the correlational research design is structural equation modeling. The statistical population in this study included cancer patients in 1399 who were selected by purposive sampling. The sample consisted of 200 cancer patients (male and female) referred to the Oncology Clinical Center of Imam Hossein Hospital in Tehran. To collect data from the Short Form of Mindfulness Mind Scale, the Resilience Scale, the Compassion Scale Form, and the mental toughness Scale were used. The bootstrap method was used to analyze the intermediate relationships.
Results: The results showed that the direct effect of resilience and mindfulness on self-compassion was significant with coefficients of (0.27) and (0.29). The direct effect of mindfulness on mental toughness, (0.056) was not significant, but the direct effect of resilience on mental toughness (0.31) was significant. The indirect effects of resilience and mindfulness on mental toughness with mediating role of self- compassion were significant respectively with coefficients (0.089) and (0.092).
Conclusion: The results of the research have practical implications for health professionals and psychologists and it can be concluded that Resilience and Mindfulness by the mediating role of self-compassion effects on the mental toughness of cancer patients.

Keywords: Resilience, Mental toughness, Mindfulness, Self-compassion

INTRODUCTION:

Communication pattern of resilience and mindfulness with mental toughness by the mediating role of self-compassion in cancer patients. After cardiovascular disease, Cancer is the second cause of mortality in human societies, and despite medical advances, it is considered a deadly disease by most people [1]. Therefore, it is one of the major public health concerns [2], which by 2018 was the leading cause of death for more than 9.6 million people worldwide, and it is estimated that by 2030, about 22.1 million people will be infected [3]. Cancer includes a group of diseases characterized by uncontrolled growth and abnormal cell proliferation [3]. People with cancer suffer physical (such as constant fatigue, shortness of breath, sleep and endocrine problems, increased risk of common chronic diseases such as heart attack and osteoporosis, etc.) and psychological consequences (such as depression, anxiety, cognitive disorders, negative thoughts, fear of disease recurrence and death, loneliness, etc.) [4]. In general, the diagnosis of cancer results in very deep emotional problems and psychological distress in patients [5] and can affect the patient's mental toughness. Mental toughness is an important structure in cancer patients. Mental toughness leads to flexibility and adaptability to difficult disease and treatment conditions for cancer patients and helps them to a more adaptable reaction. Mental toughness is one of the personality traits by which a person can effectively solve interpersonal problems and stresses, and uses it in high-pressure situations as a source of resistance and a protective shield [6].

Resilience is a variable that can be effective in stressful conditions, including cancer, as a positive factor and stress reliever. According to Zautra, Hall & Murray [7], the best definition of resilience is to consider it as a successful adaptation to adverse conditions. People with high resilience experience more resistance to encountering unavoidable trauma and stress, are more likely to find positive meaning in the stresses they experience and face the challenges of their lives effectively, and flexibly adapt to the pressures of their lives [8]. This variable can help improve the psychological condition of people after cancer, which is considered one of the most stressful situations, by affecting other psychological variables. Feizi, et al reported a significant relationship between resilience and mental toughness and found that resilience plays a role in predicting students' mental strength [9]. The mental toughness of cancer patients can be affected by mindfulness. Mindfulness is defined as the state of arousal and awareness of what is happening. This attention is purposeful attention, along with the non-judgmental acceptance of current experiences. Mindfulness enables one to respond to events with thought and reflection [10] instead and enrich life meaning [11], health [12], and high life satisfaction [13]. It also affects depression, anxiety, hope [14], resilience, and cognitive regulation of emotion [15, 16]. According to the conducted research by Arianpour, et al and Goodarzi, at al [17], mindfulness has a significant effect on reducing competitive anxiety, and increasing athletic self-confidence, and mental strength of wrestlers. The results of Zarei's research [18] showed that there was a positive relationship between mental toughness and marital adjustment and mindfulness. Wu et al [19] reported a significant relationship between mindfulness and mental toughness. Pang & Ruch [20] found a relationship between mindfulness and mental toughness.

Examining the theoretical and research backgrounds, it was found that self-compassion is one of the mediating variables in the relationship between resilience and mindfulness with mental toughness and affects the effect of these variables. Self-compassion is self-acceptance, or acceptance of one's experience in the context of self-compassion, self-understanding rather than judgment, and supporting one's own shortcomings [21-23]. People with higher self-compassion are more adaptable to problems and difficulties, and less emotionally disturbed [24]. Mohammadi and Roshan Chelsi [25] reported in a study that mindfulness explains the variance of self-compassion. According to the results of Rasaei [26)], the mindfulness variable is a significant predictor of compassion. Kotera, Green & Sheffield [27] showed that self-compassion also partially mediated the rela-

tionship between resilience and emotional well-being. Lefebvre, Montani & Courcy, and Baker [28,29] showed that employees with resilience have high compassion and there is basically a positive and significant relationship between self-compassion and resilience . McArthur et al [30] found resilience plays a role in predicting students' self-compassion and mindfulness. Considering the increasing incidence of cancer in society and the subsequent numerous physical and psychological problems for individuals, it is necessary to develop appropriate psychological intervention programs to help improve the psychological condition and quality of life of these patients. Therefore, effective psychological characteristics in high-stress conditions should be identified, and intervention and support programs should be designed based on them. In this study, according to theories, theoretical knowledge, and reviewing research backgrounds, effective psychological variables and positive personal characteristics in these conditions were selected and a conceptual model of the research was proposed based on the relationships between them.

According to the explanations, this study aimed to evaluate the fit of communication patterns of resilience and mindfulness with mental toughness and the mediating role of self-compassion in cancer patients which is illustrated in figure 1.

Research Methods:

The research method of this study is descriptive, and its design is a correlation of structural equation modeling (SEM). Structural equation modeling (SEM) is a set of statistical techniques used to measure and analyze the relationships between observed and latent variables. Similar but more powerful than regression analyses, it examines linear causal relationships among variables, while simultaneously accounting for measurement error. Its applications range from the analysis of simple relationships between variables to complex analyses of measurement equivalence for first and higher-order constructs. It provides a flexible framework for developing and analyzing complex relationships among multiple variables that allow researchers to test the validity of theory using empirical models. Perhaps its greatest advantage is the ability to manage measurement error, which is one of the greatest limitations of most studies [31].

The statistical population of the study includes all cancer patients in the year 2020 who were treated as outpatients at the clinical oncology center of Imam Hossein Hospital in Tehran and were selected by purposive sampling. The sample consisted of 200 men and women with gastrointestinal cancers (stomach, intestine, and esophagus) being treated at Tehran Imam Hossein Hospital. The criteria for entering the research are informed consent to participate in the research, 6 months have passed since the treatment of the disease, being in stage 1 or 2 of the disease, and age range is 20 to 60 years.

Regarding sample size, considering that in the structural equation model, the minimum sample size is 200 people (Boomsma, 1983), the sample size of 200 people was selected.

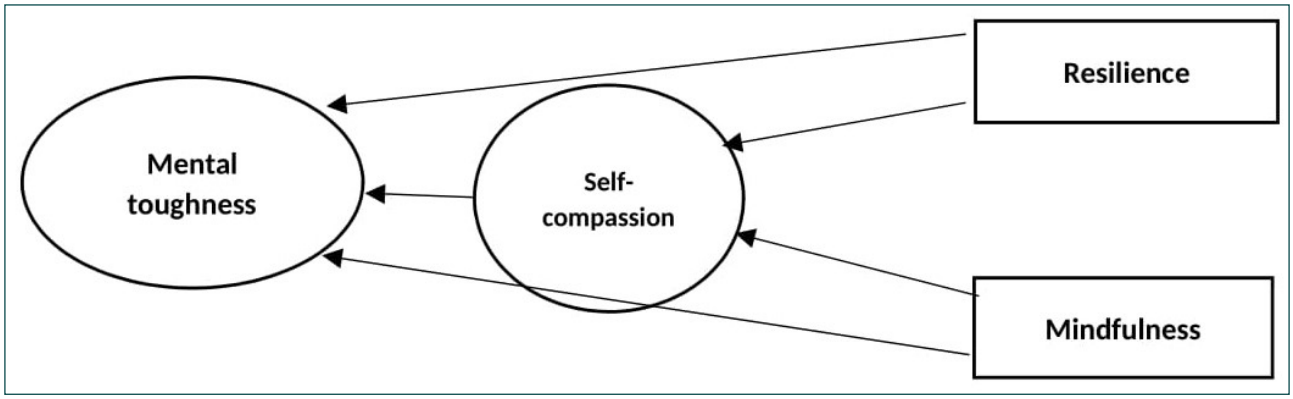

Figure 1. Communication pattern of resilience and mindfulness with mental toughness and the mediating role of self-compassion

Due to the covid-19 pandemic, the conditions prevailing in the hospital were stressful for the medical staff and patients. Also considering that the distribution of the questionnaire could have been the source of the spread of the covid-19 disease, getting the cooperation of cancer patients to participate in the research was sometimes accompanied by difficulties, but the reason for the purposeful sampling was to have the criteria to enter the research for the participant.

Structural equation modeling (SEM) was used to test the research hypotheses using Amos26 software. According to this model, the variables of resilience and mindfulness are considered exogenous variables, and the variables of self-compassion and mental strength were considered mediating and endogenous variables, respectively. Chi-square/degree-of-freedom ratio (CMIN/DF), Parsimonious Normed Fit Index (PNFI), Comparative Fit Index (CFI), Parsimonious Comparative Fit Index (PCFI), Incremental Fit Index (IFI), Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA) were used to evaluate the fit characteristics of the model (32). In order to analyze the intermediary relationships, the Bootstrap method was used in Preacher-Hayes-MACRO (2008).

Research tools:

Short form of Wagnild and Young's Resilience Scale:

This scale has been developed by Connor and Davidson [32], and includes 25 items. The short form of the Wagnild Resilience Scale [33] consisted of 14 questions out of the long form's 24 questions, which are scored based on a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). A high score on this scale indicates high resilience. The resilience of the subject in this scale is a minimum of 0 and a maximum score of 100. The results of a preliminary study on the psychometric properties of this scale have confirmed its reliability and validity. Mohammadi [34] adapted it to use in Iran and reported a Cronbach's alpha coefficient of 0.87. Moreover, the validity of the Persian Version of the Resilience Scale was confirmed by Mohammadi [34], and the reliability coefficient was reported to be 0.89. The tools' Cronbach's alpha coefficient in the present study was 0.93.

Freiburg Mindfulness Scale Short Form:

The short form of the Mindfulness Scale is a 14-item scale, which is scored based on a 4-point Likert scale from 1 (rarely) to 4 (always). The retest reliability coefficient in the study of Sawer et al. [35] was 0.88. Ghasemi Jonbeh et al. [36] reported an internal consistency coefficient of 0.92 and a retest reliability coefficient of 0.83 on this scale. In their study, the simultaneous validity of this scale with the self-control and emotion-regulation scales was 0.69 and 0.68, respectively. The internal consistency coefficient scale was 0.85 in the research of Ghasemi Nejad et al. [37]. The internal consistency coefficient of the present study was 0.80.

Scal-compassion scale-short form (SCS):

Self-compassion scale, designed by Neff et al [38], consisted of 26 questions. The Self-compassion scale-short form has 12 questions, created by Rase et al. [39], and is scored based on a 5-point Likert scale, from almost never [1] to almost always [5]. Questions 1, 3, 4, 12, and 13 are reversely scored. Khanjani, Foroughi, Sadeghi, and Bahrainian [40] examined the psychometric properties of this scale on students of the Tehran University of Medical Sciences. The simultaneous validity of this scale was examined by Perfectionism, negative affect, and external shame scales, in which negative and significant correlations were -0.33, -0.38, and -0.31, respectively. Moreover, Cronbach's alpha coefficient of this tool was reported to be 0.79. Kord and Pash asharifi [41] estimated Cronbach's alpha coefficient of the scale on a student sample using Cronbach's alpha method as 0.779 and the Split Half method as 0.76. The internal consistency of the scale in the present study was 0.81.

Clough Mental toughness Scale (2002):

Clough et al [42] developed the Clough Mental toughness Scale in 2002. This questionnaire includes 48 questions, and 8 subscales are calculated for it, and its validity and reliability have been reported as appropriate in many studies, such as studies in Iran. Mental toughness includes 8 subscales of challenge (8 questions), control (14 questions), emotional control (7 questions), life control (7 questions), commitment (11 questions), trust (15

questions), self-confidence (9 questions) and interpersonal trust (6 questions). The reliability coefficient of the test-retest method in the research of Clough et al. [42] was 0.9. The reliability of the whole tool, by Cronbach's alpha method, in Abedanzadeh et al. [43] was 0.93, and for emotion control, 0.77, life control 0.78, challenge, 0.78, commitment, 0.74, self-confidence 0.78, and interpersonal trust, 0.75. In the present study, the internal consistency of the tools was 0.83 by Cronbach's alpha method.

Results:

This part, first, deals with the demographic characteristics and descriptive results of the research variables and then presents the results of the structural equation modeling (SEM), which was performed to investigate the research objectives.

The statistical indicators related to the demographic characteristics of the tests in table 1

Descriptive data including the mean and standard deviation of research variables, as well as their correlation coefficients are presented in Table 2.

A total of 200 cancer patients with a mean age of 46.13 ± 13.9 years, in the age range of 20 to 60 years were studied. In terms of gender, 55.5% were female and 44.5% were male. In terms of education, most participants (39%) had a diploma. The social-economic status of the respondents was 15%, low, 63 moderate, and 21% good. In terms of marital status, 27% of the respondents were single, 73% of them were married, and their cancer type was gastrointestinal cancer (gastric, intestinal, and esophageal).

According to the results of the correlation matrix, there is a positive and significant relationship between all research variables ($P < 0.05$). Therefore, before applying SEM, we must first address a series of assumptions. According to Klein (2016), univariate normative hypotheses were tested and confirmed by estimating skewness and kurtosis. Due to the fact that the skewness and kurtosis of the variables were in the range of ±2, the univariate normality was confirmed. Mardia standardized kurtosis coefficient and the critical ratio (CR) were used to evaluate the normality of multi-variates. According to Blunch [44], values less than 5 for the critical ratio (CR)

Table 1. Demographic characteristics of subjects

Indicator		Variable	
Percent	Frequency	Age	Data
13.5	27	Under 30	
26	52	31-40	
23.5	47	41-50	
37	74	and More 50	
55.5	111	Female	Gender
44.5	89	Mal	
4.5	9	Illiterate	Education
22	44	Under diploma	
39	78	Diploma	
4.5	9	Above diploma	
22	44	B.S	
8	16	Master and higher	
15	30	Low	Socio-economic statue
63	126	Medium	
21	42	Good	
1	2	Excellent	
27	54	Single	Marital statue
73	146	Married	

Table 2. Descriptive results including mean, standard deviation and correlation matrix

	Mean	Standard deviation	Skewness	kurtosis	1	2	3
Resilience	85.23	17.54	-0.363	0.281	1		
Mindfulness	34.80	7.08	-0.324	0.620	0.783**	1	
Mental toughness	157.31	18.57	0.302	0.049	0.623**	0.339**	1
Self-compassion	39.94	5.47	0.179	0.102	0.641**	0.762**	0.748**

** P <0.001

Table 3. Fit indicators of the proposed and final model (modified)

Index	$\chi 2$	df	P-Value	$\chi 2$/DF	RMSEA	PNFI	CFI	PCFI	IFI	GFI	SRMR
Proposed model	280.857	99	<0.001	2.837	0.096	0.682	0.879	0.725	0.880	0.833	0.065
Final model	212.115	99	<0.001	2.281	0.075	0.673	0.921	0.713	0.922	0.902	0.052

* Acceptable rates of indicators PNFI, PCFI, (> .5), CFI, GFI, IFI (> .9), SRMR, (<.08), RMSEA (.1> acceptable, .08> good) (Klein, 2016).

Table 4. Standard effects of direct paths

Path	Standard estimation	Standard deviation	Critical ratio	Significance (P)
Resilience ---> mental toughness	0.311	0.025	3.193	<0.001
Mindfulness ---> mental toughness	0.056	0.077	0.558	0.577
Resilience ---> Self-compassion	0.277	0.030	2.299	0.022
Mindfulness ---> Self-compassion	0.292	0.022	2.539	0.011
Self-compassion ---> mental toughness	0.323	0.024	3.864	<0.001

are considered a non-violation of multivariate normality. In this study, the Mardia coefficient and the critical ratio are 4.093 and 1.132, respectively which both are less than 5. Therefore, the multivariate normality is confirmed. To investigate the absence of the multivariate outlier, Mahalanobis d-squared method was examined, and significance levels less than 0.05 indicate that data are outliers. Based on this index, the outlier was not identified. So, analyzing statistical assumptions showed that the SEM is a suitable method for evaluating the model fit, and the Maximum likelihood (ML) method has been used to estimate the parameters.

According to the results of Table 2, the fit indices of PCFI = 0.725, PNFI = 0.682, CMIN / DF = 2.837, SRM = 0.065, in the proposed model, are acceptable. In order to improve the fit of the proposed model, the modified correlation between the errors of the research variables was used. After applying the mentioned modifications, all the fit indices of the final model were PCFI = 0.713, PNFI = 0.673, CMIN / DF = 2.281, SRMR = 0.052, RMSEA = 0.075, IFI = 0.922, CFI = 0.921 and GFI = 0.902 indicate a very good fit of the modified model with the data. Therefore, the modified (final) model has a good fit. Figure 2 shows the final research model, along with standardized path coefficients. The determination coefficient of the mental strength variable in the modified (final) structural model is 0.450, which shows that exogenous and mediating variables can predict 45% of changes in the mental toughness of cancer patients, which this value is high.

Table 3 presents the standard coefficients of all paths and critical values in the modified (final) model. According

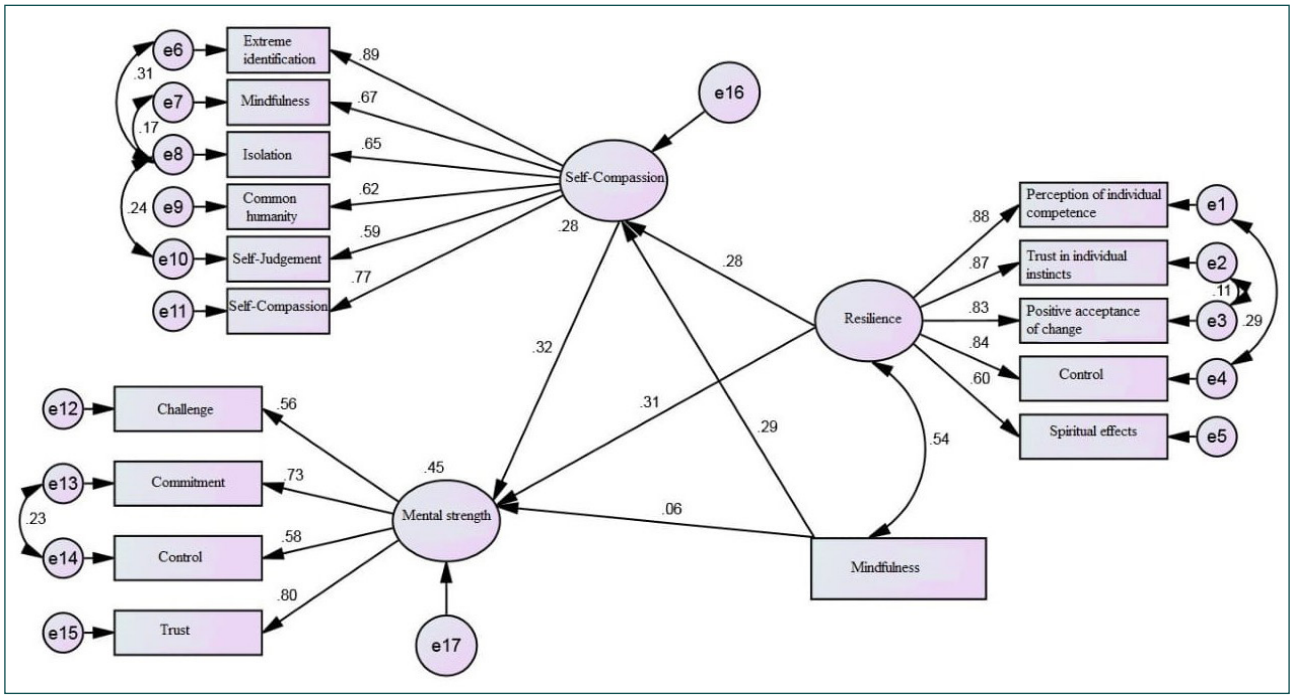

Figure 2. Final research model

to its results, all path coefficients (except mental toughness to mindfulness) are significant.

the Preacher-Hayes-MACRO (2008), to test the intermediate path are shown in Table 4.

Bootstrapping is a statistical method that utilizes random resampling with replacement to estimate a population parameter. This technique samples from a given dataset to estimate a parameter when it would otherwise be impossible or impractical to do so. In this way, the dataset is treated as the population, and each random sample aims to replicate a potential score within the true population. The amount of samples varies, but usually falls between 1,000 and 10,000.

In fact, the bootstrap method was used to determine the significance of the mediating relationships and the indirect effects of the independent variable through mediation. The meaning of the data is the indirect effect in the original sample; and boot is the mean of the indirect effect estimates in the bootstrap sample. Also, in this table, the bias represents the difference between the data and the bootstrap and the standard error also indicates the standard deviation of the indirect estimates in the bootstrap samples (45).

According to the Bootstrap test results, the indirect effects of resilience and mindfulness on mental toughness through self-compassion were 0.098 and 0.0929, respectively, which were statistically significant.

Conclusion and Discussion:

This study aimed to evaluate the effect of resilience and mindfulness on mental toughness mediated by self-compassion in cancer patients. The results showed that self-compassion played a mediating role in the relationship between resilience and mental toughness. This result is consistent with the results of conducted studies by Wu et al. [19], Wilson et al. [46], Gerber et al. [47], Mohammadi et al. [48], Feizi S. [9], and McArthur et al. [29]. Baker et al. (28). The results of Wu's research show that there is a positive and significant relationship between mindfulness and mental toughness, and mindfulness predict dimensions of psychological skills such as positive effort, effective communication and coordination. Also Mohammadi's research indicates that mindfulness is a significant predictor of self-compassion. In expla-

Table 5. Bootstrap results related to indirect relationships of research predict variables on mental toughness by mediating self-compassion

Path	Index						Significance
	Data	Boot	Bias	Error	Low bound	Upper bound	
Resilience to mental toughness through self-compassion	0.0896	0.0898	0.0002	0.0055	0.0624	0.1042	<0.001
Mindfulness to mental toughness through self-compassion	0.0928	0.0929	0.0001	0.0074	0.0699	0.1101	<0.001

nation, it should be said that mindfulness helps people to react consciously instead of reacting involuntarily to emotion and establish relationships in a more efficient way. They have more acceptance and endurance in the face of challenges and are kinder to themselves by focusing on the moments of life and the present. In Gerber and Faizi's research, the significant relationship between resilience and mental toughness was confirmed. In explaining this finding, it can be concluded that resilience with mental toughness in cancer patients can lead to their adaptation and better performance in disease conditions. In addition, Baker's research indicates a significant relationship between self-compassion and resilience. In fact, high resilience and self-compassion in people with cancer as positive psychological characteristics will lead to the ability of the person to face the disease and bear the suffering caused by the disease.

Moreover, self-compassion can affect people's mental toughness. According to Wilson et al. [21] people with higher self-compassion try to be less involved with the negative aspects of their illness and look more for the positives, and instead of focusing on the pain and sadness, and negative emotions, they try to support themselves, which can lead to their more adaptive performance in these situations. Therefore, self-compassion can strengthen mental toughness. Other research results showed that the relationship between mindfulness and mental toughness mediated by self-compassion is significant. This result is consistent with research results of Wu et al. [19]; Rasaei [26]. In fact, people with high self-compassion are self-supporting and show more adaptability in the face of negative emotions and have higher mental toughness, have the ability to evaluate and solve problems away from emotions, and accept with mindfulness and an unbiased if there are not a fixed part of the personality and life process, and they behave more efficiently and in the face of events [11].

Cancer patients will be severely disturbed psychologically and emotionally, and denial and anger are their major defensive responses in the early stages of the disease, which can cause severe psychological and physical symptoms for the patient [49]. Much of this anger is the patient's anger toward himself, and in a way, leads to non-self-compassion. People who experience a chronic illness, such as cancer, behave more unkindly and critically towards themselves, which in fact, due to by experiencing natural anger after awareness about the illness [50]. Self-compassion as positive position can help a person with cancer in stressful situation [51]. By becoming aware of their circumstances, and by increasing their in-person capacity to admit their mistakes and understanding the limitations of their current circumstances, in the painful situations, to support themselves with a more self-compassionate attitude, and instead of blaming themselves for their failure, to be kinder to themselves and to have a warm and receptive outlook [37]. Considering that mindfulness can play a role in paying attention to one's situation and understanding and accepting it, there can be a relationship between it and self-compassion. As a result of increasing mindfulness, the person will be more aware of his limitations, which in turn makes him be more resilient to his illness. The results of the research have practical implications for health professionals and psychologists and it can be concluded that Resilience and Mindfulness by the mediating role of self-compassion has an effect on the mental toughness of cancer patients. The limitations of the present study due to the epidemic conditions of COVID-19,

the sampling method is purposive and non-random, and is suggested using random sampling in future similar studies. Another limitation of the research is the lack of study the gender differences, which is recommended to be considered in future research.

Another limitation of this research, is not determining the cause and effect relationship with certainty. Doing so may lead to new patterns of correlation, which can effectively extend our theories. This article was not sponsored by any organization.

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