



# The mediating effect of psychological resilience on the level of mindfulness and general well-being in patients with inflammatory bowel disease

Meifeng Wang<sup>#</sup>, Xi Lu<sup>#</sup>, Meihong Liu

Department of Gastroenterology, The First Affiliated Hospital of Nanjing Medical University (Jiangsu Provincial People's Hospital), Nanjing, China

*Contributions:* (I) Conception and design: M Liu; (II) Administrative support: M Liu; (III) Provision of study materials or patients: X Lu; (IV) Collection and assembly of data: X Lu; (V) Data analysis and interpretation: M Wang; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

<sup>#</sup>The authors contributed equally to this work.

*Correspondence to:* Meihong Liu, Department of Gastroenterology, The First Affiliated Hospital of Nanjing Medical University (Jiangsu Provincial People's Hospital), 300 Guangzhou Road, Nanjing 210029, China. Email: 67496437@qq.com.

**Background:** The incidence of inflammatory bowel disease (IBD) increases annually, and IBD patients may experience various psychological symptoms. People with higher levels of psychological resilience tend to cope with negative events in a positive way. So here we explored the correlation of mindfulness level, psychological resilience, and general well-being in patients with inflammatory bowel disease (IBD), and the mediating effect of psychological resilience on mindfulness level and happiness in IBD.

**Methods:** Five Facet Mindfulness Questionnaire (FFMQ), Connor-Davidson Resilience Scale (CD-RICS), and General Well-Being Schedule (GWB) were used for investigation among the randomly selected IBD patients. Pearson correlation analysis and the structural equation model by Amos 24.0 were applied to explore the relationship between mindfulness level, psychological resilience, and general well-being. The mediating effect of psychological resilience was detected by bootstrap method.

**Results:** A total of 159 of the 184 distributed questionnaires were recovered (recovery rate 73.3%), and 135 of them were used for subsequent investigations. In IBD patients, the score of mindfulness level, psychological resilience, and general well-being were (119.95±8.64), (58.37±19.32), and (73.59±13.88), respectively. Both male and female score were lower than ordinary model (52.7% and 42.9%, respectively). Pearson results displayed that mindfulness level ( $r=0.312-0.390$ ,  $P<0.01$ ) and overall well-being ( $r=0.490-0.590$ ,  $P<0.01$ ) were positively related to psychological resilience and its 3 dimensions, respectively. Similarly, mindfulness level was positively correlated with overall well-being ( $r=0.391$ ,  $P<0.01$ ). Mediating effect of psychological resilience between mindfulness level and overall well-being was 0.232 ( $P=0.001$ ). The 95% confidence interval (95% CI) of psychological resilience as mediating effect (59.3% of total) was (0.138 to 0.332).

**Conclusions:** We concluded that psychological resilience in IBD patients has a partially mediating effect between mindfulness level and overall well-being.

**Keywords:** Psychological resilience; inflammatory bowel disease; mindfulness; overall well-being

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## Introduction

Inflammatory bowel disease (IBD) includes Crohn's disease (CD) and ulcerative colitis (UC). An epidemiology meta-analysis in China showed that the overall incidence of IBD in China is 1.74 [95% confidence interval (CI): 1.08 to 2.40]/100,000 people per year (1), which is increasing annually. The course of IBD presents the characteristics of alternating episodes of activity and remission, and incurability. In addition, long-term medication, regular outpatient follow-up, and repeated hospitalizations affect patient quality of life, and IBD patients may experience various psychological symptoms, such as anxiety, depression, and nervousness (2-4). As a part of comprehensive IBD therapy, although psychological intervention cannot cure clinical symptoms, it can effectively relieve symptoms, reduce negative emotions, and improve quality of life and happiness. Moreover, it can also reduce negative psychological effects on patients, and has a certain role in increasing their positive emotions (5,6).

General well-being is a high-level psychological experience, an individual's overall evaluation of quality of life, which reflects social function and adaptive state. Positive psychological intervention uses positive emotions, personality advantages, and meaningful relationships to inject happiness, immersion, and meaning into lives in order to increase happiness (7). Psychological resilience refers to a person's ability or traits when faced with stress or adversity, enabling them to successfully adapt and develop. People with higher levels of psychological resilience tend to cope with negative events in a positive way, thus showing a higher quality of life and happiness (8). Mindfulness, as a positive psychological trait, is when an individual consciously maintains attention on the current internal or external experience. Without making any judgments, people can change their perception and tolerance to reduce psychological symptoms such as anxiety and depression, so as to reinforce healthy behaviors (such as compliance, diet, and exercise). Mindfulness exerts its psychological regulating effect during the current period, thereby improving the quality of life and happiness (9,10). This study aimed to explore the correlation between mindfulness levels, psychological resilience, and overall well-being in patients with IBD, and the mediating effects of psychological resilience on mindfulness and happiness in patients with IBD. This was expected to provide a theoretical basis for exploring more suitable psychological intervention strategies for patients with IBD. We present the following article in accordance with the STROBE

reporting checklist (available at <https://dx.doi.org/10.21037/apm-21-2053>).

## Methods

### *Research participants*

This study investigated IBD patients who visited the Department of Gastroenterology, Jiangsu Provincial People's Hospital from February 2019 to February 2020 (participants were informed of and agreed to the study). The inclusion criteria were as follows: age  $\geq 16$  years old; confirmed diagnosis of IBD; clear consciousness; willingness to cooperate; a certain ability of text interpretation. The exclusion criteria were as follows: the patient was unconscious or suffered from severe acute and chronic diseases such as heart failure, kidney failure, lung disease, liver disease, or mental illness (the mental illness was according to the history of psychiatric diseases diagnosed by the hospital). All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (Jiangsu Provincial People's Hospital) (NO.:2021-SR-405) and informed consent was taken from all the patients.

### *Research methods*

(I) General Information Questionnaire: designed by researchers, including gender, age, education, source of medical expenses, course of disease, and so on. (II) The Connor-Davidson Resilience Scale (CD-RICS): the scale was originally compiled by Connor and Davidson, and translated and revised by Chinese academics (11). The scale has 25 items in 3 dimensions, including 13 resilience items, 8 strength items, and 4 optimistic items. They are scored on a 5-level Likert scale, with each item ranging from 0 to 4, meaning "never" to "almost", with a perfect score of 100. A higher score indicates better psychological resilience. The Cronbach  $\alpha$  was 0.897 in this study. (III) Five Facet Mindfulness Questionnaire (FFMQ): FFMQ as revised by Meng *et al.* (12), with a total of 39 items in 5 dimensions, which are 8 items to observe, 8 items to describe, 8 items to act consciously, 8 items to no judgment, and 7 items to no act, adopting a Likert 5-point scale. Each item ranges from 1 to 5 points, meaning "never" to "fully qualified". The higher the total FFMQ score, the higher the level of mindfulness. The Cronbach  $\alpha$  was

**Table 1** General information

General information	Subtypes	Number (%)
Gender	Male	93 (68.9)
	Female	42 (31.1)
Age	Mean $\pm$ SD [range ]	32.62 $\pm$ 11.64 [16–75]
Education	Primary school student	1 (0.8)
	Junior middle school or high school student	40 (29.6)
	Junior college student or undergraduate	87 (64.4)
	Postgraduate	7 (5.2)
Medical expenses	Medical insurance	85 (63.0)
	Own pocket	50 (37.0)
Job	Student	24 (17.8)
	Worker	69 (51.1)
	Unemployed	39 (28.9)
	Retired	3 (2.0)
Marital status	Married	111 (83.0)
	Unmarried	24 (17.0)
Duration of illness	<1 year	6 (4.0)
	1–5 years	64 (47.4)
	>5 years	65 (48.6)
Degree of illness	Remission or mild	47 (34.8)
	Moderate	80 (59.3)
	Severe	8 (5.9)
Medicine	5-aminosalicylic acid preparation	47 (34.8)
	Hormones	20 (14.8)
	Immunosuppressants	28 (20.7)
	Biologics	19 (14.1)
	Thalidomide	21 (15.6)

0.719 in this study. (IV) General Well-Being Schedule (GWB): GWB is a stereotyped test tool developed by the National Center for Health Statistics to evaluate subjects' statements of happiness. There are 33 entries in GWB, and 18 questions after revision in China. The higher the score, the stronger the happiness. National norms are 75.00 $\pm$ 15.00 points for males and 71.00 $\pm$ 18.00 points for females. Due to widely recognized and used in the evaluation system,

these questionnaires and scales objectively can judge the relationship between mindfulness level, psychological elasticity and overall well-being.

### Research quality control

Questionnaire design: Based on a large amount of literature and expert opinions, we selected a scientific and effective scale. Questionnaire compilation: the requirements were clarified and language was easy to understand. Pre-investigation: the questionnaire was refined based on the participant's feedback. The questionnaire was distributed by questionnaire star (www.wjx.cn) in 2 IBD WeChat groups (filled in by the participants themselves). The 2 investigators reviewed the filled-in information, and contacted the participant by phone to verify and make amendments if the initial response was not clear. The respondents whose questionnaires were completed in less than 15 minutes, where most of the answers were the same option, or determined to be filled in randomly after being contacted by phone were deemed invalid. A total of 184 questionnaires were issued and 159 were recovered, of which 135 were valid. The effective recovery rate was 73.3%.

### Statistics

Statistical analysis was performed using the software SPSS 21.0 (IBM Corp., Chicago, IL, USA) and Amos 24.0 (IBM Corp., Chicago, IL, USA). (I) Pearson correlation analysis was used to explore the relationship among mindfulness level, psychological resilience, and overall happiness. (II) The Amos 24.0 software was used to establish the structural equation model of the relationship among 3 variables: mindfulness level, psychological resilience, and overall happiness. (III) The bootstrap method was used to determine the mediating effect of psychological resilience between the level of mindfulness and overall well-being. The differences were considered significant if  $P < 0.05$ .

## Results

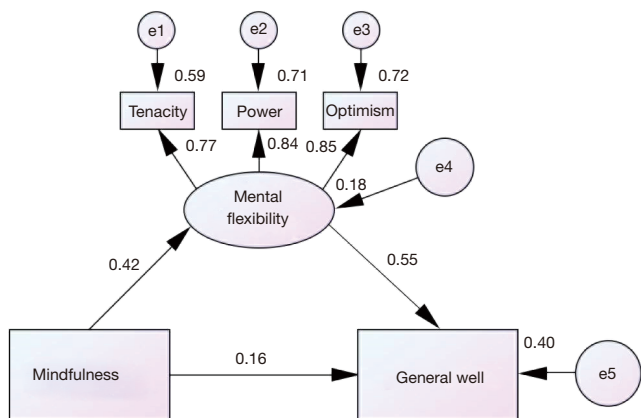
### General information

A total of 135 IBD patients participated in the study, of which 93 were male (68.9%) and 42 were female (31.1%) (Table 1). Their age was 16–75 (32.62 $\pm$ 11.64) years old. The ratios of education levels were 0.8% (primary school student), 29.6% (junior middle school or high school

**Table 2** Correlation analysis of mindfulness level, psychological resilience, and overall well-being (r)

Variable	Mindfulness	Psychological resilience	Resilience	Strength	Dimensions	Overall well-being
Mindfulness	1.000	–	–	–	–	–
Psychological resilience	0.390*	1.000	–	–	–	–
Resilience	0.366*	0.909*	1.000	–	–	–
Strength	0.312*	0.891*	0.638*	1.000	–	–
Dimensions	0.379*	0.816*	0.634*	0.735*	1.000	–
Overall well-being	0.391*	0.590*	0.560*	0.495*	0.490*	1.000

\*, two-sided test, P<0.01; –, blank.



**Figure 1** Structural equation model of mindfulness level, psychological resilience, and overall well-being.

student), 64.4% (junior college student or undergraduate), and 5.2% (postgraduate). A total of 85 participants (63%) choose to use medical insurance to pay for medical expenses, and the others (37%) paid themselves. Among them, there are 24 students, 69 office workers, 39 unemployed people, and 3 retirees, and only 24 were unmarried (17%). In addition, 47 participants were in remission or had mild illness, and 80 and 8 had moderate and severe illness, respectively. Finally, a 5-aminosalicylic acid preparation and hormones were used by 47 and 20 participants, respectively, while immunosuppressants, biologics, and thalidomide were used by 28, 19, and 21 participants, respectively.

**Current status of mindfulness, psychological resilience and overall well-being in IBD patients**

In this study, IBD patients had a mindfulness score of (119.95±8.64), an observation score of (22.13±4.65), a

description score of (24.83±4.12), a perceptually behavioral score of (27.69±5.32), no judgment score of (26.15±4.46), and no action score of (19.33±5.14), respectively. In addition, the psychological resilience score was (58.37±19.32), and the 3 dimensions of resilience, strength, and optimism were (28.89±10.25), (20.77±8.39), and (8.71±3.10), respectively. The overall well-being score was (73.59±13.88). The male patients scored (73.48±13.77), of which 52.7% were lower than the ordinary model; female patients scored (73.81±14.27), of which 42.9% were lower than the ordinary model. Compared with the ordinary model, the differences were not statistically significant (P>0.05).

**Correlation analysis of mindfulness level, psychological resilience, and overall well-being**

Table 2 shows that the level of mindfulness was positively correlated with psychological resilience and its 3 dimensions (psychological resilience: r=0.390, resilience: r=0.366, strength: r=0.312, optimism r=0.379; P<0.01). Meanwhile, overall well-being was positively correlated with psychological resilience and its 3 dimensions (psychological resilience: r=0.590, resilience: r=0.560, strength: r=0.495, optimism: r=0.490; P<0.01). The level of mindfulness was positively correlated with overall well-being (r=0.391, P<0.01).

**Mediating effect of psychological resilience between mindfulness level and overall well-being**

Next, we used the mindfulness level as the independent variable, overall well-being as the dependent variable, and psychological resilience and its 3 dimensions as the intermediate variables to construct a structural equation model (Figure 1). It was found that the path coefficients of the model were statistically significant (P<0.05) and

**Table 3** Structural equation model fit index

Fit index	CMIN/DF	RMSEA	GFI	AGFI	TLI	IFI	CFI	PGFI	NFI
Test result	1.947	0.084	0.977	0.913	0.965	0.986	0.986	0.260	0.972
Fit standard	$1 < \chi^2/df < 3$	<0.08	>0.90	>0.90	>0.90	>0.90	>0.90	>0.05	>0.90

CMIN/DF, chi-square minimum degrees of freedom; RMSEA, root mean square error of approximation; GFI, goodness of fit index; AGFI, adjusted goodness of fit index; TLI, Tucker-Lewis index; IFI, incremental fit index; CFI, comparative fit index; PGFI, parsimonious goodness of fit index; NFI, normed fit index.

**Table 4** Bootstrap analysis of the mediating effect of psychological resilience between mindfulness level and overall well-being

Effect	Normalized path coefficient ( $\beta$ )	95% CI		P value
		Minimum value	Maximum value	
Direct effect (c')	0.159	0.008	0.312	0.035
Indirect effect (ab)	0.232	0.138	0.332	0.001
Total effect (c)	0.391	0.223	0.530	0.001

CI, confidence interval.

the fitting indexes were perfect, indicating that the model had been well constructed (*Table 3*). Meanwhile, we used the bootstrap method to detect the mediating effect of psychological resilience. Bootstrap repeat sampling was set to 2,000 and with 95% CI. The results showed that the direct effect was 0.159, and the 95% CI was (0.008 to 0.312) ( $P=0.035$ ). In contrast, the indirect effect was 0.232, and the 95% CI was (0.138 to 0.332) ( $P=0.001$ ) (*Table 4*). The study revealed that the direct and indirect effects of mindfulness level on overall well-being are statistically significant and 95% of the CIs did not include zero. Therefore, psychological resilience was shown to have a mediating effect on mindfulness level and overall well-being, and the mediating effect accounted for 59.3% of the total effect.

## Discussion

### *Mindfulness level, psychological resilience, and overall well-being in IBD patients*

Mindfulness emphasizes maintaining a present moment awareness of their thoughts, feelings, body sensations and surrounding environment. It also involves acceptance, meaning that people pay more attention to their thoughts and feelings without judgment (13). As a result, people can improve their psychological adjustment ability and adopt effective solution seeking skills. The mindfulness level of

IBD patients in this study was slightly lower than that of university students ( $126.02 \pm 12.14$ ) (14), but higher than that of IBD patients in Luo's study ( $105.30 \pm 14.11$ ) (15). There was no significant difference between mindfulness levels of patients with coronary heart disease (16) and IBD in this study. Both the observation and inaction scores are lower than 3 points, which indicates that IBD patients cannot maintain stable emotions and normal cognitive levels to cope with anxiety or depression when they experience recurrent illnesses or onset of symptoms that are prohibitive to participating in social activities. Therefore, mindfulness-based stress reduction (MBSR) (17) or mindfulness-based cognitive therapy (MBCT) (18), which reduce the negative impact on individuals by improving their cognitive ability, can be applied to IBD patients.

This study revealed that IBD patients can experience decreased psychological resilience, especially in regards to optimism. These results are consistent with the findings of Kang (19). The main reason for this impact on psychological resilience is that IBD currently lacks a clear and effective cure, and treatment can only control or delay the onset of IBD. Patients with IBD are severely affected by the physical pain and inconvenience of life or social activities incurred by the disease. When patients experience frustration and dilemma, they lack a calm and positive attitude and adopt more negative coping strategies such as self-blame, retreat, and rationalization. These behaviors will compound their psychological stress, aggravate their condition, and create a vicious cycle. These conclusions suggest that in addition to paying attention to the patient's disease process, clinical nurses should proactively engage the patient's psychological resilience to improve their psychological resilience level and promote individuals to deal with stress and distress actively and effectively.

Overall well-being comes from the satisfaction of self-needs and the fulfillment of ideals. As a comprehensive psychological index for evaluating the overall quality of life of an individual, it is a complex, multi-layered mental state

formed by the interaction of psychological factors (including needs, cognition, and emotions) and external incentives. The overall well-being levels of male and female patients in this study were 52.7% and 42.9% lower than those in the ordinary model. The overall well-being of IBD patients is lower than normal, especially for males. The reasons are as follows: (I) intestinal symptoms and related complications at the onset of the disease cause physical pain. (II) The disease affects patients' daily lives and social activities, such as increased loneliness caused by inability to work and study and social alienation. (III) Increased financial burden caused by treatment costs. Due to differences in social division of labor and psychological factors, men may experience stress, which may be the reason why men's overall well-being below the ordinary model was proportionately higher than that of women. However, the overall average well-being was similar to the ordinary model. The reasons are as follows: (I) for mild patients, symptoms can be controlled through the efficacy of the drug. (II) The majority of patients surveyed in this study were young and middle-aged (mean age:  $32.62 \pm 11.64$ ), they have received higher education due to educational reform; meanwhile, they had certain self-regulation ability and higher self-regulation subjective initiative. In addition, they had relatively stable economic sources and easier access to quality medical resources. (III) Other factors such as personal self-esteem (20), family care (21), social support (22), and so on can also increase overall patient well-being.

#### *The relationship between mindfulness level, psychological resilience, and overall well-being*

Pearson's correlation analysis showed that there was a positive correlation between mindfulness level, psychological resilience, and overall well-being, indicating that higher mindfulness level and better psychological resilience will engender higher overall happiness.

#### *Intermediary effect of psychological resilience between mindfulness level and overall well-being*

There was a correlation between mindfulness levels, psychological resilience, and overall well-being which met the basic criteria of intermediary effect. Intermediary effect analysis showed that mindfulness level and psychological resilience can positively predict overall well-being, supporting that mindfulness level and psychological resilience are predictors of overall well-being (23,24).

Meanwhile, psychological resilience played an intermediary role between mindfulness level and overall well-being. This result indicates that mindfulness level not only directly affects overall well-being, but also indirectly regulates overall well-being through psychological resilience, which is a mediating variable. Psychological resilience is one of the mechanisms of the positive relationship between mindfulness level and overall well-being. Furthermore, bootstrap analysis further supported the existence of an intermediary effect in psychological resilience, which accounted for 59.3% of the total effect.

In conclusion, the mindfulness level, psychological resilience, and overall well-being of patients with IBD need to be improved. Mindfulness level and psychological resilience are predictors of overall well-being. Psychological resilience has a partial mediating effect between mindfulness level and overall well-being. This suggests that in the nursing process for IBD patients, clinical caregivers can directly increase mindfulness level through psychological intervention to improve happiness, or they can indirectly achieve the goal by enhancing psychological resilience.

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#### **Footnote**

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at <https://dx.doi.org/10.21037/apm-21-2053>

*Data Sharing Statement:* Available at <https://dx.doi.org/10.21037/apm-21-2053>

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://dx.doi.org/10.21037/apm-21-2053>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures

performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (Jiangsu Provincial People's Hospital) (NO.:2021-SR-405) and informed consent was taken from all the patients.

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