



Resilience, Intolerance of Uncertainty, Future Anxiety and Mental Well Being among Young Researchers

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Abstract

Young researchers face significant psychological challenges that may jeopardize their mental health. In order to protect and support the psychological health of young researchers, the determinants of mental well-being should be examined. This study aims to examine the serial mediating roles of intolerance of uncertainty and future anxiety in the relationship between resilience and mental well-being in young researchers. The study sample consisted of 259 female and 146 male doctoral students ($M_{age}=30.385$, $SD=3.062$). The research findings revealed that resilience, intolerance of uncertainty, and future anxiety are important predictors of young researchers' mental well-being. The results indicate that resilience positively predicts mental well-being, while intolerance of uncertainty and future anxiety play a partially serial mediating role in this relationship. This finding means that young researchers with low resilience experience more intolerance of uncertainty, which increases their future anxiety and thus leads to a decrease in mental well-being. This result emphasizes the importance of developing resilience in young researchers to reduce the negative effects of uncertainty and anxiety on mental health. Being resilient to navigate uncertain situations and reduce future anxiety is a protective factor for the mental well-being of young researchers. All these findings expand the understanding of the protection of the mental health of young researchers and offer important implications.

Keywords COST ReMO · Young researchers · Resilience · Mental well-being · Intolerance of uncertainty · Future anxiety

Introduction

Human beings are distinguished from other living beings by some of their existential characteristics. One of these characteristics is the sense of curiosity. As beings who can think and produce, humans tend to perform by acting with the sense of curiosity they possess. The aforementioned performances include searching for answers to various questions by performing scientific activities. This situation contributes to the realization of different

scientific activities and the development of various scientific fields. While scientists pursue answers in their fields, the process fosters scientific progress but also poses challenges to their well-being [16]. The difficulties encountered during the process can lead individuals to face both physical and psychological health problems. Intolerance of uncertainty and future anxiety are among the challenges that can be expected in a work environment requiring continuous performance. Understanding the factors influencing these problems is crucial for conducting preventive and remedial interventions. One of the traits that contribute to scientists' ability to cope with these challenges is resilience. This study aims to identify the role of intolerance of uncertainty and future anxiety in the relationship between scientists' psychological resilience and well-being.

Scientists who make original and unique contributions to the world of science must first be physiologically and psychologically healthy and protect their health in order to continue making these contributions. Data announced by the Organisation for Economic Co-operation and Development (OECD) in 2021 demonstrate that there is a significant increase in mental health problems of individuals identified as scientists or researchers [32]. This important data reveals the necessity of protecting and supporting the mental health of researchers. Countries that take this requirement into account are developing policies to protect and improve the mental health of researchers. For instance, the Council of Ministers of the European Union develops specific policy strategies to provide solutions to the psychological problems that researchers face or may potentially face (Council of the European Union, 2021). The steps taken within the scope of these policies are to ensure that the mental health of researchers is monitored, to take protective measures regarding psychological health, and to increase the frequency of studies that support mental well-being. In addition, a recent study by Di Giacomo et al. [8] states that in many countries, there are calls to consider the issue of researcher mental health as a priority area and to support the psychological health of researchers. Apart from this research, various studies on the mental health of researchers have been conducted in many different countries in recent years (e.g., [26, 42]). The studies in question discuss the factors that influence the psychological health of scientists and what can be done to strengthen psychological health. The World Health Organization has also been drawing attention to the issue of researcher mental health through various statements for many years [WHO, 2010]. All these policies and declarations prove the importance of researcher mental health.

Mental well-being is one of the concepts that is closely related to mental health. It is an important multidimensional structure that expresses the individual's capacity to maintain meaning, purpose and emotional balance in life. According to Ryan and Deci [37], mental well-being is defined as the ability of individuals to cope with the difficulties they may encounter throughout life and to feel good psychologically, emotionally, and socially. Keyes [19] states that individuals with high levels of mental well-being are healthier physically and spiritually and have higher standards of living. Lyubomirsky et al. [28] also emphasize that people with high mental well-being have better creative thinking levels and state that these individuals are more successful in communication skills. Mental well-being is characterized by various indicators, including the ability to adapt to one's environment, optimism, self-awareness, hope, life satisfaction, and social adaptation [4]. From this point of view, individuals who are mentally healthy can be described as those who can think logically, are in harmony with their environment, exhibit conscious behaviors, and therefore have positive mental health.

Resilience is one of the main variables that predict mental well-being. Resilience, one of the frequently studied concepts in the field of positive psychology, is expressed as one of the effective concepts in individuals having a positive mental structure (Öz &

Bahadır -Yılmaz, 2009). It is defined as the capacity of an individual to adapt, recover and even emerge stronger in the face of negative life events such as stress, trauma, difficulty or failure [47]. Kurtoğlu et al. [23] emphasize that one of the goals of the COST-ReMO working group is to protect mental well-being by increasing the resilience of researchers. From this point of view, resilience can be expressed as an important concept, especially for researchers' mental well-being. According to Olsson et al. [33], resilience is defined as the ability to successfully cope with stressful and challenging events encountered throughout life and to show the necessary adaptation to this process. Resilience, which is defined in various ways, is essentially gathered at three common points (Luthar & Cicchetti, et al., 2000). These are: (a) risk factors, (b) protective factors, and (c) positive outcomes. These three common points have an important role in increasing the mental well-being of individuals.

In other words, reducing risk factors that threaten the resilience of individuals and increasing protective factors will have a positive impact on mental well-being. There are many research findings in the literature that support this opinion (e.g., [41]). In the aforementioned studies, preventing the risk factors that exist in the lives of individuals and increasing the protective factors strengthens resilience and therefore increases the well-being of individuals. Similarly, in the current study by Kotera et al. [22], resilience was reported as a variable that significantly predicts mental well-being. There are other studies in the literature examining the level of resilience and mental well-being of researchers (e.g., [6]). These studies reveal that resilience plays an important role in increasing the mental well-being of researchers. These findings prove that resilience should be developed to strengthen the mental well-being of young researchers in particular.

Factors other than resilience are also effective in strengthening the mental well-being of researchers. The main reason why young researchers experience anxiety, especially in terms of their profession, is uncertainty. It is observed that researchers who work under contract or who do not feel like they belong to an institution on a permanent basis experience more career anxiety [34]. Similarly, study emphasizes that young researchers experience difficulties due to lack of career security. The uncertainty that doctoral students experience about finding a job creates anxiety and reduces the well-being of young researchers [24]. In light of all this information, it is thought that intolerance of uncertainty may play a role in strengthening the mental well-being of young researchers. Uncertainty is defined as the inability to predict what the outcome of a behavior or event will be [38]. This concept can adversely influence the well-being of individuals. The main reason for this is that individuals inherently want to be sure of the future and guarantee their future [12]. The effects of uncertainty on the mental well-being of the individual are explained by the concept of intolerance. In the literature, intolerance of uncertainty is defined as the tendency to react negatively to events that create uncertainty [2]. There are studies in the literature indicating that intolerance of uncertainty is related to the resilience of individuals [17, 46]. Previous research has emphasized that individuals' high levels of intolerance to uncertainty will negatively reflect on their well-being [21, 40]. In these studies, intolerance of uncertainty was reported as a variable predicting mental well-being.

Another concept that researchers consider important for strengthening mental well-being is anxiety about the future. The uncertainty of the future is particularly effective in doctoral students considering leaving their education [29]. When the concepts related to uncertainty are examined in the literature, future anxiety is among the frequently studied concepts (e.g., [1],[13]). These aforementioned studies demonstrate that uncertainty increases anxiety in individuals. Future anxiety is defined as the type of anxiety that occurs due to the uncertainty, worry and fear that individuals may encounter in later life [7, 52].

It also includes uneasiness about future failures and possible negative events. Individuals who think about a dangerous event that may occur later in life are more likely to experience future anxiety. Previous studies emphasize that the mental well-being of individuals experiencing future anxiety is negatively impacted [30, 36, 51]. In these studies, it is emphasized that future anxiety is a variable that predicts mental well-being. In addition, a study investigating researchers' future anxiety reported that academics who struggle to secure academic positions experience higher levels of future anxiety (Özdemir & Özdoğru, 2018).

In light of the existing literature and the information presented, it can be concluded that young researchers with lower levels of resilience tend to exhibit higher levels of intolerance to uncertainty. This may increase individuals' future concerns and cause their mental well-being to decrease. In this study, the serial mediating role of intolerance of uncertainty and future anxiety in the relationship between resilience and mental well-being was examined. There are various studies in the literature examining the bilateral relations between concepts. However, no study has been found examining the chain effect of intolerance of uncertainty and anxiety about the future. In this respect, the research will make a unique contribution to the literature. At the same time, the determinants of the mental well-being of young researchers will be revealed through the research. Based on all these, the following hypotheses will be tested:

H1. Intolerance of uncertainty have a mediating role in the relationship between resilience and mental well-being in young researchers.

H2. Future anxiety have a mediating role in the relationship between resilience and mental well-being in young researchers.

H3. Intolerance of uncertainty and future anxiety have a serial mediating role in the relationship between resilience and mental well-being in young researchers.

Method

Participants and Procedure

The data for the study was collected using a convenience sampling method. Convenience sampling is an unlikely sampling method in which the researcher includes the easiest-to-reach individuals in the sample. A total of 405 young researchers under the age of 35, residing in 66 different cities from 26 sub-regions of Türkiye and currently receiving doctoral education participated in the study. The sample of the study consisted of 259 females (64%) and 146 males (36%). The average age of the participants was 30.385 ($SD=3.062$). All detailed information regarding the characteristics of the participants is presented in Table 1.

The quantitative data used in the study were collected using the Warwick-Edinburgh Mental Well-Being Scale [18], the Brief Resilience Scale [9], the Intolerance of Uncertainty Scale [39], and the Future Anxiety Scale [50]. Prior to the commencement of the research, necessary ethical approvals were obtained. The study was conducted in accordance with the Helsinki Declaration, with ethical approval granted by the Yıldız Technical University Research Ethics Committee (Report No: 20230502124). The data were collected online. Before data collection, informed consent was obtained from all participants. Participants were provided with detailed information about the study, including its purpose, voluntary participation, and data confidentiality, before

Table 1 Participants' characteristics

Variable	N	%
<i>Gender</i>		
Female	259	64.0
Male	146	36.0
<i>Perceived socio-economic status</i>		
Very low	11	2.7
Low	64	15.8
Medium	287	70.9
High	43	10.6
<i>Education</i>		
PhD course period	99	24.5
PhD qualification period	52	12.8
PhD thesis period	254	62.7
<i>Role</i>		
Assistant researcher	201	49.6
Lecturer	130	32.1
PhD student	74	18.3
<i>Field of study</i>		
Science and mathematics	33	8.2
Engineering	77	19.2
Educational sciences	97	24.1
Social, human, and administrative sciences	120	29.9
Health sciences	60	14.9
Other	18	3.7
<i>Marital status</i>		
Single	142	35.1
Romantically in a relationship	48	11.9
Engaged	14	3.5
Married	190	46.8
Divorced	11	2.7
<i>Number of children</i>		
None	316	78.0
One	60	14.8
Two	25	6.2
Three	4	1.0
<i>Status of receiving psychological help</i>		
Yes	143	35.3
No	262	64.7
<i>Status of psychological diagnosis</i>		
Yes	36	8.9
No	369	91.1

completing the scales. Additionally, participants were informed of their right to withdraw from the study at any time.

Measures

Warwick-Edinburgh Mental Well-Being Scale The Warwick-Edinburgh Mental Well-Being Scale, developed by Tennant et al. (2007), was adapted into Turkish by Keldal [18]. The scale consists of 14 items (e.g., "*I am interested in new things*") and is unidimensional. It is rated on a five-point Likert scale (*1=strongly disagree; 5=strongly agree*). Higher scores on the scale indicate higher levels of mental well-being. Confirmatory factor analysis revealed that the unidimensional structure demonstrated good model fit (NFI=0.94, RFI=0.93, IFI=0.96, CFI=0.96, NNFI=0.95, RMR=0.054). Criterion-related validity indicated significant positive correlations between mental well-being and psychological well-being, life satisfaction, and subjective happiness. The Cronbach's alpha reliability coefficient ($\alpha=0.92$) was reported to be at an acceptable level [18]. In this study reliability coefficient calculated as $\alpha=0.90$.

The Brief Resilience Scale The Brief Resilience Scale, developed by Smith et al. [43], was adapted into Turkish by Doğan [9]. The scale consists of six items (e.g., "*I tend to bounce back quickly after hard times*") and is unidimensional. It is scored on a five-point Likert scale (*1=Not at all true, 5=completely true*). Higher scores on the scale indicate greater levels of resilience. Confirmatory factor analysis results indicated that the unidimensional structure demonstrated good model fit (CFI=0.99, IFI=0.99, GFI=0.99, AGFI=0.96, SRMR=0.03, RMSEA=0.05). The Cronbach's alpha reliability coefficient ($\alpha=0.83$) was reported to be at an acceptable level [9]. In this study reliability coefficient calculated as $\alpha=0.88$.

The Intolerance of Uncertainty Scale The Intolerance of Uncertainty Scale, developed by Carleton et al. [5], was adapted into Turkish by Sarıçam et al. [39]. The scale consists of 12 items (e.g., "*I can't stand being caught off guard by a situation*") and is composed of two dimensions. It is rated on a five-point Likert scale (*1=Not at all true for me, 5=completely true for me*). Higher scores on the scale indicate higher levels of intolerance of uncertainty. Confirmatory factor analysis results indicated that the two-dimensional structure demonstrated good model fit (CFI=0.95, IFI=0.95, GFI=0.94, SRMR=0.046, RMSEA=0.073). The Cronbach's alpha reliability coefficient ($\alpha=0.88$) was reported to be at an acceptable level [39]. In this study reliability coefficient calculated as $\alpha=0.90$.

The Future Anxiety Scale The Future Anxiety Scale, developed by Zaleski et al [53], was adapted into Turkish by [50]. The scale consists of five items (e.g., "*The thought of not being able to achieve my goals in the future bothers me*") and is rated on a six-point scale (*1=completely false, 6=completely true*). Higher scores on the scale indicate higher levels of future anxiety. Confirmatory factor analysis results indicated that the two-dimensional structure demonstrated adequate model fit (CFI=0.97, GFI=0.96, SRMR=0.044, RMSEA=0.064). The Cronbach's alpha reliability coefficient ($\alpha=0.87$) was reported to be at an acceptable level [50]. In this study reliability coefficient calculated as $\alpha=0.83$.

Statistical Analysis

The primary aim of the study is to test a hypothetical model that examines the relationships among resilience, intolerance of uncertainty, future anxiety, and the mental well-being of young researchers. To achieve this aim, the dataset was first examined for missing and outlier values. Outliers were identified and removed using the Mahalanobis distance threshold of 0.001 [3]. Next, the normality of the data was assessed by calculating the mean scores, standard deviations, reliability values, skewness, and kurtosis values of the variables. The skewness and kurtosis values for all variables were found to fall within the acceptable range of ± 1 , indicating that the assumption of normality was met [45]. Finally, before testing the hypothetical model, the correlational relationships among the variables included in the study were examined.

After completing the preliminary analyses, the hypothetical model was tested using PROCESS v4.0 (Model 6), developed by Hayes [15]. This method, based on regression analysis, was employed to perform a serial multiple mediation analysis with two mediating variables. In this model, the independent variable can influence the dependent variable in four different ways: one direct path and three indirect paths through the mediators [15]. To assess the significance of the mediation effects, bootstrapping analysis was conducted following the testing of the hypothetical model. The absence of the value zero between the upper and lower bounds of the confidence intervals in the bootstrapping results indicates that the mediation effect is statistically significant [14]. Throughout the data analysis process, SPSS 26 and JASP 11 statistical software were utilized.

Results

Initially, reliability coefficients, descriptive statistics, and correlation values for the variables were calculated (see Table 2). The reliability values for the research variables were found to range between 0.829 and 0.900 for Cronbach's alpha, 0.832 and 0.902 for McDonald's omega, and 0.809 and 0.912 for Guttman's lambda. These results demonstrate that all variables in the study have adequate reliability (Nunnally & Bernstein, 1994). The skewness values of the variables ranged from -0.594 to -0.208 , and the kurtosis values ranged from -0.034 to 0.231 . These findings indicate that all variables in the study follow a normal distribution [45]. Examining the relationships between the variables revealed that resilience had significant negative correlations with intolerance of uncertainty ($r = -0.406$, $p < 0.001$) and future anxiety ($r = -0.457$, $p < 0.001$), while showing a significant positive correlation with mental well-being ($r = 0.607$, $p < 0.001$). Additionally, intolerance of uncertainty was positively correlated with future anxiety ($r = 0.550$, $p < 0.001$) and negatively correlated with mental well-being ($r = -0.377$, $p < 0.001$). Lastly, future anxiety had a significant negative correlation with mental well-being ($r = -0.394$, $p < 0.001$).

The primary aim of this study is to test the hypothetical model. To this end, a conditional process analysis was conducted using Hayes' [15] PROCESS Macro with Model 6. In the proposed hypothetical model, resilience is the independent variable, mental well-being is the dependent variable, and intolerance of uncertainty and future anxiety serve as mediating variables. Gender and age were included in the model as control variables. The analysis revealed that resilience positively predicts mental well-being ($c = 0.616$, 95% CI = [1.014, 1.318]). When the mediating variables were included in the model, the

Table 2 Reliability coefficients, descriptive statistics, and correlation values of study variables

Variables	Reliability values and descriptive statistics							Correlations			
	α	ω	λ_6	Mean	SD	Skewness	Kurtosis	1	2	3	4
1. Resilience	.884	.886	.872	18.84	4.51	-.208	-.034	—			
2. Intolerance of Uncertainty	.899	.901	.910	37.63	8.57	-.264	-.024	-.406**	—		
3. Future Anxiety	.829	.832	.809	19.29	6.22	-.594	-.015	-.457***	.550**	—	
4. Mental Well-being	.900	.902	.912	49.31	8.54	-.243	.231	.607**	-.377**	-.394**	—

** $p < .001$

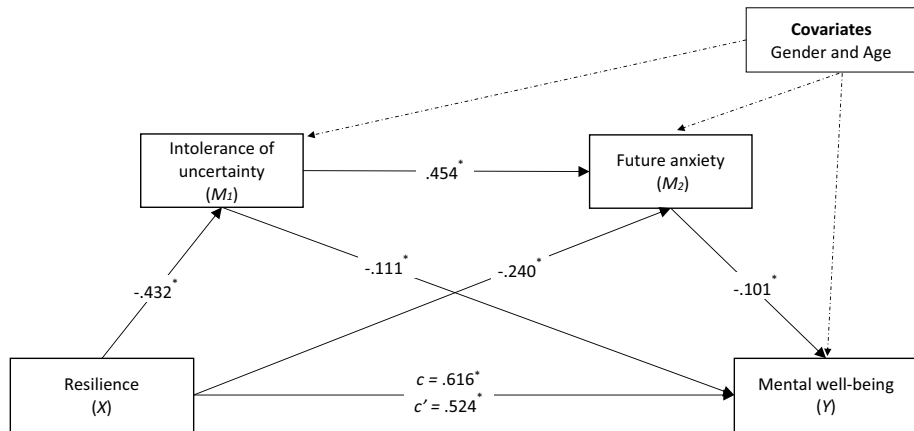


Fig. 1 The result of serial mediation model, * $p < .05$, Note 1. Displayed values are standardized coefficients. Note 2. Non-significant pathways are presented with dotted lines

Table 3 Findings regarding bootstrap coefficients and confidence intervals

Effect	Bootstrap coefficient ^a	Lower limit ^b	Upper limit ^b
Total effect	1.166	1.014	1.318
Direct effect	.992	.821	1.162
Total indirect effect	.092	.043	.143
Indirect effect ($X \rightarrow M_1 \rightarrow Y$)	.048	.009	.089
Indirect effect ($X \rightarrow M_2 \rightarrow Y$)	.024	.001	.052
Indirect effect ($X \rightarrow M_1 \rightarrow M_2 \rightarrow Y$)	.019	.001	.041

^a Standardized; Based on 5,000 Bootstrap Samples, ^b %95 Confidence Interval

X: Resilience, M₁: Intolerance of uncertainty, M₂: Future anxiety, Y: Mental well-being

significant relationship between resilience and mental well-being remained but diminished ($c' = 0.524$, 95% CI = [0.821, 1.162]). This indicates that intolerance of uncertainty and future anxiety partially mediate the relationship in the model. Additionally, resilience negatively predicted intolerance of uncertainty ($a_1 = -0.432$, 95% CI = [-0.996, -0.648]) and future anxiety ($a_2 = -0.240$, 95% CI = [-0.452, -0.211]). Furthermore, future anxiety ($b_1 = -0.101$, 95% CI = [-0.272, -0.005]) and intolerance of uncertainty ($b_2 = -0.111$, 95% CI = [-0.206, -0.016]) were found to negatively predict mental well-being (Fig. 1).

Based on this mediation finding, three different indirect effects were identified. The first indirect effect shows that resilience significantly predicts mental well-being through intolerance of uncertainty (bootstrap coefficient = 0.048, 95% CI = [0.009, 0.089]). The second indirect effect indicates that resilience significantly predicts mental well-being through future anxiety (bootstrap coefficient = 0.024, 95% CI = [0.001, 0.052]). Lastly, the third indirect effect reflects the main hypothesis of our study. This finding demonstrates that intolerance of uncertainty and future anxiety play a sequential multiple mediation role in the relationship between resilience and mental well-being (bootstrap coefficient = 0.019, 95% CI = [0.001, 0.041]). In summary, the significance of the mediation roles was tested

within a 95% confidence interval using bootstrapping with 5,000 samples. The absence of zero between the lower and upper bounds of the confidence intervals indicates significance. This finding suggests that intolerance of uncertainty and future anxiety statistically and serially mediate the relationship between resilience and mental well-being (Table 3).

Discussion

The development of humanity relies on the advancement of science, and the progress of the scientific world requires researchers. For researchers to continue making significant contributions to the scientific community, they must feel mentally well. One indicator of mental well-being is resilience [4, 20]. Researchers with low resilience may experience diminished levels of mental well-being. This study investigated new problems that may arise among young researchers with low resilience and the impact of these problems on their mental well-being. Young researchers with low resilience are likely to experience intolerance of uncertainty in various ambiguous situations. Since research processes inherently involve numerous unknowns, this can be considered a domain where researchers might face intolerance of uncertainty. The uncertainties experienced in their professional lives may negatively affect their expectations for the future, leading to increased future anxiety. As future anxiety grows due to intolerance of uncertainty, the mental well-being of young researchers may also be adversely affected. The findings of this study support these predictions. The direct and indirect relationships hypothesized in the study are discussed sequentially below.

The first finding of the study pertains to the direct relationship between resilience and mental well-being. A review of prior studies conducted on young researchers indicates that the positive relationship between these concepts is frequently emphasized [11, 44]. Resilience is demonstrated by an individual's ability to cope with difficulties encountered throughout life or to develop new solutions [10]. Li and Hasson [25] noted that resilience mitigates the negative effects of work-related stress and contributes to well-being. All these findings support the first result of the study. Therefore, low resilience among young researchers (namely, their inability to cope with challenges they encounter) may lead to poor mental well-being.

The second finding of the study pertains to the indirect effect of low resilience on mental well-being. According to this finding, low resilience increases intolerance of uncertainty, which in turn negatively impacts mental well-being. This finding highlighted the challenges faced by young researchers in their professional lives, particularly emphasizing ambiguous situations. Researchers with low resilience often struggle to adapt to the uncertainties they encounter in their careers. Studies in the literature indicate that intolerance of uncertainty is closely related to resilience [17, 46]. Wang et al. [48] reported findings supporting the negative relationship between resilience and intolerance of uncertainty. Research examining the relationship between intolerance of uncertainty and mental well-being emphasizes the adverse effects of this concept on mental well-being [21, 40]. These findings support the second result of the study. Drawing on the literature, low resilience in young researchers appears to contribute to greater intolerance of uncertainty, which in turn may negatively impact their mental well-being.

Another indirect effect identified in the study relates to future anxiety. According to this finding, low resilience increases future anxiety, thereby negatively affecting mental well-being. Future anxiety is defined as a type of anxiety arising from concerns

and fears about potential challenges in later stages of life [7]. Mutia and Hargiana [31] emphasized the negative relationship between resilience and future anxiety. Similarly, Paredes et al. [36] reported that low resilience increases future anxiety. Studies focusing on the relationship between future anxiety and mental well-being highlight the negative connection between these concepts [36, 51]. Findings by Miloyan et al. [30] demonstrated that anxious thoughts about the future adversely impact individuals' mental health. All these studies in the literature contribute to understanding the indirect effect of future anxiety on the relationship between resilience and mental well-being. These findings suggest that low resilience in young researchers may lead to increased future anxiety, which may subsequently have a detrimental effect on their mental well-being.

The final and most fundamental finding of the study pertains to the serial mediating effect of intolerance of uncertainty and future anxiety in the relationship between resilience and mental well-being. According to this finding, intolerance of uncertainty and future anxiety indirectly affect resilience and mental well-being. Young researchers with low resilience are likely to be negatively affected by ambiguous situations, which may increase their intolerance of uncertainty. These results highlight an important way in which resilience reveals positive associations on mental well-being: individuals with higher resilience appear to tolerate uncertainty better, which reduces their anxiety about the future and ultimately increases their psychological well-being. This increase may, in turn, influence their thoughts and feelings about the future, triggering future anxiety.

Elevated future anxiety could further harm their mental well-being. A review of the literature related to this finding revealed no prior studies directly addressing this serial mediation. However, Rehman et al. (2021) reported findings in their study on the relationship between intolerance of uncertainty and mental well-being among higher education students that align with the results of this research. Similarly, Mallett et al. (2021) reported comparable findings. Furthermore, a literature review on the negative relationship between future anxiety and mental well-being identified consistent results (e.g., [36]). These studies found that individuals with high future anxiety tend to have lower mental well-being. In summary, the findings suggest that young researchers with low resilience are more likely to experience intolerance of uncertainty, which may reflect on their future-related anxieties, posing a threat to their mental well-being. Consequently, alternative interventions aimed at enhancing the resilience of young researchers could be effective in combating uncertainty and preventing future anxiety, thereby supporting their mental well-being positively.

Limitations and Future Research

This study relies on self-reported data collected from young researchers, which may introduce response bias due to the subjective nature of the instruments used. Additionally, the cross-sectional design limits the ability to infer causation between the variables, as temporal relationships cannot be established. The sample is restricted to young researchers in Türkiye, which may affect the generalizability of the findings to other cultural or demographic groups. The study also focuses solely on resilience, intolerance of uncertainty, and future anxiety, potentially overlooking other significant factors influencing mental well-being. Lastly, the research uses convenience sampling, which may not fully represent the broader population of young researchers.

Implications

Despite its limitations, this study provides valuable insights into the complex interplay between resilience, intolerance of uncertainty, future anxiety, and mental well-being among young researchers. To support researchers in coping with occupational stressors, academic and research institutions should ensure consistent access to psychosocial support services. Early identification and intervention for those experiencing heightened anxiety or uncertainty are crucial to prevent the development of long-term mental health problems. Additionally, policymakers should also enact measures to reduce career uncertainty by offering more secure funding, grants, and permanent research positions. Furthermore, the serial mediation model highlights the need to examine intermediate factors in mental health research, offering a framework for future longitudinal and cross-cultural studies in similar contexts.

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Author Contribution Seydi Ahmet Satici and M. Engin Deniz were the academic advisors and general supervisors of the study. Hasan Kütük, Sinan Okur, Begüm Satici, İbrahim Demirci, Ahmet Rifat Kayış and M. Çağrı Aksu carried out the data analyses and interpreted the findings. A. Berke Körün, Ezgi Okur, Fatma Betül Yılmaz, Gaye Birni, Yağmur Kaya and Zahide Gül Aktepe were involved in the data collection and manuscript processes. All authors reviewed and approved the final version of the study and reached a consensus on the version to be published.

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Data Availability Data will be available on request.

Declarations

Ethical Approval The study protocol has been approved by the Yıldız Technical University's Scientific Research and Ethics Committee (Report Number = 20230502124, Verification Code = 951fd). The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its following updates.

Consent to Participate Informed consent was obtained from all the individual participants that were included in the study.

Conflict of interest No conflict of interest exists for this manuscript for any of the authors.

Pre-registration Statement This study was not pre-registered.

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