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Research Article

Examination of Differential Item Function for Resilience Scale Items with Latent Classes Based on Intolerance of Uncertainty

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Abstract
The concept of resilience encompasses various elements such as spirituality, cultural heritage, adverse life events, and family lineage. Due to this diversity, examining the items measuring resilience, which is one of the concepts evaluated within the scope of positive psychology, differential item function (DIF), is considered important in terms of revealing the structure. As well as determining DIF, there is a need to reveal the reasons for its sources. At this point, the variable intolerance of uncertainty, which is highly related to resilience, is addressed. In this context, the general purpose of this research is to examine whether the resilience scale items show DIF before and after the latent classes have been created within the scope of intolerance of uncertainty. The research, in which the Brief Resilience and Intolerance of Uncertainty scales were used, was conducted with 718 university students. In the first stage of data analyses, likelihood ratio, one of the DIF determination methods, was used. In the second stage, the latent class analysis was carried out to create latent classes within the scope of intolerance of uncertainty. According to the results of this research, all items within the scope of gender for the Brief Resilience scale show a middle level of DIF. Within the scope of Latent Class analysis, it was determined that the four-class model was compatible with the data. After the groups were formed, DIF was examined in terms of gender for the Brief Resilience scale within each group. DIF was not determined in any of the items in class 1 and class 4. However, in class 3, all items showed moderate DIF. It was determined that the DIF results changed after the created latent classes. All these results show that intolerance of uncertainty may be the source of DIF determined in resilience scale items. Therefore, it is recommended to study the interrelated variables together when studying DIF.

Keywords:
Resilience • Intolerance of Uncertainty • Differential Item Functioning • Latent Class Analyses

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Introduction

A human being can exist in the context of the psychological characteristics he/she has. He/she encounters many different situations throughout his/her life, either positive or negative, and he/she can survive in line with his/her reactions to the negative situations he/she faces. Undoubtedly, situations that individuals describe as negative and their reactions to these situations may differ. In the face of these negative situations, some individuals may show chaotic reactions such as anxiety, emotional or mental exhaustion, and burnout. Some individuals consider these negativities as an opportunity, which can be regarded as a new beginning or a driving force that will contribute to their development (Brown & Nagel, 2004; Conner & Davidson, 2003; Coutu, 2002; Kobasa, 1979). Although there are surely many different psychological characteristics underlying this difference between individuals, the ability of the individual to return to their normal life or maintain their psychological health under adverse conditions can also be explained by the concept of resilience in the positive psychology approach (Doğan, 2015; Tuck & Anderson, 2014; Neenan, 2009).

The concept of resilience, which was first used by Block (1950), is one of the important concepts within the scope of positive psychology (Tura & Doğan, 2020). The concept of resilience, which is of Latin origin, derives from the word "resiliens" and has been defined in different ways in the literature. These definitions can be summarized as follows:being able to struggle against unpleasant situations, stress, difficulty, and loss; adapting internally and externally; being able to heal or recover after these experiences; finding life meaningful despite bad experiences and having hope for the future; not feeling like a victim when faced with bad experiences (Coutu, 2002; Day & Gu, 2014; Ee & Chang, 2010; Giroux, 2007; Masten, 1994; Smith *et al*., 2004; Weston & Parkin, 2010). Although the definitions of resilience vary the common points appear to bereturning to normal or getting better by overcoming difficult conditions, stress, bad experiences, and negativities.

Individuals with resilience are able to establish social and positive relationships; have positive outlook on the future, high self-confidence, self-esteem and motivation (Henderson & Milstein, 2003). They have problem solving skills and are purposeful (Benard, 1991). They canaccept the facts as they are rather than denying them; use the available resources in a unique way and are flexible in the face of difficulties and uncertainty (Coutu, 2002). Resilience, which is not just a personality trait, can also increase or decrease depending on the social environment the individual is in or other characteristics he/she has (gender, age, birth order, number of siblings, etc.) (Day *et al.*, 2011). When examining the variables in which individuals' resilience is discussed in the literature, age (Aydın *et al*., 2019; Bingal, 2018; Bozdağ, 2020; Kimter, 2020; Ulukan, 2020), number of siblings (Aydın & Egemberdiyeva, 2018; Erata & Özbey, 2020; Ergül, 2016; Özkapu, 2019), birth order (Arslan & Topal, 2021; Polat Başpınar,

2021; Oktan *et al*., 2014), gender (Cantez, 2018; Çelebi, 2020; Çelik *et al*., 2019; Doğan & Yavuz, 2020; Hoşoğlu *et al*., 2018; Karal & Biçer, 2021; Önder & Gülay, 2008; Turgut, 2016) variables are seen. It can be stated that studies with the finding that resilience differs especially according to gender stand out in number. These differences may be related to the characteristics of the studied group or due to the items included in the measurement tool. It may be caused by the substances in the measuring instruments. In this context, the concepts of bias and differential item function (DIF) regarding scale items measuring resilience are considered important.

Bias is a systematic error in the measurement process (Osterlind, 1983).It can be defined as the probability of individuals in one group to answer the item correctly compared to individuals in the other group due to some properties of the items or test conditions (Zumbo, 1999). Bias causes the validity of the measurement to decrease. In order to determine whether the scale items show bias or not, it is necessary to determine whether they show DIF. Differential Item Functioning (DIF) is the matching of individuals according to their abilities in terms of the variable to be measured, and then statistically revealing whether these individuals in different groups have different probabilities of responding to the item (Camilli & Shepard, 1994; Embretson & Reise, 2000; Zumbo, 1999). DIF is a preliminary step in determining bias, and expert opinions are generally consulted to make decisions about bias (Demirtaşlı & Ulutaş, 2015; Kalaycıoğlu & Kelecioğlu, 2011; Karakaya & Kutlu, 2012; Roever, 2005). However, experts cannot reach a common opinion regarding the source of DIF (Karami & Nodoushan, 2011). Determining the causes or sources of DIF is as important as determining the DIF. The sources cited among the most common causes of DIF in the studies in the literature are different scoring models (Gelin & Zumbo, 2003; Henderson, 2001; Tunç & Kutlu, 2018), item contents (Liu & Wilson, 2009; Mendes-Barnett & Ercikan, 2006; Ong *et al.*, 2011) and cultural differences (Asil, 2010; Girl & Khaliq, 2001). When it is aimed to determine DIF and its sources, in addition to these, other latent variables that are related to the relevant latent variable can also be evaluated. In this context, latent variables related to the concept of resilience can be addressed in order to determine whether the scale items of resilience show DIF and, if so, what their potential sources might be.

Variables that affect resilience can be handled under three main headings: risk factors, protective factors, and positive results (Rutter, 2006). Positive results for individuals can occur when risk factors are less effective than protective factors (Masten & Reed, 2005). For this reason, risk factors are considered important in affecting resilience. However, unexpected events are an important risk factor for resilience (Weick & Sutcliffe, 2011). People who react negatively to unexpected or uncertain situations are those who cannot tolerate uncertainty (Buhr & Dugas, 2002). Intolerance of uncertainty is the tendency of individuals to interpret uncertain situations as a source of discomfort or threat (Carleton,

2022; Majid & Pragasam, 1997). Dugas *et al.* (2004) defined the tendency to react negatively to situations and events characterized by uncertainty occurring in emotional, cognitive and behavioral areas as "intolerance to uncertainty". People with intolerance to uncertainty experience distress and anxiety when faced with uncertainty. They believe that uncertainty is negative and should be avoided, and they have difficulty adapting to uncertain conditions (Dugas *et al*., 2001; Buhr & Dugas, 2002). These individuals believe that uncertainty is a source of stress and persecution, and they tend to identify various reasons for anxiety in situations they see as unacceptable (Buhr & Dugas, 2006; Francis *et al*., 2016). Intolerance of uncertainty has been consistently associated with psychopathological constructs, including worry, anxiety, and obsessive-compulsive symptoms (Dugas *et al*., 2001; Holaway *et al*., 2006). Studies have shown that intolerance to uncertainty causes anxiety disorders, high levels of anxiety, depression and obsessive thoughts (Dugas *et al*., 2005; Yüksel, 2014; Gentes & Ruscio, 2011; Değirmenci, 2017; Sarıçam, 2017; Çevik, 2017; Yıldız, 2017) and in this context, it has been shown that individuals have a negative impact on their level of resilience (Cook *et al*.; Einstein, 2014; Durna *et al.*, 2022). Individuals with high resilience are less intolerant to the uncertainty they face (Bozdağ, 2020; Karataş & Tagay, 2021). In the literature, there are many studies in which resilience and intolerance of uncertainty are discussed together (Kılınç & Uzun, 2022; Lee, 2019; Mitmansgruber, *et al.* 2016; Sarıçam *et al.*, 2020; Tingley, 2020) and intolerance of uncertainty is thought to be an important latent variable for resilience. Therefore, intolerance to uncertainty variable can be examined as a possible source of DIF that can be observed in resilience items. While carrying out this examination, it is important to establish the latent classes based on intolerance of uncertainty and to examine DIF in this context in order to determine the source of DIF. Therefore, in this study, first of all, it was examined whether the items of the resilience scale showed DIF, and then DIF analyses were performed again for the latent classes formed within the scope of intolerance of uncertainty.

The general purpose of this research is to examine whether the resilience scale items show DIF before and after the latent classes have been created within the scope of intolerance of uncertainty.

Method

Model of the Research

In this study, DIF was determined for the Resilience Scale items, and latent classes were created to see the effect of students' intolerance of uncertainty levels on DIF. DIF analysis was conducted separately both for the entire group and each latent class. Within the scope of this purpose, it was determined that this research was in the descriptive survey model.

Study Group

There is no specific rule about the sample size required for Latent Class Analysis (LCA) because the sample size depends on many conditions. However, since the sample size plays a decisive role in defining the model, the sample is expected to be as large as possible (Cleveland *et al*., 2010). The study group of the research consists of 718 students studying at a public university in Istanbul. 61.3% of the students are female and 38.7% are male students.

Data Collection Tool

Within the scope of this research, the Brief Resilience Scale and Intolerance of Uncertainty Scale were used.

Brief Resilience Scale (BRS): Smith et al. (2008) was developed to measure the resilience of individuals. BRS is a five-point Likert-type measurement tool consisting of six items. High scores from the scale indicate high resilience. The development and validity-reliability studies of the scale were carried out on four different study groups. Accordingly, the first two groups were university students, and the next two groups were patients with heart conditions and fibromyalgia. Exploratory factor analysis was performed to determine the construct validity of the scale, and as a result of the analysis, a single factor structure was obtained, which explained 61%, 61%, 57% and 67% of the total variance for four different sample groups respectively. The factor loads of the scale items ranged from .68 to .91. The reliability of the scale was calculated with internal consistency and test-retest methods. The internal consistency reliability coefficient was found to vary between .80 and .91. The test-retest reliability coefficient was found between .62 and .69. Within the scope of criterion-related validity, the relationships between BRS and other scales were examined. Accordingly, there were significant positive correlations between BRS and ego resilience, optimism, life goals, social support, positive coping strategies and positive emotions. Negatively significant relationships were found between BRS and pessimism, depression, anxiety, negative emotions, perceived stress and negative coping strategies.

In the adaptation made by Doğan (2015), 295 (186 females, 109 male) university students were studied. As a result of the exploratory factor analysis, a single factor structure was obtained, which explained 54% of the total variance, and factor loadings were found to vary between .63 and .79. CFA result for BRS, goodness of fit indices, x^2/df (12.86/7) = 1.83, NFI = 0.99, NNFI = 0.99, CFI = 0.99, IFI = 0.99, RFI = 0.97, GFI = 0.99, AGFI = 0.96, RMSEA = 0.05, SRMR = 0.03. The reliability of the BRS was examined by the internal consistency method and the internal consistency coefficient was obtained as .83. The BRS is a five-point Likert scale and the response is "not at all appropriate" (1), "not suitable" (2), "somewhat appropriate" (3), "appropriate" (4), "completely appropriate" (5). Items 2, 4 and 6 in

the scale are reverse items. Cronbach's α reliability of the results obtained from this study was determined as .87 and McDonald's ω reliability was determined as .87.

Intolerance of Uncertainty Scale (IUS): The Intolerance of Uncertainty Scale was developed by Carleton, Norton, Asmundson (2007) on the basis of a 27-item scale previously developed in French by Freeston et al. (1994) in order to measure the level of intolerance of uncertainty. Adaptation studies of the scale into Turkish were carried out by Sarıçam et al. (2014). High scores on the scale are interpreted as the individual's high level of intolerance of uncertainty. The research was conducted on total 593 university students in two mid-state universities. Results of confirmatory factor analyses demonstrated that 12 items yielded two factors as original form and that the two-dimensional model was well fit (χ^2 = 147.20, *df* = 48, RMSEA =.073, CFI =.95, IF I=.95, GFI =.94, and SRMR =.046). Factor loadings ranged from .55 to .87. Cronbach alpha internal consistency coefficient was found as .88 for overall scale, .84 for prospective anxiety subscale and .77 for inhibitory anxiety subscale. In the concurrent validity significant relationships were found between the Intolerance of Uncertainty Scale (IUS-12) and Coping Flexibility Scale, Educational Stress Scale (*r*=-.43, .41 respectively). Test-retest reliability coefficient was .74. Corrected item-total correlations ranged from .42 to .68. Cronbach's α reliability of the results obtained from this study was determined as .93 and McDonald's ω reliability was determined as .91.

Data Analysis

The analysis was carried out in two stages. In the first stage, DIF was determined within the scope of gender for the items in the Brief Resilience Scale. Likelihood ratio, one of the DIF determination methods, was used. In this method, the hypothesis of whether there is a difference between the focus and reference group item parameters is tested. Furthermore, limited and generalized models are created, and their ratios to one another are tested by creating accordingly. By taking the Likelihood Ratio logarithm, the G^2 value is obtained and checked from the Chi-Square table using the degrees of freedom. If this value is significant, this shows the presence of DIF (Thissen, 2001). G^2 values give information about DIF size. The DIF levels are presented below based on the values of the G^2 value (Greer, 2004; Thissen, 2001):

- If it is $3.84 < G^2 < 9.4$, then, no DIF or DIF at a negligible level,
- $9.4 \leq G^2 < 41.9$ shows a middle level of DIF,
- $G^2 \geq 41.9$ shows a high level of DIF.

In the second stage, Latent Class Analysis was carried out to create latent classes within the scope of Intolerance of Uncertainty. LCA; It is a statistical method that aims to divide individuals into homogeneous subgroups, based on the observable (measurable) response patterns of individuals. Latent classes are subgroups that

cannot be observed directly. While individuals in these subgroups are similar to each other in terms of certain criteria, they also differ significantly from individuals in other groups (Vermunt, 2003; Vermunt & Magidson 2004).

When choosing a model in latent class models, the aim is not to find the correct model, but to identify the model that provides more information. The most common way is to select the model with the best fit by analyzing models with different numbers of classes and comparing their fit indices. Elections are made comparatively (Moors and Wennekers, 2003). Fit indices such as Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), AIC Consistent AIC (CAIC), Likelihood-ratio test (G^2) are used to evaluate model fit. Likelihood-ratio test interprets even the smallest difference between two models as incompatibility of the models when the sample size increases. Additionally, it may not be able to control parameters even in medium-sized samples (McCutcheon, 2002). In this case, this method intended to be used for model selection may be misleading. BIC and CAIC are preferred statistics because they also control sample sizes (Kankaras *et al*., 2010). Nylund *et al*., (2007) stated in their study that the BIC index gave better results. Lukočienė, Varriale & Vermunt (2010) reported in their simulation study that BIC is the best criterion in model selection. Güngör Culha (2012) also stated in his research that BIC and CAIC criteria give better results than other criteria in making the right decision when choosing the most appropriate model as the sample grows. It is stated that the lower the values obtained from the information criteria, the better the model fit.

After examining the model fit indices, homogeneity and degree of separation of latent classes, it is very important to examine the "entropy" value. The entropy value indicates the uncertainty in classification. A single entropy value is produced for the entire analysis, and this value, which has values between 0.00 and 1.00, takes values close to 1.00, indicating that the classification uncertainty is low (Collins & Lanza, 2010; Cheng, 2012).

Within the scope of LCA, latent class probabilities and conditioned response probabilities are obtained (Lanza *et al.*, 2003; Nylund *et al*., 2007). The latent class probability parameters show the proportion of the universe in each latent class, and the sum of these parameters is equal to 1. Conditional response probability parameters show the probability of a certain response to the observed variable. This parameter represents the relationship between the observed variable and the latent variable. It can be said that values close to 1.00 show a strong relationship between the latent variable and the observed variable. Through these parameters, it can be predicted how individuals will react to the observed variable in each latent class condition (Akbaş & Kahraman, 2019). Conditional response probability is the probability of individuals in each latent class approving the items in the measurement tool used. Jamovi 2.3.13 program was used in data analysis.

Results

There are six items in the Brief Resilience scale, and the DIF results of these items according to Likelihood ratio analysis are given in Table 1.

Table 1.
Likelihood ratio Chi-square statistics for Brief Resilience Scale

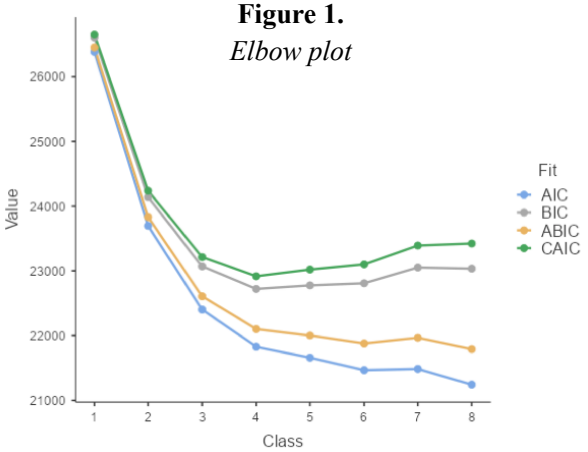
	G^2	*p*
Item 1	12.8	<.001
Item 2	11.0	<.001
Item 3	16.1	<.001
Item 4	17.4	<.001
Item 5	12.0	<.001
Item 6	14.1	<.001

As seen in Table 1, the G^2 values of all items are in the range of $9.4 \leq G^2 < 41.9$. For this reason, it is seen that all items in the scale show a middle level of DIF according to gender. To determine the source of DIF, LCA was performed to determine the latent classes that would occur within the scope of Intolerance of Uncertainty. Models with 2, 3, 4, 5, 6, 7 and 8 classes were tested in the analyses, respectively. The fit measures related to the models tested during the analyses are given in Table 2 and Elbow plot is given in Figure 1.

Table 2.
Fit Measures of Formed Models Related to the Intolerance of Uncertainty

Class	Log-likelihood	AIC	CAIC	BIC	df	G^2
2	-11751	23696	24237	24140	620	15412
3	-11053	22399	23213	23067	571	14017
4	*-10714*	*21819*	*22906*	*22673*	*522*	*13339*
5	-10534	21556	22917	22711	473	12978
6	-10406	21399	23033	22740	424	12723
7	-10294	21271	23178	22836	375	12497
8	-10192	21167	23347	22956	326	12295

Figure 1.
Elbow plot



It is known that BIC and CAIC statistics are better in model selection (Güngör Culha, 2012; Kankaras *et al.,* 2010; Lukočienė *et al*., 2010; Nylund *et al*., 2007). Therefore, in this study, especially considering these two values, it was determined that the four-class model fit the data. The entropy value, which gives a general value of classification accuracy, was obtained as 0.938. The fact that this value is close to 1.00 indicates that the classification uncertainty is low. This finding provides information that the established four-class model is successful in assigning individuals to the correct classes. There are 12 items in the Intolerance of Uncertainty scale. Parameter estimates for the four-class model for each item are given in Table 3.

Table 3.
Parameter estimates for the four-class model

		Y=1	Y=2	Y=3	Y=4	Y=5
Item 1	**Class 1**	0.0421	0.0331	0.109	0.251	**0.5650**
	Class 2	0.0167	0.0375	0.261	**0.428**	0.2569
	Class 3	0.0141	0.1534	**0.413**	0.384	0.0354
	Class 4	0.1319	0.3232	**0.489**	0.0000	0.0563
Item 2	**Class 1**	0.0000	0.0745	0.102	0.172	**0.6515**
	Class 2	0.0366	0.0619	0.349	**0.399**	0.1530
	Class 3	0.0139	0.2867	**0.447**	0.216	0.0357
	Class 4	0.2453	**0.3981**	0.186	0.113	0.0570
Item 3	**Class 1**	0.0474	0.0527	**0.354**	0.1989	0.3470
	Class 2	0.1125	0.1090	**0.442**	0.2533	0.0836
	Class 3	0.0381	0.4052	**0.422**	0.0809	0.0534
	Class 4	**0.4149**	0.2426	0.171	0.1530	0.0189
Item 4	**Class 1**	0.0000	0.0949	0.166	0.2006	**0.5384**
	Class 2	0.0237	0.1350	**0.382**	0.3264	0.1325
	Class 3	0.1073	**0.3946**	0.266	0.1515	0.0809
	Class 4	**0.4524**	0.2818	0.171	0.0565	0.0377
Item 5	**Class 1**	0.02312	0.0374	0.129	0.149	**0.6613**
	Class 2	0.00820	0.0547	0.328	**0.404**	0.2049
	Class 3	0.05460	0.2562	**0.472**	0.144	0.0735
	Class 4	**0.31923**	0.2261	0.210	0.245	0.0000
Item 6	**Class 1**	0.0000	0.0237	0.178	0.1678	**0.6303**
	Class 2	0.0133	0.0839	0.394	**0.4259**	0.0832
	Class 3	0.0359	0.3556	**0.510**	0.0867	0.0119
	Class 4	**0.4141**	0.3800	0.149	0.0377	0.0189
Item 7	**Class 1**	0.0000	0.0520	0.0303	0.130	**0.7878**
	Class 2	0.0155	0.0332	0.1610	**0.536**	0.2546
	Class 3	0.0000	0.2711	**0.3965**	0.259	0.0730
	Class 4	0.2642	0.2666	**0.2994**	0.132	0.0375
Item 8	**Class 1**	0.0000	0.0000	0.0000	0.1708	**0.8292**
	Class 2	0.0233	0.0363	0.146	**0.5797**	0.2151
	Class 3	0.0000	0.3914	**0.466**	0.0963	0.0468
	Class 4	**0.6604**	0.2251	0.0000	0.0200	0.0944

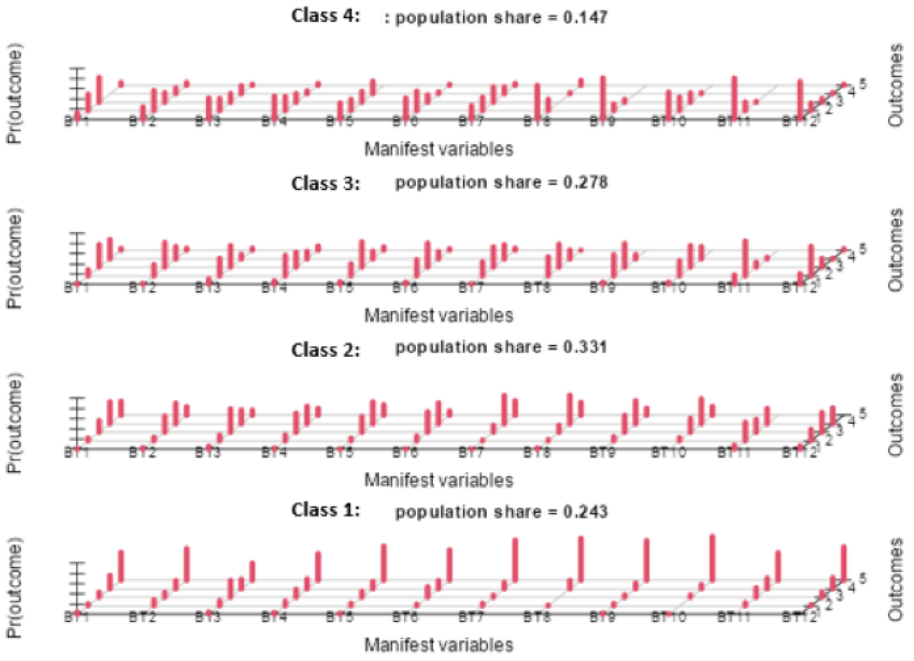
Table 3.
Parameter estimates for the four-class model

		Y=1	Y=2	Y=3	Y=4	Y=5
Item 9	**Class 1**	0.0237	0.0000	0.0498	0.1181	**0.808**
	Class 2	0.0230	0.0782	0.3365	**0.4397**	0.123
	Class 3	0.0122	**0.4831**	0.4566	0.0482	0.0000
	Class 4	**0.8097**	0.1327	0.0576	0.0000	0.0000
Item 10	**Class 1**	0.0118	0.0000	0.0119	0.0965	**0.8798**
	Class 2	0.0000	0.0624	0.3106	**0.4664**	0.1607
	Class 3	0.0434	0.3102	**0.4104**	0.2244	0.0117
	Class 4	**0.5277**	0.2667	0.1866	0.0190	0.0000
Item 11	**Class 1**	0.0000	0.0701	0.1631	0.2218	**0.5451**
	Class 2	0.0798	**0.4010**	0.2405	0.2786	0.0000
	Class 3	0.1935	**0.6373**	0.1322	0.0263	0.0108
	Class 4	**0.8067**	0.1744	0.0189	0.0000	0.0000
Item 12	**Class 1**	0.0000	0.0238	0.1155	0.2327	**0.6280**
	Class 2	0.0850	0.2606	**0.3716**	0.2829	0.0000
	Class 3	0.1949	**0.5529**	0.1665	0.0105	0.0753
	Class 4	**0.7350**	0.1523	0.0749	0.0189	0.0189

1= Not at all suitable for me 2= Very little suitable for me 3= Somewhat suitable for me
4= Very suitable for me 5= Completely suitable for me

The conditional response probabilities seen in Table 3 are the probability of individuals in each latent class approving the items in the measurement tool. For example, when the conditional probabilities are examined, within the scope of the first item, 56% of those in Class 1 are likely to answer “Completely suitable for me”, while 43% of those in Class 2 are likely to answer “Very suitable for me”. 41% of those in Class 3 and 49% of those in Class 4 are likely to answer “Somewhat suitable for me”. When Table 3 is examined in general, it can be stated that Class 1 has the probability of answering the items as “Completely suitable for me”, Class 2 as “Very suitable for me”, Class 3 as “Somewhat suitable for me” and Class 4 as “Not at all suitable for me”. The visualization of the estimated conditional response probability parameters can be seen in Figure 2.

Figure 2.
Parameter estimates for the four-class model



As seen in Figure 2, 24% of individuals are in class 1; 33% are in class 2; 28% are in class 3, and 18% are in class 4. Without creating latent classes, the middle level of DIF was determined for all items in the Brief Resilience Scale for all individuals. DIF results by gender within the scope of four latent classes formed within the scope of Intolerance of Uncertainty are given in Table 4.

Table 4.
Likelihood ratio Chi-square statistics for Brief Resilience Scale (Emerged Latent Classes)

	Class 1		Class 2		Class 3		Class 4	
	G^2	*p*	G^2	*p*	G^2	*p*	G^2	*p*
Item 1	1.359	0.244	3.121	0.077	11.1	<.001	0.994	0.319
Item 2	0.740	0.390	0.667	0.414	15.9	<.001	7.516	0.006
Item 3	1.831	0.176	3.451	0.063	10.2	0.001	7.793	0.005
Item 4	0.359	0.549	14.505	<.001	10.0	0.002	0.167	0.683
Item 5	0.120	0.729	5.298	0.021	13.5	<.001	1.818	0.178
Item 6	0.274	0.600	2.779	0.096	14.3	<.001	4.938	0.026

As seen in Table 4, there are no items showing DIF for Class 1. Since the G^2 value in Item 4 for Class 2 is in the range of $9.4 \leq G^2 < 41.9$, it shows a middle level of DIF. Since the G^2 value of the fifth item is in the range of $3.84 < G^2 < 9.4$, DIF is observed

at a negligible level. Since the G^2 value of all items for Class 3 is in the range of $9.4 \leq G^2 < 41.9$, it shows a middle level of DIF. For Class 4, as the G^2 value of the second, third and sixth items is in the range of $3.84 < G^2 < 9.4$, a negligible DIF is observed.

Class 1 has the possibility of answering "Completely suitable for me". For those with high levels of Intolerance of Uncertainty, Brief Resilience Scale items do not function differently depending on gender. A similar situation also applies to Class 4. Class 4 generally has the possibility of responding "Not at all suitable for me" within the scope of Intolerance of Uncertainty. Therefore, for those with low Intolerance of Uncertainty levels, the Brief Resilience Scale items do not function differently depending on gender. The situation is different for Class 3. There is a possibility that Class 3 will generally answer "Somewhat suitable for me" within the scope of Intolerance of Uncertainty. In Class 3, all items also show a middle level of DIF. Before creating latent classes, all items exhibited DIF; now, all items still display a middle level of DIF based on gender among those with a medium level of Intolerance of Uncertainty.

Discussion

According to the results of this research, all items within the scope of gender for the Brief Resilience scale show a middle level of DIF. In this regard, it can be stated that men and women with the same level of resilience tend to respond differently to the items. When the studies conducted in Turkey were examined, no research could be found examining the item function of the Brief Resilience scale items depending on gender. However, when the international literature is examined, there are studies on resilience and DIF. In their study examining the psychometric properties of the Brief Resilience scale, Liu & Lim (2020) determined negligible gender-based DIF for the fifth and sixth items. In a study where the psychometric properties of the Resilience Scale (RS-25) were determined, it was examined whether the items showed DIF according to gender, and evidence was obtained that there was no DIF according to gender (Seong *et al*., 2023). In their study, Gorman and colleagues, (2021) determined DIF according to gender within the scope of the Connor–Davidson Resilience Scale. In the study where Chen and colleagues (2020) examined DIF according to gender with the Chinese version of the Resilience Scale (RS-14), they detected DIF according to gender in four items of the scale. Wongpakaran and colleagues (2023) found that two items of the resilience scale they developed within the scope of their study showed DIF. Although all these studies examined DIF according to gender in line with resilience, possible sources of DIF were not investigated. For this reason, after determining the DIF in this research, results were obtained within the scope of latent classes, whichcould provide information about possible sources.

Within the scope of Latent Class analysis, it was determined that the four-class model was compatible with the data, especially by using BIC and CAIC statistics. It has been

demonstrated that the classes created with entropy value are successful in distinguishing individuals. When the created classes are examined, it can be stated that Class 1 tends to answer "Completely suitable for me", and thus, their intolerance to uncertainty level is high. On the contrary, it can be stated that Class 4 is inclined to answer "Not at all suitable for me", and thus, their level of intolerance to uncertainty is low. It is seen that Class 2 generally tends to answer "Very suitable for me" and the level of intolerance of uncertainty is also high for this class. It can be stated that Class 3 is prone to answer "Somewhat suitable for me" and there is a medium level of intolerance to uncertainty for this class. In the study with 519 students, Boelen & Lenfeink (2018) identified four latent classes in parallel with the findings of this research. Similarly, Volarov *et al*. (2021) identified four classes in their study conducted with 1440 university students. Results suggest that IU has four latent classes, named as Low IU, Moderate-Low IU, Moderate-High IU and High IU. Therefore, it can be stated that this scale is divided into similar latent classes in different cultures.

After the groups were formed, DIF was examined in terms of gender for the Brief Resilience scale within each group. There was no substance showing DIF for Class 1. For Class 2, only the fourth item (when something bad happens it's hard for me to get over it) shows a middle level of DIF. In Class 3, unlike other classes, all items show a middle level of DIF. In Class 4, negligible DIF is observed in three items. For the group with a moderate level of intolerance to uncertainty and a high probability of answering "Somewhat suitable for me", the items continue to show DIF according to gender. Considering that all items of the scale showed DIF before the latent classes were created, it can be stated that the variable intolerance of uncertainty may have affected the difference in DIF results after the classes were created. In other words, it can be shown that the levels of intolerance of uncertainty, which is one of the possible sources of DIF seen in resilience items, differ. Although there are no studies examining two variables together within the scope of DIF, there are many studies showing the relationship between the two variables. These studies have shown that intolerance of uncertainty negatively affects individuals' resilience levels (Cook *et al*., 2013; Einstein, 2014; Joshi, *et al.*, 2020; Durna *et al*., 2022).

This research was carried out within certain limitations. In this study, Likelihood ratio analysis was performed to determine DIF. Other DIF determination techniques may also be used in other studies. In the study, DIF was examined according to gender whereas in other studies, DIF can be investigated for the resilience scale within the scope of other variables. Possible sources of DIF can be examined by creating latent classes with other variables that may be related to resilience.

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