

ORIGINAL PAPER

Ear/Nose/Throat

A study on stress and resilience among hearing-impaired people during the COVID-19 pandemic

Sule Kaya¹  | Fahrettin Deniz Senli¹ | Hilal Mecit¹ | Betul Kagitcibasi² | Mustafa Karabulut³

¹Department of Audiology, Ankara Yıldırım Beyazıt University, Ankara, Turkey

²Ottomer Hearing Aid Center, Bursa, Turkey

³Department of Otorhinolaryngology and Head and Neck Surgery, Maastricht University Medical Centre, Maastricht, The Netherlands

Correspondence

Sule Kaya, Department of Audiology, Ankara Yıldırım Beyazıt University, Ankara, Turkey.
Email: sulecekeic@hotmail.com

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Abstract

Aim: The aim of the study is to determine the acute stress and psychological resilience level of people with hearing impairment during the COVID-19 pandemic and to investigate the relationship between the grade of hearing impairment, psychological resilience and perceived stress level in this period.

Methods: A cross-sectional study. A total of 135 hearing-impaired individuals using hearing aids (study group) and 125 healthy individuals (control group) participated. The Turkish versions of the Acute Stress Symptoms Scale (ASSS) and Brief Resilience Scale (BRS) were applied to all participants. The Turkish version of Amsterdam Inventory for Auditory Disability and Handicap (T-AIADH) was also applied to the study group in addition to other scales. The presence of any difference between the groups in terms of ASSS and BRS scores was investigated.

Results: There was a statistically significant difference between the control group and the study group in terms of ASSS results ($Z = -4.4$, $P = .00$). No statistically significant difference was found between the control group and the study group in terms of BRS scores ($Z = -0.248$, $P = .804$). Furthermore, T-AIADH scale was observed not to correlate either with ASSS or BRS ($P > .05$). In the study group, the change in income level after the pandemic, age and sex variables were determined as a significant predictor of ASSS.

Conclusion: Identifying risks and protective factors for hearing-impaired individuals at the early stage of the epidemic is considered to be of critical importance to predict the psychological impact of both the epidemic and the response to the COVID-19 health crisis and to reduce stress.

1 | INTRODUCTION

Stress is defined as the natural reaction of the body in the presence of any danger that requires adaptation.¹ It has been proven to have adverse effects on health and mental well-being.² Psychological resilience is defined as the adaptation and coping skills of the individual when faced with stressful situations.³ The functioning of

stress and psychological resilience has been studied in some population groups at risk, such as people affected by traumatic events (eg violence)⁴ and those with chronic diseases.⁵ On the other hand, the number of studies evaluating stress and psychological resilience in hearing-impaired individuals is limited.⁶⁻⁸ Hearing loss is a condition that can be seen in all age groups and causes many handicaps if early intervention is not provided. At least 15% of the

adult population experiences a noticeable hearing impairment in their daily lives⁹. Untreated hearing impairment has been proven to cause poor health outcomes such as deterioration in cognitive functions, reduced quality of life and limitations in mobility^{10,11}. Such poor health outcomes have been further shown to bring negative psychosocial consequences, such as stress, depression and anxiety^{12,13}. On the other hand, it is a fact that the use of the hearing aid has very significant positive effects on psychosocial lives of hearing-impaired people.

A recent subject Coronavirus Disease 2019 (COVID-19), which is expected to affect the majority of the world population with a very high transmission rate^{14,15}, has been shown to increase anxiety, depression and stress levels in the overall population¹⁶⁻¹⁸. Due to global restrictions, hearing-impaired people may have not reached services as easy as before the COVID-19 pandemic which may bring some limitations. We think that these limitations may be interrelated with the psychological resilience and acute stress levels of hearing-impaired individuals during the COVID-19 pandemic. Therefore, this study aimed to determine the psychological resilience and acute stress level of people with hearing impairment during the COVID-19 pandemic and to investigate the relationship between the grade of hearing impairment and psychological resilience and perceived stress level in this period.

2 | MATERIAL AND METHODS

2.1 | Study design

This study was approved by the Ankara Yildirim Beyazit University Ethics Committee (Approval No.: 84892257-604.01.02-E.15651, date 21.05.20). Informed consent was obtained from all participants prior to begin the study. Data were collected via the questionnaire method. Questionnaires were administered to all participants with online Google Forms. All data were collected after the start of the COVID-19 outbreak in Turkey.

2.2 | Participants

A total of 135 hearing-impaired individuals (study group) and 125 healthy individuals (control group), who were aged 18-85 years, were included in the study. The sample size was determined by G-Power analysis. The study group consisted of individuals with hearing loss for at least one year and using hearing aids. The data of the study group were obtained by contacting individuals, who had previously applied to a hearing aid centre in Bursa and used hearing aids, via phone or e-mail. Individuals with normal hearing (pure-tone average [PTA]<20 dB) and without any psychological disorders were included in the control group. Control group data were obtained from people the researchers knew, and they were asked to deliver the questionnaires to their acquaintances using the snowball method. Individuals with a known neurological

What's known

- Covid-19 may increase anxiety, depression and stress levels in the overall population.
- Hearing-impaired people may overcome hearing loss handicap with hearing aid usage.
- Evidence-driven research to investigate predicting factors to psychological impacts of the epidemic is needed.

What's new

- Although psychological resilience levels are similar, hearing-impaired individuals have higher acute stress exposure during the pandemic than normal hearing people.
- Hearing-impaired individuals are more likely to experience acute stress during the pandemic process, despite using hearing aids.
- The change in income level after pandemic and age variables are significant predictors of acute stress symptoms for hearing-impaired individuals.

or psychiatric illness and those who were illiterate were excluded from the study.

2.3 | Procedure

Before starting the questionnaire, six questions about demographic information were asked to the participants. The questions about demographic information were created by the researchers. The Turkish versions of the Acute Stress Symptoms Scale (ASSS) and Brief Resilience Scale (BRS) were applied to all participants. The Turkish version of Amsterdam Inventory for Auditory Disability and Handicap (T-AIADH) was applied to the study group in addition to other scales. The presence of any difference between the groups in terms of ASSS and BRS scores was investigated. In the study group, whether T-AIADH was correlated with ASSS and BRS was investigated.

2.4 | Scales

2.4.1 | ASSS

It is a self-report scale consisting of seven items and measures the severity of acute stress disorder symptoms and associated discomfort. The Likert-type scale (0 = never, 4 = always) is designed to evaluate the severity of acute stress disorder symptoms, which occur after a stressful event or experience, based on self-report in individuals over 18 years of age. Ascibasi et al¹⁹ conducted the reliability and validity study of the Turkish form of the scale.

2.4.2 | BRS

This scale was developed to measure individuals' psychological resilience. This scale focuses on the ability of individuals to bounce back or recover from stress, return to the former functionality and re-adapt. It is a five-point Likert-type self-report scale consisting of six items. After the reverse-coded items in the survey are adjusted accordingly, the high scores obtained indicate a high level of psychological resilience. The scale was adapted into Turkish by Dogan et al²⁰.

2.4.3 | T-AIADH

It is one of the questionnaires used to assess hearing impairment and handicap. The questionnaire consists of five domains and 30 items. These domains are distinction of sounds, localization of sounds, speech intelligibility in quiet, speech intelligibility in noise and detection of sounds. There are four answers for each question: almost never (3 points), occasionally (2 points), frequently (1 point) and almost always (0 point).²¹ Mujdeci et al adapted the questionnaire into Turkish.

2.5 | Statistical analysis

Statistical analyses were performed using SPSS version 26.00 package program for Windows. Results were analysed by visual (histogram and scatter plots) and statistical (*Kolmogorov Smirnov-Shapiro-Wilk*) methods. If the data did not show normal distribution, the quantitative data were expressed as median \pm interquartile range (IQR) (median \pm IQR). Categorical parameters were expressed as the number

of observations (n) and the overall cohort percentage (%). Significant group differences were evaluated using the nonparametric Mann-Whitney U test. Spearman's correlation coefficient was used for correlation analysis. Multiple linear regression analysis was performed to evaluate the predictive effect of change in income level after the pandemic, age and sex variables on ASSS and BRS. In the analysis, a *P* value of $<.05$ was considered statistically significant.

3 | RESULTS

A total of 135 hearing-impaired individuals (study group) (mean age: 37.85 ± 13.83 years) and 125 healthy individuals (control group), who were aged 18-85 years, were included in the study. Of the individuals in the control group, 38 were male and 87 were females, with a mean age of 37.3 ± 10.4 years (min: 19; max: 61). Of the individuals in the study group, 67 were male and 68 were females, with a mean age of 38.3 ± 16.3 years (min: 19; max: 83). There was no statistically significant difference between the groups in terms of mean age ($P > .05$). The demographic characteristics of the participants are shown in Table 1.

The Mann-Whitney U test was used to evaluate whether there was a difference between the groups in terms of psychological resilience and acute stress symptoms scores. There was no statistically significant difference between the control group (median = 18.00, IQR = [2.00]) and the study group (median = 18.00, IQR = [2.00]) in terms of BRS results ($Z = -0.248$, $P = .804$). There was statistically significant difference between the control group (median = 9.00, IQR = [7.00]) and the study group (median = 7.00, IQR = [6.00]) in terms of acute stress results ($Z = -4.400$, $P = .00$) (Figure 1).

TABLE 1 Sociodemographic characteristics of the participants

Sociodemographic characteristics	Control group (N:125)		Study group (N:135)	
	Number	Percentage (%)	Number	Percentage (%)
Gender				
Male	38	30	67	50
Female	87	70	68	50
Age (years)	Mean \pm SD: 37.3 ± 10.4 Median: 39 Minimum: 19, Maximum: 61		Mean \pm SD: 38.3 ± 16.3 Median: 32 Minimum: 19, Maximum: 83	
Working Status (Currently)				
Unemployed	41	33	61	45
Working	84	67	74	55
Socioeconomic Status				
Poor	13	10	13	10
Moderate	109	87	105	78
Good	3	3	17	12
Change in Income Level during the Pandemic				
No	81	65	77	57
Yes	44	35	58	43

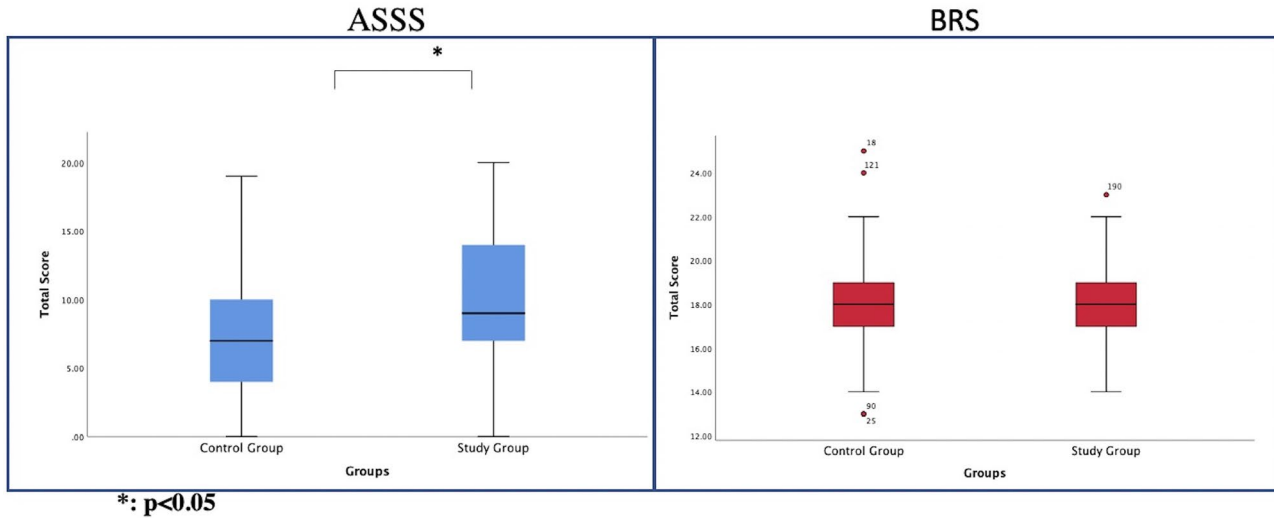


FIGURE 1 Total scores between control and study group for Acute Stress Symptoms Scale (ASSS) (Mann-Whitney U test, $Z = -4.400$, $P = .00$) and Brief Resilience Scale (BRS) (Mann-Whitney U test, $Z = -0.248$, $P = .804$)

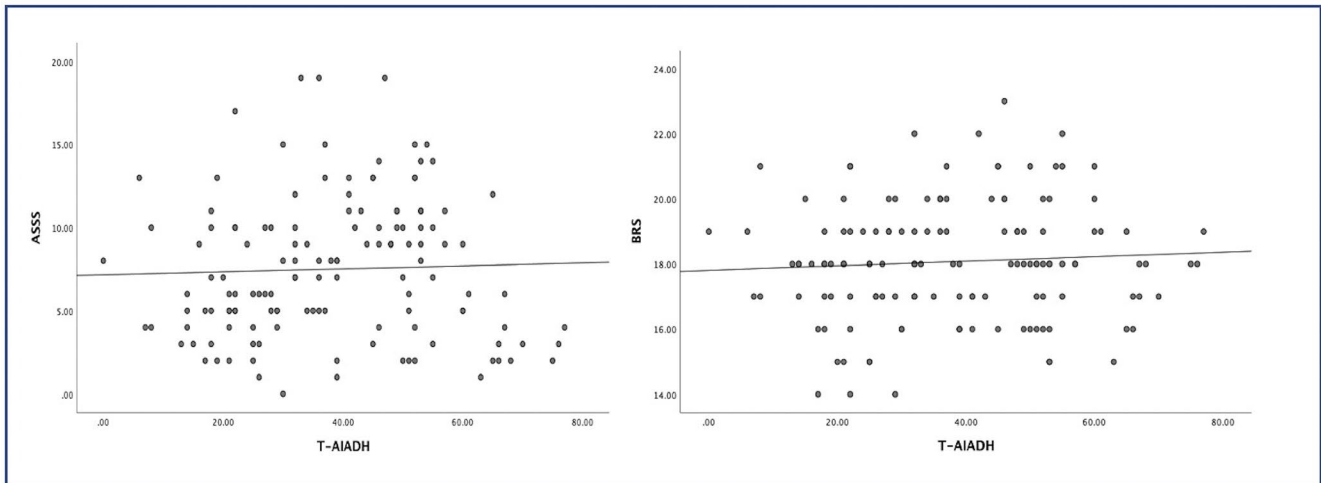


FIGURE 2 Scatter plots between ASSS and T-AIADH (Spearman Correlation Test, $P = .360$) and between BRS and T-AIADH (Spearman Correlation Test, $P = .491$)

Figure 1. Total scores between control and study group for Acute Stress Symptoms Scale (ASSS) (Mann-Whitney U test, $Z = -4.400$, $P = .00$) and Brief Resilience Scale (BRS) (Mann-Whitney U test, $Z = -0.248$, $P = .804$).

Spearman's correlation coefficient was used to evaluate the correlation of T-AIADH scale applied to the study group with ASSS and BRS. T-AIADH was observed not to correlate with ASSS ($P = .360$) and BRS ($P = .491$) (Figure 2).

Multiple linear regression analysis was performed separately for each group to predict acute stress symptoms according to the change in income level after the pandemic, age and sex variables. In the study group, the change in income level after the pandemic, age and sex variables were found to be significant predictors for acute stress symptoms ($F[3,176] = 10.989$, $P < .001$). The three variables together

explain 20.1% of the variance in acute stress symptoms. The change in income level after pandemic and age variables were observed to significantly predict acute stress symptoms ($P < .05$). The predictive variables in the function of their importance were age ($\beta = 0.425$) and the change in income level after the pandemic ($\beta = 0.117$), respectively. According to the analysis result, the equation predicting acute stress symptoms was $2.263 + 0.986^* \text{ change in income level after the pandemic} + 1.284^* \text{ sex} + 0.109^* \text{ age}$. On the other hand, in the control group, only the age variable was found to be a significant predictor of acute stress symptoms ($F[3,177] = 4.343$, $P = .024$) (Table 2).

Multiple linear regression analysis was performed separately for control and study groups to determine to what extent the change in income level after the pandemic, age and sex parameters predicted

TABLE 2 Multiple linear regression analysis to predict ASSS according to change in income level after pandemic, gender and age according to the groups

		B	Sh	β	t	P	R	R ²	F	P
Study group	Change in Income Level	0.986	0.664	0.117	3.485	.040*				
	Gender	1.284	0.654	0.154	1.963	.052	0.448	0.201	10.989	.000*
	Age	0.109	0.020	0.425	5.408	.000*				
Control group	Change in Income Level	1.455	0.890	0.151	1.635	.105				
	Gender	-0.837	0.879	-0.083	-0.952	.343	0.312	0.097	4.343	.006*
	Age	-0.092	0.040	-0.208	-2.291	.024*				

* $P < .05$.

psychological resilience. As a result of the analysis, three variables were found not to predict psychological resilience in both the control group and the study group ($P > .05$).

4 | DISCUSSION

This study was carried out to evaluate the psychological resilience and acute stress levels of hearing-impaired individuals during the COVID-19 epidemic. The findings obtained from the present study have shown that although the psychological resilience of hearing-impaired individuals during the COVID-19 epidemic is similar to those of individuals with normal hearing, they have higher acute stress exposure during the pandemic period. It has been further revealed that changes in income level during the pandemic, age and sex variables directly affect the perceived acute stress level.

Different individuals give different psychological reactions to hearing impairment and some people consider hearing impairment as a part of their identity²². In the present study, no difference was found between the hearing-impaired patients and normal hearing individuals in terms of the ability to bounce back, recover and return to previous functionality evaluated with BRS during Covid-19. Several studies²³⁻²⁵ similarly reported no significant difference between hearing-impaired individuals and individuals with normal hearing in terms of psychological resilience. This has revealed that in the present study conducted during the COVID-19 pandemic, individuals using hearing aids displayed similar behaviours to normal hearing individuals in terms of psychological resilience despite the restrictions in health-care services. We also think that all hearing-impaired individuals included in the study were using hearing aids may have effect on this result.

On the other hand, acute stress findings of hearing-impaired individuals assessed via ASSS during the COVID-19 pandemic were found to be higher compared to the control group. It has been previously shown that the use of the hearing aid has very significant positive effects on psychosocial lives and provide better quality of life^{26,27}, which result in less distress. In our study, as we mentioned, we included only hearing-impaired individuals using hearing aids. Despite this, it was observed that they had more acute stress than normal hearing people during COVID-19. There are also many

studies in the literature evaluating stress in different populations during the COVID-19 pandemic²⁸⁻³¹. Causes resulting from the pandemic, such as fear of getting infected with the highly contagious virus, fear of losing loved ones, false or misleading information on the COVID-19 pandemic, lack of medical treatment, lack of properly equipped units to treat patients, and problems related to lockdown (eg prolonged home isolation, social distancing, food insecurity, fear of unemployment, loss of income, etc), have been associated with psychological problems such as stress, anxiety and depression in the general population. Besides these factors, disruptions in monthly or annual hearing aid control routines and changes in the consultation or counselling processes are thought to cause more stress, particularly for hearing-impaired individuals. Another plausible explanation is the use of a face mask. Individuals with hearing impairment have been reported to experience communication difficulties even before the use of face masks³². Chodosh et al³³ documented that these challenges continued during the COVID-19 pandemic period, but the use of masks created new obstacles. Wearing a facial mask has been shown to disrupt the high-frequency content of sound, which is necessary for the intelligibility of speech, as well as preventing facial expressions and lip movements. Considering all these factors, it can be understood why individuals with hearing impairments are more likely to experience acute stress during the pandemic process, despite using hearing aids.

In the present study, the correlation of auditory disability and handicap with acute stress and psychological resilience was tested, and no significant correlation was observed in both groups. The T-AIADH scale was used to evaluate the detection, distinction and localization of sounds, and speech intelligibility in quiet and noise in individuals with hearing impairment. Previous studies have proven that there is a correlation between stress and hearing problems³⁴. Thomas found that difficulties in discerning speech were associated with measures of stress, depression and anxiety³⁵. In a study by Eriksson-Mangold et al individuals with acquired hearing loss, who were in a middle-aged and elderly group, were reported to have higher levels of stress compared to those with normal hearing. Stress symptoms have been reported to be related to the degree of disability as well as the ability to discern speech³⁶. In the present study, the degree of disability and handicap did not cause a significant difference in the acute stress and psychological resilience levels of

individuals. This may be due to the fact that the use of hearing aids by all hearing-impaired individuals included in the present study may have eliminated the differentiation caused by the degree of hearing impairment.

In the study group, the change in income level during the pandemic, sex and age factors were found to be significant predictors of acute stress symptoms. According to the formula given in the results section; female sex, younger age and income level changed during the pandemic were observed to increase acute stress levels in the study group. Compatible with the present study, Rodríguez-Rey et al.²⁵ conducted a study in the general Spanish population during the COVID-19 pandemic and reported that women, young and those who lost their job during the health crisis showed the strongest negative stress symptoms. Similarly, financial problems and disruptions in liabilities during the pandemic process were observed to cause stronger acute stress effects in hearing-impaired individuals in the present study.

When evaluated separately, age and changes in the income levels of the hearing-impaired individuals (study group) predicted the acute stress whereas gender had no predictive effect in this regard. Another study proved that after an emergency caused by natural disasters, older adults had increased resilience to psychopathologies, such as post-traumatic stress disorder, and mood or anxiety disorders, compared to younger individuals³⁷. On the other hand, in a study conducted by Brown et al.³⁸ during the COVID-19 pandemic process, loss of employment or income/ inability to provide for the family was found to be the most remarkable stressor. These findings corroborate research demonstrating robust relationships between low income and mood disorders^{39,40}. The results of the present study are compatible with these findings. When evaluated in terms of gender, women have been reported to show significantly higher psychological distress than men in the literature⁴¹. Contrary to the literature, no significant difference was found in terms of gender in this study. Considering all these factors, the unpredictability of the current crisis and misinformation derived are thought to make the pandemic process more stressful for hearing-impaired individuals, who may be affected more by restrictions. We further believe that changes in income levels have turned into concern on livelihood and affected the stress factor negatively in hearing-impaired individuals. In the control group, only the age factor was found to be a significant predictor of acute stress. Conversano et al.⁴² reported in their study conducted in the general population during the COVID-19 pandemic that individuals showed less psychological stress with increasing age. Unlike hearing-impaired individuals, acute stress levels of individuals with normal hearing are affected by fewer parameters.

This study has several limitations to be addressed. Functional benefits of the hearing aids used by the individuals could have been evaluated. However, clinical evaluation could not be made due to the pandemic. Hearing-impaired individuals not using hearing aids could have been included to make the study more powerful. In addition, it might have better if we could evaluate these patients regarding acute stress and physiological resilience and compare the results before and after COVID-19 pandemic.

However, it was not possible to achieve them due to the unpredictability of pandemic.

In light of these data, identifying risks and protective factors for hearing-impaired individuals at the early stage of the epidemic is considered to be of critical importance to predict the psychological impact of both the epidemic and the response to the health crisis, and to reduce stress.

5 | CONCLUSIONS

The COVID-19 crisis has significantly affected and continues to affect many different populations around the world. Researchers have focused mostly on the physical, psychological and mental effects of the pandemic on healthy individuals or individuals who have recovered from COVID-19. This study examined the psychological resilience and acute stress levels of the hearing-impaired individuals, during the pandemic period and revealed the effects of the pandemic. The results obtained from the present study are shown to help the entire population, particularly clinicians and researchers, to understand the potential negative effects of COVID-19 in hearing-impaired individuals. Furthermore, special populations, such as those with hearing impairment, may require special approaches and need to be supported during pandemics. We believe that this result made this study valuable.

DISCLOSURE

The authors declared no potential conflicts of interest concerning the research, authorship, and publication of this article.

AUTHOR CONTRIBUTIONS

All authors contributed to this work. SK, FDS and HM: design of the work; BK, MK: acquisition; SK, FDS and MK: analysis; FDS, BK and HM: interpretation; SK, FDS, HM, BK and MK: revising the work, final approval of the version to be published, and agreement to be 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.

ORCID

Sule Kaya  <https://orcid.org/0000-0001-8174-800X>

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