

## Indigenous Mental Health Perspective in the Representation of Vertigo symptoms: A Cross Sectional Study of Vestibulocochlear Disorder Patients

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### Abstract

**Background:** In its most persistent form, vertigo is a subjective phenomenon experienced among vestibulocochlear disorder patients. Although there is ample research on its co-morbidity with stress, depression, and anxiety, that on co-morbidity with other fundamental psychiatric symptoms, such as malingering has obtained less attention. Therefore the objective of the current study was to examine associations of vertigo, stress, depression, anxiety, malingering and coping strategies in patients with vestibular disorder, and to identify potential moderation effects of malingering among the study variables.

**Methods:** In present study, a purposive sampling technique and cross-sectional design were used. This study was performed on two hundred and two vestibulocochlear disorder patients having chief complaints of vertigo, age ranged from 18 to 89 ( $M = 46.14$ ;  $SD = 16.64$ ) recruited from various hospitals of Islamabad and Rawalpindi, Pakistan from February 2019 to August 2019. Also co morbidities of other diseases were consulted through a detailed medical history and prior imaging test results from other institutions.

**Results:** Findings of present study demonstrated that there were significant associations among malingering, coping styles, vertigo, anxiety, stress and depression in patients with vestibulocochlear disorder. Also it was revealed that female patients were more inclined towards increased levels of stress, depression, anxiety as compared to male patients. Typically it was noted that the effects of vertigo on psychological distress and effect of coping strategies were moderated by malingering, with these effects being more crucial for vestibulocochlear disorder patients with different levels of malingering.

**Conclusions:** This study would be beneficial to comprehend the mechanism that enhances vertigo intensity through psychological negative vicious circle, and to further clarify the impeding modifiable factors pointing out towards the development of new interventions and prevention strategies for tackling this problem in vertigo patients.

**Keywords:** Vertigo, malingering, depression, anxiety, stress and coping strategies

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## Background

“Vertigo or Benign Paroxysmal Positional vertigo is described as short episodes of dizziness that are caused due to movements of head in varying directions (Jönsson, Sixt, Landahl, & Rosenhall, 2004; Wada et al., 2015). Dizziness is an umbrella term that is most of the time used to describe vertigo. Vertigo can be a source of dizziness when a person changes position abruptly, while lying down on bed, bends over to pick something or turns head suddenly (Brevern & Michael, 2015; Cherin et al., 2017; Jacobson et al., 2018).

Vertigo or illusion of motion can be linked to numerous conditions related to vestibulocochlear disorders (Dieterich & Staab, 2017). The most common occurrence of vertigo can be due to labyrinthitis (when one the vestibular nerves becomes inflamed), ischemia (in-adequate blood supply to the nerve), or head injuries causing the anterior vestibular artery to trigger vertigo (Ahmed, Aqeel, & Ahmed, 2020; Ahmed, Aqeel, Akhtar, Salim, & Ahmed, 2019; Kerber et al., 2015; Newman, Toker, & David, 2016).

Malingering is defined as an intended fabrication of false or exaggeration of symptoms in order to obtain some benefit or to achieve some recognizable goal (American Psychiatric Association, 2013; Jain & Desai, 2018). The only way to differentiate malingering from disorders like somatoform and conversion disorders is merely dependent on the clinician's findings, observations and visible symptoms that are willingly formed in the presence of a perceptibly identifiable goal (Martin & Schroeder, 2015; Tracy & Rix, 2017). Malingering must also be discriminated from factitious disorders, to make a precise differentiation (Impelen, Merckelbach, Jelicic, Niesten, & Campo, 2017).

Therefore according to the definition, a person who is malingering is acting purposely (Bush, Heilbronner, & Ruff, 2014) this signifies that malingerer is having conscious knowledge. Evaluations are done by evaluators to find out the symptoms and signs of exaggeration, however, intentionality is a difficult assess in certain cases (Sartori, Zangrossi, Orrù, & Monaro, 2017; Schnellbacher & Mara, 2016).

Various prior studies have explained that the frequency of malingering varies broadly depending on the nature and context of the assessment (Bass & Halligan, 2014; Bush et al., 2014; Pouw, Karanjia, & Sadun, 2017). Particularly, it has been reported by clinicians that they typically come across malingerers among 30% of personal injury patients, 35% in case of Disability patients, 21% in criminal instances, and 9% in other medical conditions (Chmielewski, Zhu, Burchett, Bury, & Bagby, 2017; Myers, Hall, Marshall, Tolou-Shams, & Wooten, 2016; Sartori, Orrù, & Zangrossi, 2016; Tuck, Johnson, & Bean, 2018). The inconsistent prevalence of malingering across different settings has an important implication for assessments in medical settings; therefore one cannot anticipate the base rate of malingering to match that with other samples and settings (Mason, Cardell, & Armstrong, 2014).

Malingering on a baseless claim like having dizziness; simulation exists in explaining imaginary balance disorders, to intentionally deceive the observer; “over-simulation”, more attributes among balance-disorder patients, comprise on exaggeration of a real disorder inferior to a real ( non-organic causes), demonstrated lesion (Brandt,

Huppert, Strupp, & Dieterich, 2015). Psychogenic vertigo exists often with malingering when there is some legal issue, along with medical causes of vertigo (Yoshida, Yamamoto, Tanaka, Ikemiyagi, & Suzuki, 2017).

The 2nd Edition of Minnesota Multiphasic Personality Inventory, (MMPI-2) is the most broadly used psychological test in many countries, and it is regularly used in neuropsychological assessments (Wygant, Walls, Brothers, & Berry, 2017). The Fake Bad Scale (FBS) is derived from MMPI for detecting malingerers among the criminal instances, claimants of personal injury for insurance purposes and other medical conditions (Chmielewski et al., 2017; Nichols & Gass, 2015).

Prior studies have signified the importance of MMPI-2 and therefore encouraged clinicians to employ detailed competency measures and evaluate psycho-legal capability (Benuto, Leany, & Garrick, 2015; Maloff, 2018). Research regarding the capability of specific competency measures to detect malingering among medical professionals, although increasingly being considered, still remains somewhat restricted (Block, Marek, Porath, & Kukal, 2017). Prior researches have explored that in various developed countries by exhibiting clinical symptoms (malingering) of anxiety, stress and depression, financial and other economic compensations are obtained by either faking or exaggeration (Pedersen, Juhl, Wetke, & Andersen, 2016). The literature on this area of study is still at its initial stages and findings are controversial in certain instances due to ethical issues involved (Egeland, Andersson, Sundseth, & Schanke, 2015).

This current research is designed to further compare and explore stress, anxiety and depression in conjunction with coping styles and malingering among vestibulocochlear disorder patients in Pakistan. Prior studies have given less attention on the psychological wellbeing of patients experiencing vertigo symptoms and therefore not much is known that how psychological aspects and coping styles contribute to the efficacy, recurrence and management of patients experiencing vertigo (Cha, Kane, & Baloh, 2008; Peng, Pang, & Yang, 2015). Previous researches have only highlighted the presence of depressive symptoms that are affecting vertigo patients medically, but the hidden psychological symptoms are underexplored that may be pertinent, and may be contributing in the severity of vertigo (Ergen, Baykara, & Polat, 2018; Miura et al., 2017). Hence there is a need to find out and explore the psychopathologies involved which would further contribute in the development of innovative diagnostic-therapeutic techniques for vestibulocochlear disorder patients in the rehabilitation processes.

## Method

### Research design

A purposive sampling and cross-sectional design were used to carry out this study.

### Objectives

1. To investigate the associations of malingering, coping strategies, vertigo, anxiety, stress, depression and mood affect among vestibulocochlear disorder patients.

- To study the moderating role of malingering between vertigo, stress, anxiety and depression among vestibulocochlear disorder patients.

## Hypotheses

- Vertigo will be positively related to anxiety, depression and stress in vestibulocochlear disorder patients.
- Female patients with vestibulocochlear disorder are more predisposed to anxiety, stress and depression as compared to male vestibulocochlear disorder patients.

## Participants

A purposive sampling and cross-sectional design were used to carry out this study. Purposive sample of 202 vestibulocochlear disorder patients was recruited from E.N.T & Audiology departments of various hospitals in Rawalpindi and Islamabad based on consecutive/convenience sampling. Two hundred and two patients were enlisted 60 women (30%) and 142 men (70%). In this study patients had vertigo complaints along with other ear related problems, from the total sample 17% patients had normal hearing, 44% patients had moderate hearing loss, 35% patients had moderate to severe hearing loss and 5% patients had profound degree of hearing loss. The participants age ranged from 18 to 89 ( $M = 46.14$ ;  $SD = 16.64$ ) having vertigo symptoms for at least 3 months. Further it was made sure that included patients were not having any side effects of medications due to prolonged exposure to any specific drug.

## Measures

### Physiological Instruments

**Audiometric assessments for Vertigo and Tinnitus evaluation.** All the clinical examinations of ear were performed by means of Welch Allyn otoscope. The hearing loss caused by vertigo was ascertained by performing audiometric assessments in dBHL via Inventis Flute middle ear analyzer for Tympanometry and reflexes. Acoustic reflexes were checked both with contra and ipsilateral protocols to detect vertigo symptoms. Interacoustic AD-629 Clinical Audiometer was used for audiometric evaluations (Penha Nascimento, Almeida, Junior, & da Rosa, 2018).

### Psychological Instruments

**Dizziness Handicap Inventory (DHI).** Dizziness Handicap Inventory (DHI; Newman, 1990; Perez, 2001, Ahmed, Aqeel, & Chughtai, 2020) is a self-reporting twenty five item scale, the purpose of this scale is to evaluate vertigo or dizziness that can be used to screen and evaluate patients according to the severity of their disorder due to the vestibular system disease. All the items are rated on a three-point likert scale. A high overall score reveals a more severe handicap. According to Perez (2001) the DHI scale is further classified into three categories of Vestibular Handicap, Vestibular Disability and Visuo-vestibular disability (Ahmed, Aqeel, & Chughtai, 2020; Perez et al., 2001).

**Brief COPE (COPE-Brief Version).** The brief cope (COPE; Carver, 1997; Hastings et al., 2005; Akhtar, 2005) is a scale developed to measure coping functioning during a stressful, unpleasant or difficult situations. Brief cope is an abbreviated form of COPE

inventory developed by Carver (1997) and it comprises on 28 items in total. As proposed by Hastings et al. (2005) this scale has been divided into four subscales: Problem Focused, Active Avoidance, Religious and Positive coping strategies (Hastings et al., 2005). Responses are given on a four point likert scale ranging from "Never" to "a lot". The high score on a particular subscale indicates more use of that specific coping strategy and similarly low score indicates less reliance on that coping strategy (Akhtar, 2005; Carver, 1997; Hastings et al., 2005).

### Depression Anxiety and Stress Scale (DASS).

The Depression, Anxiety and Stress scale (DASS; Lovibond, 1995; Zafar & Khalily, 2015) is a 42 item scale developed to measure and evaluate three dimensions of psychological problems in the domains of stress, anxiety and depression (Lovibond & Lovibond, 1995). Responses are given on a four point likert scale ranging from 0 "did not apply to me" to 3 "applies very much or most of the time".

### Minnesota Multiphasic Personality Inventory (MMPI).

The Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943; Mirza, 1976) which is designed to evaluate the overall personality and psychosocial standing of a person (McKinley & Hathaway, 1943; Mirza, 1976). In the current study only malingering subscales were employed which include: the K scale, which is designed to identify psychopathology among people within normal range, high score on this particular scale shows defensiveness of a person, the F scale which measures the traces of malingering and is used to detect atypical behavior of answering the test items, the L scale is lie scale which identifies deliberate avoidance of giving responses asked in the MMPI in a honest and straight forward manner (Crowne & Marlowe, 1960; Fariña, Redondo, Seijo, Novo, & Arce, 2017), the F-K index helps in identifying the under and over exaggeration of psychological symptoms (Osborne, Colligan, & Offord, 1986).

### Procedure

This study was carried out in Audiology and E.N.T departments of various hospitals and clinics of Islamabad and Rawalpindi from February 2019 to August 2019. Each participant in the study gave written informed consent for participating in the study and knew beforehand the implication of exposure to situations unsafe to hearing, also co morbidities of other diseases were consulted through a detailed medical history and prior imaging test results from other institutions. Afterwards they were asked to give responses on a range of measures designed to assess psychological responses to vertigo and tinnitus. The order of psychological measures was randomized for every participant. Lastly, an audiometric test battery was administered; this included hearing evaluation, tympanometry, acoustic reflexes and video-nystagmography. The psychological and audiological assessments took around 40 minutes per subject to complete.

### Results

Results in the table 1 shows alpha reliability of all the scales included in the present study. The reliability analysis shows that alpha coefficient for the overall scale of DHI is .97 which is good for the overall scale, similarly the subscales Vestibular Handicap= .95, Vestibular Disability=.89 and

Visuo-Vestibular Disability =.87, which is indicative of highly reliable subscales. Therefore it is stated that Dizziness Handicap Inventory is a highly reliable scale and due to its high reliability this scale is being used in the present study.

Alpha reliability for Depression, Anxiety and Stress scale (DASS) and its subscales indicate that alpha coefficient for the total scale DASS is .98 and of its subscales Depression=.95, Anxiety=.94, and Stress=.94. Reliability of the three subscales and with the overall scale is highly reliable that is the reason this scale was incorporated in the present study. Alpha reliability for Brief Cope Questionnaire (Brief COPE) and its subscales indicate that alpha coefficient for the total scale of Brief Cope Questionnaire is  $\alpha$  =.88 and of its subscales Problem Focused Coping=.82, Active Avoidance Coping=.74, Religious Coping=.50 and Positive Coping=.62. Reliability of the three subscales is highly reliable only Religious Coping is having weak reliability due to few items in this subscale, but since the overall scale is highly reliable that is why this scale was used in the present study.

Alpha reliability for MMPI subscales for malingering indicates that alpha coefficient for the F.K Index is .79, for F scale (F) is .72, for K-Scale (K) is .59 and Lie (L) is .60. The Reliability of the three subscales comes under fair category only K scale is having weak reliability due to few items in this subscale. However the overall reliability seems fine therefore this scale was employed in the current study.

Table 1 reveals significant positive correlation between Dizziness handicap inventory (DHI) and its subscales. There is also significant positive correlation among its subscales. The results shown in table revealed that dizziness handicap inventory was significantly correlated with its subscales 2. Vestibular Handicap ( $r = .98, p < 0.001$ ), 3. Vestibular Disability ( $r = .94, p < 0.001$ ) and 4. Visuo-Vestibular Disorder ( $r = .95, p < 0.001$ ), results in the same table also revealed that dizziness handicap inventory was significant positively correlated with 5. Depression Anxiety Stress Scale ( $r = .19, p < 0.001$ ), significantly positively correlated with its subscales 6. Depression ( $r = .24, p < 0.001$ ), 7. Anxiety ( $r = .15, p < 0.05$ ) and 8. Stress ( $r = .15, p < 0.05$ ).

Additionally in the same table it was revealed that dizziness handicap inventory was non-significant negatively correlated with 9. Brief Cope ( $r = -.08, n.s$ ), and significant negatively with subscale 10. Problem focused coping ( $r = -.21, p < 0.001$ ) however it was negatively non-significant correlated with the subscale 11. Religious coping ( $r = -.04, n.s$ ) and significant negatively correlated with 12. Positive Coping ( $r = -.21, p < 0.001$ ), non-significant positively correlated with 13. Active Avoidance Coping ( $r = .11, n.s$ ) and negatively significant with the subscale of malingering 14. F-scale ( $r = -.16, p < 0.05$ ) and 15. K-scale ( $r = -.26, p < 0.05$ ), positively non-significant correlated with 16. Lie (L) scale ( $r = .02, n.s$ ), however DHI was negatively significant correlated with 17. FK Index ( $r = -.21, p < 0.05$ ).

The table further reveals that dizziness handicap subscale Vestibular Handicap was significantly positive correlated with the subscale, 3. Vestibular Disability ( $r = .89, p < 0.001$ ) and 4. Visuo-Vestibular Disorder ( $r = .90, p < 0.001$ ), further it was revealed that Vestibular Handicap is positively correlated with 5. Depression Anxiety Stress Scale ( $r = .17, p < 0.05$ ), significantly positively correlated with its subscale 6. Depression ( $r = .23, p < 0.001$ ) and non-significant

positively correlated with Anxiety ( $r = .13, n.s$ ) and Stress ( $r = .14, n.s$ ).

Moreover it was observed in the table that DASS was having significant positive correlations with 9. Brief Cope ( $r = .41, p < 0.01$ ), and its subscales 10. Problem focused coping ( $r = .39, p < 0.01$ ), 11. Religious coping ( $r = .14, p < 0.05$ ), 12. Positive Coping ( $r = .37, p < 0.01$ ) and 13. Active Avoidance Coping ( $r = .41, p < 0.05$ ). Positive significant correlations with the subscales of malingering were observed with 14. F-scale ( $r = .17, p < 0.01$ ), 15. K-scale ( $r = .22, p < 0.05$ ) and negatively non-significant correlation with 16. Lie (L) scale ( $r = -.03, n.s$ ), further DASS was positively significant correlated with 17. FK Index ( $r = .20, p < 0.01$ ).

Regarding the hypothesis 1 which states that "Vertigo will be positively related to anxiety, depression and stress in vestibulocochlear disorder patients" was proved. Also the Objective 1 in the present study "To investigate the association among malingering, coping strategies, vertigo, tinnitus, anxiety, stress, depression and mood affect among vestibulocochlear disorder patients" was partly proved.

Table 2 reveals the mean differences between male and female vestibulocochlear disorder patients on study variables. According to the results from table reveal that female patients were more inclined towards increased levels of stress, depression, anxiety as compared to male patients. Also there was more inclination towards adopting coping strategies in female vestibulocochlear disorder patients. Hypothesis 2 which states that "Female patients with vestibulocochlear disorder are more predisposed to anxiety, stress and depression as compared to male vestibulocochlear disorder patients" is proved.

The performed analysis on the model related to the moderating role of moderating role of malingering between vertigo and development of stress, anxiety, depression among vestibulocochlear patients (Figure 1) revealed that the tested model was statistically significant having,  $\chi^2 = 26.15, p < .001, \chi^2/df = 3.73, RMSEA = .07, CFI = .99, TLI = .96, NFI = .99, IFI = .97$ .

The results obtained from this model Figure and table- revealed that malingering K-scale is a significant positive predictor for Anxiety ( $\beta = -.31, p < 0.000$ ) and malingering Lie scale is negative predictor of Anxiety ( $\beta = -.18, p < 0.000$ ) and Stress ( $\beta = -.07, p < 0.01$ ). The interaction between Vestibular Handicap and F-scale reveals positive prediction towards Depression ( $\beta = .59, p < 0.000$ ) and Stress ( $\beta = .88, p < 0.000$ ).

However the interaction between Visuo-Vestibular Disability and malingering F-scale reveals negative prediction towards Depression ( $\beta = -.43, p < 0.000$ ) and Stress ( $\beta = -.89, p < 0.000$ ). Further it was revealed that the interaction between vestibular disability and malingering K-scale was predicted negatively towards Anxiety ( $\beta = -.90, p < 0.000$ ), Depression ( $\beta = -.91, p < 0.000$ ) and Stress ( $\beta = -.89, p < 0.000$ ). In addition the results revealed that interaction between Visuo-Vestibular Disability and malingering K-scale reveals positive prediction towards Anxiety ( $\beta = .73, p < 0.000$ ), Depression ( $\beta = .60, p < 0.000$ ) and Stress ( $\beta = .90, p < 0.000$ ). Further it was revealed that the interaction between Vestibular Handicap and Lie scale was negative predictor of Depression ( $\beta = -.30, p < 0.000$ ) and Stress ( $\beta = -.51, p < 0.000$ ). The interaction between Vestibular Disability and Lie scale was positively predicting Anxiety ( $\beta = .15, p < 0.000$ ), Depression ( $\beta = .63, p < 0.000$ ) and Stress

## Results

**Table 1**

*Correlation matrix between DHI, THI, DASS, Malingering, Coping strategies, Positive and Negative affect along with subscales of Vestibulocochlear disorder patients (N=202).*

Variables	M	S.D	$\alpha$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.DHI	64.15	28.61	0.97	-	.98**	.94**	.95**	.19**	.24**	.15*	.15*	-.08	.21**	-.04	.21**	.11	-.16*	.26**	.02	.21**
2.V_HC	35.26	16.10	0.95		-	.89**	.90**	.17*	.23**	.13	.14	-.08	.21**	-.05	.23**	.12	.21**	.26**	.05	.24**
3.V_DY	13.31	6.42	0.89			-	.89**	.23**	.26**	.21**	.20**	.03	-.10	.04	-.05	.14*	-.11	.23**	-.01	-.17*
4.V_V_DY	15.58	7.10	0.87				-	.16*	.22**	.15*	.10	.17*	.28**	-.10	.27**	.03	-.06	.23**	.04	-.13
5.DASST	54.67	29.93	0.98					-	.98**	.96**	.96**	.41**	.39**	.14*	.37**	.41**	.17*	.22**	-.03	.20**
6.DASSD	17.87	10.88	0.95						-	.91**	.92**	.39**	.36**	.14*	.33**	.42**	.16*	.18*	-.01	.17*
7.DASSA	17.33	9.87	0.94							-	.88**	.31**	.32**	.01	.31**	.35**	.24**	.29**	.02	.27**
8.DASSST	19.47	10.22	0.94								-	.48**	.44**	.27**	.44**	.42**	.09	.17*	-.10	.13
9.BC_T	65.63	11.74	0.88									-	.91**	.73**	.88**	.82**	.22**	-.07	.24**	-.17*
10.BC_P	15.48	3.78	0.82										-	.65**	.85**	.63**	-.11	.01	.19**	-.07
11.BC_R	9.92	2.11	0.50											-	.67**	.40**	.27**	.24**	-.15*	.27**
12.BC_POS	17.44	3.39	0.62												-	.52**	-.04	.08	-.15*	.01
13.BC_AA	22.40	4.55	0.74													-	.26**	-.13	.24**	.22**
14.M_F	25.25	4.33	0.72														-	.82**	.57**	.97**
15.M_K	10.16	2.70	0.59															-	.64**	.93**
16.M_L	4.78	1.08	0.60																-	.62**
17.FK_I	35.42	6.72	0.79																	-

Note: Significant results are reported in this Table DHI: Dizziness Handicap Inventory, V\_HC: Vestibular Handicap ,V\_DY: Vestibular Disability, V\_V\_DY: Visuo-Vestibular Disability, DASST: Depression Anxiety and Stress Scale, DASSD: Depression Scale, DASSA: Anxiety Scale, DASSST: Stress Scale, BC\_T: Brief Cope Scale, BC\_AA: Active Avoidance Scale, BC\_P: Problem Focused Coping Scale, BC\_POS: Positive Coping Scale, BC\_R: Religious coping scale, M\_F: F- scale, M\_K: K Scale ,M\_L: Lie scale, FK\_I: FK Index.

**Table 2**

*Mean Difference between male and female vestibulocochlear patients on DHI, THI, DASS, Brief Coping and malingering along with subscales.*

Variables	Male Tinnitus		Female Tinnitus		t(df)	P	95% CI		Cohen's d
	Patients		Patients				LL	UL	
	(n=142)	(n=60)	M	SD					
DHI	58.13	31.17	78.40	13.17	-6.50(199.99)	0.00	-26.42	-14.11	0.84
VHC	31.91	17.46	43.17	7.81	-6.33(199.34)	0.00	-14.76	-7.75	0.83
VDIS	11.85	6.85	16.76	3.40	-6.80(194.99)	0.00	-6.34	-3.49	0.91
VVD	14.67	7.83	18.47	3.54	-5.12(199.10)	0.00	-5.68	-2.52	0.63
DASST	41.88	23.87	84.85	19.16	-13.57(137.76)	0.00	-49.35	-36.79	1.98
DASSD	13.43	9.28	28.38	6.14	-13.46(163.99)	0.00	-17.14	-12.75	1.90
DASSA	13.27	7.84	26.92	7.22	-11.95(119.93)	0.00	-15.90	-11.38	1.81
DASSSTR	15.17	8.14	29.65	6.89	-12.90(130.18)	0.00	-16.70	-12.26	1.92
BCT	63.13	11.89	71.53	9.00	-5.48(144.91)	0.00	-11.43	-5.37	0.80
BCPROB	14.92	3.82	16.80	3.36	-3.48(125.57)	0.00	-2.95	-0.81	0.52
BCREL	9.51	1.98	10.86	2.13	-4.20(103.83)	0.00	-1.99	-0.71	0.66
BCPOS	16.92	3.66	18.66	2.24	-4.15(173.94)	0.00	-2.58	-0.92	0.57
BCAA	21.40	4.70	24.77	3.11	-5.98(163.91)	0.00	-4.48	-2.25	0.85
MF	25.59	4.67	24.46	3.26	1.95(156.36)	0.05	-0.01	2.26	0.28
MK	10.18	2.73	10.11	2.66	0.14(113.57)	0.89	-0.76	0.88	0.03
ML	4.78	1.14	4.76	.95	0.10(132.44)	0.92	-0.29	0.32	0.02

Note: Significant results are reported in this Table, CI=Confidence Interval, LL=Lower Limit, UL=Upper Limit, DHI: Dizziness Handicap Inventory, VHC: Vestibular Handicap, VDIS: Vestibular Disability, VVD: Visuo-Vestibular Disability, THI: Tinnitus Handicap Inventory, THIF: Tinnitus Functional Scale, THIE: Tinnitus Emotional Scale, THIC: Tinnitus Catastrophic Scale, DASST: Depression Anxiety and Stress Scale, DASSD: Depression Scale, DASSA: Anxiety Scale, DASSST: Stress Scale, BCT: Brief Coping Scale, BCAA: Active Avoidance Scale, BCPOS: Positive Coping Scale, BCREL: Religious Coping Scale, MF: Malingering Faking Scale, MK: Malingering Exaggerated symptoms Scale, ML: Malingering Lie Scale, HL: Hearing Loss.

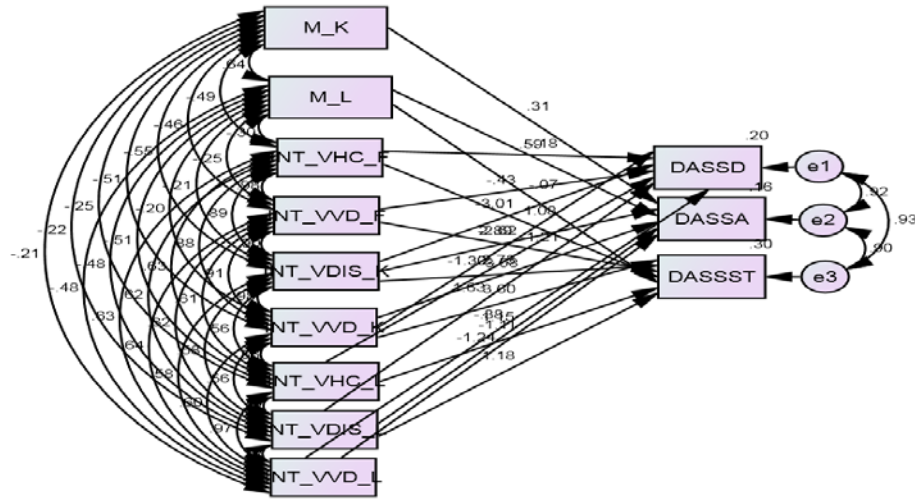
**Table 3**

*The moderating role of malingering between vertigo and development of stress, anxiety, depression among vestibulocochlear patients (N=202).*

Variables	Anxiety			Depression			Stress		
	B	SE	$\beta$	B	SE	$\beta$	B	SE	$\beta$
M_K	1.09	.19	.31***						
M_L	-1.56	.44	-.18***				-.61	.24	-.07**
INT_VHC_F				4.29	1.16	.59***	7.33	1.11	.88***
INT_VVD_F				-3.03	1.20	-.43**	-7.93	1.15	-.89***
INTVDIS_K	-15.68	2.75	-.90***	-20.17	2.84	-.91***	-22.28	2.20	-.89***
INTVVD_K	15.24	2.53	.73***	20.89	2.05	.60***	18.06	2.66	.90***
INT_VHC_L				-8.61	.95	-.30***	-6.82	.89	-.51***
INTVDIS_L	7.08	1.38	.15***	11.22	1.46	.63***	7.54	1.00	.88***
INTVVD_L	-7.24	1.24	-.24***	-2.46	1.20	-.38**			

Note. M\_K= K-scale, M\_L= Lie Scale, INT\_VHC\_F=Vestibular Handicap x F-scale, INT\_VVD\_F=Visuo Vestibular Disability x F-Scale, INTVDIS\_K=Vestibular Disability x K-scale, INTVVD\_K= Visuo-Vestibular Disability x K-Scale, INT\_VHC\_L= Vestibular Handicap x k-scale, INTVDIS\_L, INTVVD\_L= Vestibular Disability x Lie-scale  
\*\*\*p < .000, \*\*p < .01, \*p < .05

**Figure 1.** The moderating role of malingering between vertigo and development of stress, anxiety, depression among vestibulocochlear patients.



( $\beta = .90, p < 0.000$ ). Further it was revealed that the interaction between Vestibular Handicap and Lie scale was negative predictor of Depression ( $\beta = -.30, p < 0.000$ ) and Stress ( $\beta = -.51, p < 0.000$ ). The interaction between Vestibular Disability and Lie scale was positively predicting Anxiety ( $\beta = .15, p < 0.000$ ), Depression ( $\beta = .63, p < 0.000$ ) and Stress ( $\beta = .88, p < 0.000$ ). However the interaction between Visuo-Vestibular disability and Lie scale was negatively predicted as Anxiety ( $\beta = -.24, p < 0.000$ ) and Depression ( $\beta = -.38, p < 0.000$ ). Thus the results regarding to objective 2 “To study the moderating role of malingering between vertigo, stress, anxiety and depression among vestibulocochlear patients” was proved.

### Discussion

The aim of current investigation was to evaluate the association among malingering, coping styles, vertigo, anxiety, stress and depression among vestibulocochlear disorder patients. Moreover, this study also investigated the moderating role of malingering among coping strategies, vertigo, depression, anxiety and stress. Additionally, to scrutinize gender differences on above subject matter.

The current study results have demonstrated that there are significant correlations between malingering, coping styles, vertigo, anxiety, stress and depression among vestibulocochlear disorder patients therefore highlighting their relationship with each of the study variable. Prior studies have demonstrated that vertigo and malingering diagnosis is argued upon in some studies, particularly in malingering cases, therefore the topic remains inconclusive in this area with varying outcomes (Ku et al., 2014; Raju, 2015). Therefore objective 1 “To investigate the association among malingering, coping styles, vertigo, anxiety, stress and depression among vestibulocochlear disorder patients” was partly proved.

Another finding of this study was that religious coping and active avoidance coping strategies although have a negative impact in the current study but both were non-significant for vertigo and tinnitus. However religious coping had a significant positive influence on depression and stress suggesting that there will be an increased level stress and depression while implementing religious coping strategy (Hafsa et al., 2021; Rashid et al., 2021; Saif et al., 2021; Sarfraz et al., 2021; Toqeer et al., 2021). Further it was noted that active avoidance coping was significantly having a positive influence on anxiety, depression and stress, but was having non-significant impact on tinnitus and vertigo. Also it was noted that religious coping and active avoidance coping strategies were having a significant positive influencing on both positive and negative mood affect. Hence, religious coping and active avoidance coping strategies can go both ways, depending upon the situation, level and severity of the disorder (Beukes et al., 2018; Taheri Kharamah, Zamanian, Montazeri, Asgarian, & Esbiri, 2016).

In this study the second objective was to study the moderating role of malingering between coping strategies, vertigo, depression, anxiety and stress in patients with vestibulocochlear disorder. It was found in the present study that the effect of vertigo on

psychological distress and mood affect along with the mediating effect of coping strategies were moderated by malingering, with these effects being more crucial for vestibulocochlear disorder patients with modest level of malingering for the reported disorder. These findings correspond with the previous studies indicating the effects of malingering reported by clinicians that they typically come across malingerers for personal injury patients, Disability patients, criminal instances, and other medical conditions under different circumstances (Chmielewski et al., 2017; Myers et al., 2016; Sartori et al., 2016; Tuck et al., 2018).

### Implications of present research

Findings of the present study will have vital and significant implications for future researches exploring psychological repercussion of Vestibulocochlear disorders.

1. This research will provide a pivotal role in creating awareness among Pakistani vestibulocochlear disorder patients about the psychological consequences faced by vertigo and tinnitus patients.
2. Present research findings will guide psychologists and health practitioners in accommodating patients experiencing vertigo and tinnitus symptoms by counseling and psycho education to help in elevating emotional and psychological suffering.

### Limitations and Suggestions

1. Due to time constraints and availability of sample, male and female sample was unequal. Therefore future researches should focus on equal number of female and male patient ratio to get more balanced results.
2. Further classification is needed to differentiate psychopathological symptoms of vertigo and medical reasons causing vertigo related symptoms, this would further elaborate this symptom in two dimensions.
3. Future researches should include more elaborate statistical analysis along with other psychological instruments to further evaluate and explain the mechanisms behind development of psychological problems caused by the vestibular system.

### Conclusion

Over the past decade there has been a rapid increase in the reporting of vestibulocochlear disorders around the world. Patients experiencing disorder symptoms like vertigo in this domain tend to have a deviant psychological profile that is analogous with other chronic diseases. It is within a psychologist's scope of practice to discover psychological problems along with issues arising from vestibulocochlear disorders. Various factors contribute and interfere in the psychological process that further contribute and aggravate the severity



and symptoms of vertigo. Therefore the specific aim of the present study was to evaluate the association among malingering, coping styles, vertigo, anxiety, stress and depression among vestibulocochlear disorder patients. The results revealed that there were significant correlations between malingering, coping styles, vertigo, anxiety, stress, depression and mood affect among vestibulocochlear disorder patients therefore highlighting their relationship with each of the study variable. The study results also revealed that malingering acted as a moderator in the relationship between vestibulocochlear disorders and psychological problems therefore highlighting its implications in the present study. Typically it was noted that both the effects of vertigo on psychological distress were moderated by malingering, with these effects being more crucial for vestibulocochlear disorder patients with modest levels of malingering. These findings suggest further investigation for various other aggravating factors that contribute in the vestibulocochlear disorders severity. It is also suggested

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#### Availability of data and materials

The data sets used and analyzed during the current study are available from the corresponding author on reasonable request.

#### Authors' contributions/Author details

Mr. Ammar Ahmad performed the main study under the supervision of Dr. Naeem Aslam. Dr. Naeem Aslam, Brig (R) Dr. Bashir Ahmed & Dr. Sammeen Salim wrote the article under the guidelines of Nature-Nurture Journal of Psychology.

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#### Ethics declarations

#### Ethics approval and consent to participate

This study was approved by the Institutional Review Board (National Institute of Psychology, Quaid-I-Azam University, Islamabad, Pakistan). A written informed consent was obtained from all participants.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare to have no competing interests.

#### Additional Information

Not applicable.

that neuro-otological investigations in the patients reporting unsteadiness should be explored to manage patients with psychiatric co-morbidity. Therefore this study will be helpful for future investigations exploring the clinical effectiveness of cognitive and multi-sensory rehabilitation protocols for vertigo patients.

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#### Ethical Consideration

The study was approved by the Foundation University Islamabad. Consent Form was taken before taking data and participants were asked to take voluntary participation

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