

# A confirmatory factor analysis in identifying the nature of mental health in Jaffna society: A follow-up study

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## ABSTRACT

This study focuses on the nature of mental health conditions in post-war Jaffna society, which was carried out in 2018. This is a follow-up study of the Jaffna socio-economic health study performed in 1999. The general population was considered for drawing the sample. The sampling units are 1121 families of the 1999 study drawn using two-stage stratified random sampling, but the subjects are changed as one of the siblings in the sampling unit, who has now become adult after 20 years and his/her spouse instead of parents. A sample of 1036 sibling adults is available from the follow-up to explore the information in the current study. An interviewer administered questionnaire was used to record the data on mental disability measures. Specific measures were formulated from symptomatic dimensions; psychological, physiological, psycho-physiological, and ambiguous. The data collected on the variables of these dimensions coded according to the requirement of statistical analysis. Outcomes of exploratory data analysis, cluster analysis, and logistic regression analysis reported in 2020. The present study reported using confirmatory factor analysis; the number of factors determined by the percentage of variation and communality of the *varimax* rotations. Factor analysis on various mental health symptoms of 17 variables revealed that the psychological variables; feeling lonely, failure of expectation, wondering un-worthwhile events, and restlessness formed a combined major factor determining the nature of mental health while feeling unhappy, low spirit, and sleepless also formed individual minor factors in this context. These outcomes confirm that the psychological sphere was dominant in exploring the nature of mental health in Jaffna society. Further, the variables of physiological, psycho-physiological, and ambiguous dimensions formed individually gender-specific with two-factor formations, within which the factors of wives are dominant over the factors of husbands. Considering the gender by combining all dimensions, we were able to find altogether eight factors characterized suitably.

**Keywords:** Ambiguous dimensions, Factor analysis, Physiological, Psychological, Post-war scenario.

## INTRODUCTION

The general health conditions of the people of the Jaffna peninsula during the period prior to the conclusion of the war in 2008 were well documented (Elankumaran, 2001b). An in-depth statistical analysis of physical disabilities and mental disorders due to continuous war and displacements confirmed that the people of the Jaffna peninsula were severely affected (Elankumaran, 2001a). The assessments of the parent's physical and mental health status in the previous field study, named JSEHS-1999, was the basis (Elankumaran, 1999) to the present follow-up study, conducted in 2018. This study is dealt with the detailed study of 'Physical Health' and 'Mental Health'. We did a separate analysis for these health statuses and attempted to determine relationships with socio-economic status, specifically with occupation and monetary status. The analysis of physical disabilities has been reported elsewhere (Elankumaran, 2018, 2019). The results of subjects-based analysis on mental health disorders were reported earlier (Elankumaran, 2020). The outcomes of a variables-based analysis are reported now.

The disability, which includes physical and mental disabilities, was first classified by WHO (1980). The ICDH (International Classification of Impairments, Disabilities, and Handicaps) intended to offer a conceptual framework for information. This is relevant to the long-term consequences of the disease, injuries or disorders, and applicable to both personal health and the mitigation of environmental and social barriers. Circumstances can be expected to place such individuals at a disadvantage concerning their peers when viewed from the norms of society. Hence, this research concentrates on the intermediate stage disability, which is the least controversial according to WHO.

The objectives of the present research of 2018 are concentrated with the cross-sectional study followed-up in the 'sample of siblings' derived from the 'sample of parents' in the JSEHS-1999 (Elankumaran, 1999). The post-war situation in the study area after 2009 is mixed with an atmosphere of the conclusion of the war. Hence, the direct impacts of war on the study area population in terms of physical and mental disabilities become significant. The objective is to highlight the clear statistical parametric picture of the Mental Health Status of the people of the Jaffna peninsula within a decade after the conclusion of 30 years of ethnic civil war. The only pio-

**Table 1:** List of variables included in the dimensions of mental disorders of parents.

Mental disorder dimensions	Variable names	Husband	Wife
Psychological	Low spirit	PSYH1	PSYW1
	Poor memory	PSYH2	PSYW2
	Lonely	PSYH3	PSYW3
	Restlessness	PSYH4	PSYW4
	Expectation failure	PSYH5	PSYW5
	Wandering un-worthywhile	PSYH6	PSYW6
	Unhappy	PSYH7	PSYW7
	Sleepless	PSYH8	PSYW8
Physiological	Poor appetite	PHYH1	PHYW1
	Fullness of head	PHYH2	PHYW2
	Frequent Fainting	PHYH3	PHYW3
Psycho-Physiological	Feel hot all over	PSPH1	PSPW1
	Feel weak all over	PSPH2	PSPW2
	Troubled by headache	PSPH3	PSPW3
Ambiguous	Palpitation	AMBH1	AMBW1
	Acid stomach	AMBH2	AMBW2
	Trembling hands	AMBH3	AMBW3

neer study in this respect was JSEHS-1999. Therefore, it has become essential to review the nature of Mental Health. The specific objectives of the current research in this follow-up study are to identify the major factors, which are the parameters of Mental Health in Jaffna society, considering all relevant variables.

## METHODOLOGY

The attitudes and behaviors of humans in epidemiological studies were analyzed by categorical variables with ordered scores explaining the severity levels in the responses (Janet, 1988). In our study, the definitions of the ADL items defined carry ordered categorical scores and hence fit with the international standards. Mental disorders have been defined under four different dimensions: Psychological symptoms, Physiological symptoms, Psycho-physiological symptoms, and Ambiguous symptoms. A number of mental disorder symptoms have further described each dimension. The values from 0 to 2 score all the measures of these dimensions. The value 0 represents 'disorder not present', 1 represents 'disorder presents some times', and 2 represents 'disorder present always'.

The overall status called common mental disorder includes confidence in the quality of life and pain or discomfort in daily life. The detailed investigation on these two measures, along with the socio-economic variables, was earlier reported. The statistical analysis, mainly using exploratory data analysis, logistic regression analysis, and cluster analysis were employed, and the related outcomes of this follow-up data were earlier reported (Elankumaran, 2020).

Factor analysis has also been used in many studies of similar types of data and objectives of our research (Twining and Allen, 1981; Janet, 1988). Jenkins et al. (1990) employed factor analysis on about 500 persons

with 58 outcome measures. These measures included all types of variables nominal, ordinal, count, discrete, and continuous. Influential factors were extracted with the above description of various data to be used in this study. The four dimensions of the mental health disorders and the detailed description of the dimensions with corresponding disorder variables of categorical measurements for husbands and wives are listed in Table 1.

We continued our in-depth analysis with the four dimensions, including 17 mental health disorders, which were subjected to analysis and reported with outcomes earlier. At the first stage of the present analysis, we performed factor analysis individually to all the dimensions. In the dimension-wise analysis, we did not consider gender but gave importance to the disability dimensions only. Further, we employed Factor Analysis on all the dimensions together by considering the gender separately to see any possible differences.

## RESULTS AND DISCUSSIONS

Factor analysis was executed on all the four dimensions individually, ignoring the gender and consequently on all the four dimensions together, concerning the gender separately. In the previous study by Elankumaran (2020), we have highlighted that mental health disorders are prevalent in the parents of Jaffna society. About 91% of the husbands and 92% of the wives have unsatisfactory mental health status in terms of 'confident in the quality of life'. Similar sufferings in terms of 'Pain or discomfort in daily life' expressed were 88% of the husbands and 89% of the wives.

### Psychological symptoms

The investigation of psychological symptoms is described by the eight symptoms known as low spirit (PSY1), poor memory (PSY2), lonely (PSY3), restlessness (PSY4),

**Table 1:** Factor loadings for the variables of psychological symptoms

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Communality
PSYH1	-0.030	-0.134	0.738	-0.234	0.171	-0.04	0.649
PSYH2	0.000	-0.245	0.226	-0.282	0.574	-0.093	0.529
PSYH3	0.673	-0.017	0.053	-0.230	0.230	-0.012	0.562
PSYH4	0.081	-0.040	0.052	-0.013	0.015	-0.890	0.803
PSYH5	0.485	-0.351	0.472	-0.051	-0.327	-0.024	0.692
PSYH6	0.567	-0.259	0.039	-0.129	-0.114	-0.328	0.527
PSYH7	0.177	-0.878	0.093	-0.147	0.08	-0.096	0.848
PSYH8	0.039	-0.157	0.121	-0.842	-0.025	-0.16	0.777
PSYW1	0.119	0.063	0.771	-0.013	0.305	0.03	0.707
PSYW2	0.195	-0.081	0.216	0.020	0.745	0.014	0.647
PSYW3	0.748	-0.020	-0.018	-0.081	0.328	0.096	0.685
PSYW4	0.517	-0.110	-0.210	0.000	0.122	-0.437	0.53
PSYW5	0.616	-0.339	0.354	0.100	-0.152	0.054	0.655
PSYW6	0.708	-0.197	0.091	-0.084	-0.014	-0.158	0.58
PSYW7	0.213	-0.862	0.013	-0.048	0.189	-0.025	0.827
PSYW8	0.270	-0.007	0.081	-0.676	0.178	0.152	0.592
Variance	2.9276	1.9856	1.6756	1.4213	1.4006	1.198	10.6088
% Var	0.183	0.124	0.105	0.089	0.088	0.075	0.663

**Table 2:** Factor loadings for the variables of physiological symptoms

Factor	Name of the factor	Explained
1	Feeling lonely, failure of expectation, wandering un-worthy by Couples and feeling restlessness by Wives	18.3%
2	Feeling unhappy by Couples	12.4%
3	Feeling low spirit by Couples	10.5%
4	Feeling sleepless by Couples	08.9%
5	Feeling poor memory by Couples	08.8%
6	Feeling restlessness by Husbands	07.5%

expectation failure (PSY5), un-worthy wandering (PSY6), unhappiness (PSY7), and sleepless (PSY8). We applied factor analysis on all the above sixteen variables to explore any structural features among the variables. Table 1 describes the extracted factors and their factor loadings. We extracted five, six, and seven factors as suitable. However, the six-factor extraction was more sensible with reality in our study. Table 2 describes the factors and their explained variation.

All the above six extracted factors together explain 66.3% of the total variation of the data. The results reveal that about 26% of the time, the mental disorders or disturbances have been stimulated by the psychological impacts of feeling lonely, failure of expectation, wandering for un-worthy events, and restlessness. The above effect in the first factor has been influenced by about 7% of the times with feeling restlessness by husbands. Feeling unhappy, low spirit, poor memory and sleepless have also been identified as important psychological impacts that stimulate mental disorders.

### Physiological symptoms

We next consider physiological symptoms. This is described by three important symptoms known as poor appetite (PHY1), the fullness of the head (PHY2), and

frequent fainting (PHY3). We applied factor analysis on all the six variables of the dimension to explore any structural features to extract two statistically acceptable factors. Table 3 describes the factors and their factor loadings.

The extracted two factors are 'physiological symptoms of wife' (27.5%) and 'physiological symptoms of husband' (24.8%). This means that physiological symptoms of wives stimulate about 28% of the time mental disorders. This is also true for husbands 25% of the time. Here, the physiological impacts are gender-specific.

### Psycho-physiological symptoms

We now consider psycho-physiological symptoms. This is described by three important symptoms known as fell hot all over suddenly (PSP1), feel weak all over (PSP2), and troubled by headache (PSP3). Factor analysis results were applied to all the six variables of the dimension to extract two statistically acceptable factors. Table 4 describes the factors and their factor loadings. The extracted two factors are psycho-physiological symptoms of the wife (27.2%) and psycho-physiological symptoms of the husband (26.3%). This means that psycho-physiological symptoms of wives have stimulated about 27 of the time mental disorders. This is also true for

**Table 3:** Factor loadings for the variables of physiological symptoms

Variable	Factor1	Factor2	Communality
PHYH1	0.264	0.63	0.466
PHYH2	0.111	0.763	0.594
PHYH3	-0.054	0.660	0.438
PHYW1	0.660	0.258	0.503
PHYW2	0.758	0.075	0.581
PHYW3	0.743	-0.023	0.552
Variance	1.6473	1.4868	3.1342
% Var	0.275	0.248	0.522

**Table 4:** Factor loadings for the variables of psycho-physiological symptoms

Variable	Factor1	Factor2	Communality
PSPH1	0.008	0.759	0.576
PSPH2	0.080	0.793	0.636
PSPH3	0.053	0.606	0.370
PSPW1	0.744	0.014	0.554
PSPW2	0.815	0.064	0.669
PSPW3	0.636	0.064	0.408
Variance	1.6317	1.5805	3.2122
% Var	0.272	0.263	0.535

**Table 5:** Factor loadings for the variables of ambiguous symptoms

Variable	Factor1	Factor2	Communality
AMBH1	0.047	-0.772	0.599
AMBH2	0.02	-0.762	0.582
AMBH3	0.186	-0.671	0.485
AMBW1	0.758	-0.087	0.581
AMBW2	0.743	-0.076	0.558
AMBW3	0.731	-0.081	0.541
Variance	1.6973	1.6478	3.3451
% Var	0.283	0.275	0.558

husbands with 26% of the time. Here also, the psycho-physiological impacts on mental disabilities are gender-specific.

### Ambiguous symptoms

Finally, the ambiguous symptoms are described by three symptoms known as palpitations (AMB1), acid stomach (AMB2), and trembling hands (AMB3). If we consider the results of factor analysis applied on all the six variables of this dimension, we also extracted two factors. Table 5 describes the extracted factors and their factor loadings. The extracted two factors are 'ambiguous wife' (28.3%) and 'ambiguous symptoms of husband' (27.5%). This means that ambiguous symptoms of wives have stimulated about 28% of the time, the mental disorders. This is also true for husbands 27% of the time. Here also, the ambiguous impacts on mental disabilities are gender-specific.

### Overall mental health

In the above sections, we discussed the mental disorders by dimensions, where we did not consider the gender

effects within dimensions. However, we found that all three dimensions produced two factors except for psychological symptoms, each gender-specific. However, all three cases were explained by poor total percentages of 52.2%, 53.5%, and 55.8%. Therefore an overall gender-specific description is justifiable, which will give common causes associated with gender. Hence, all the 17 mental disorder variables were considered for husbands firstly and secondly for the wife. Related analytical tables produced described the extracted factors and their factor loadings. The inspections of those factor loadings revealed that an eight-factor combination of variables is the most suitable formation in the Factor Analysis for both husbands and wives, as shown in Tables 6 and 7.

All the eight factors for husbands together explain 67% of the total variation, and similarly, all the eight factors for wives explain 68.4% of the total variation. The total variations explained by the eight-factor formation in this gender-specific combined dimensions analysis seem to be superior to the individual analysis. These two tables reveal that the factor formation on mental disorders for husbands and wives are almost identical except on certain factors where the combination of variables is

**Table 6:** The factors extracted from the mental disorder variables for husbands

Factor	Name of the factor	Explained (%)
1	Feeling lonely, failure of expectation, wandering un-worthwhile and unhappy	11.8%
2	Ambiguous symptoms	09.6%
3	Feeling sleepless and poor appetite	09.2%
4	Feeling low spirit and poor memory	08.8%
5	Feeling hot all over suddenly and weak all over	08.1%
6	Feeling fullness of head and troubled by headache	07.1%
7	Feeling frequent fainting	06.4%
8	Feeling restlessness	06.0%

**Table 7:** The factors extracted from the mental disorder variables for wives

Factor	Name of the factor	Explained (%)
1	Feeling lonely, failure of expectation, & wandering un-worthwhile	10.5%
2	Ambiguous symptoms	10.4%
3	Feeling fullness of head, frequent fainting, & troubled by headache	09.4%
4	Feeling hot all over suddenly and weak all over	08.4%
5	Feeling sleepless	08.4%
6	Feeling low spirit and poor memory	08.1%
7	Feeling unhappy	07.2%
8	Feeling failure of expectation	06.1%

shifted.

This is slightly different from the factors extracted within the dimensions considered with their spouses. We can observe from these two tables that the psychological impacts lonely, failure of expectation, and wandering for un-worthwhile matters have influenced the mental disorders primarily for both husbands and wives.

### CONCLUSION

Factor analysis applied on psychological symptoms using *varimax* rotation extracted six factors as suitable. The number of factors was determined considering the percentage of variation and communalities. The results reveal that about 26% of the time, the mental disorders or disturbances have been stimulated by the psychological impacts of feeling lonely, failure of expectation, wandering for un-worthwhile assignments or events, and restlessness. This effect has been influenced about 7% of the time with feeling restlessness by husbands. Feeling unhappy, low spirit, and sleepless have also been identified as important psychological impacts that stimulate mental disorders.

Factor analysis applied on physiological symptoms extracted two factors, which are 'physiological symptoms of wife' (27.5%) and 'physiological symptoms of husband' (24.8%). This means that physiological symptoms of wives have stimulated about 28% of the time the mental disorders. This is also true for husbands 25% of the time. Here we can conclude that the physiological impacts are gender-specific. Similar explanations were performed in Psycho-physiological symptoms and Ambiguous symptoms. We found that except for psychological symptoms, all other symptoms show two fac-

tors, each gender-specific. All three cases are explained by poor total percentages of 52.2%, 53.%, and 55.8%.

Therefore an overall gender-specific description is justifiable, which might give common causes associated with gender. We found that the eight-factor combination was suitable for both husbands and wives and that the factor formations on mental disorders for husbands and wives are almost identical, except on certain factors where the combinations of variables are slightly different. This gender factor analytic approach has also shown that the wives influence the circumstances of the husbands.

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