

Hidden Patterns in Young Male Population Based on Clustering Analysis in Quality Life Research



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Research interests:

quality of life, human health, physical activity, pro-health attitudes and anxiety levels, anxiety levels in a threat of experiencing military conflict, impact of Covid-19 on mental health and wellbeing different population groups in European region, physical literacy of different population groups, physical education program for children with ASD, croc-culture adaptation and validation of measure

Recent publications (well-being of youth during Covid pandemic, pro-health attitudes and anxiety levels, anxiety levels in a threat of experiencing military conflict, etc.) was published in world known journals as Scientific Reports, Journal of Clinical Medicine, International Journal of Environmental Research and Public Health, BMC Public Health, Plos One.



Actual projects:

Cross-culture adaptation of instruments for assessing of life quality of different population groups. Assessment and adaptation of measures for use in Ukrainian population (adaptation of instruments under the permission of WHO, MAPI; special tools for accessing of civic competences, fair play, physical literacy, academic motivation, etc.).

International and Multidimensional Perspectives on the Impact of Covid-19 (IMPACT-C19). The project involves over 150 members across major geographical regions in over 70 countries with multidisciplinary research expertise on Covid-19 topics. I am contributing with team and data in Ukraine.

Social Support and help-Seeking in a Changing World organized by the Psi Chi Network for International Collaborative Exchange (NICE) CROWD project for 2021 at Mississippi State University. I am contributing with team and data in Ukraine.

Mental health of undergraduates during the COVID-19 pandemic (DOI 10.17605/OSF.IO/WFSQB); **Well-being of undergraduates during the COVID-19 pandemic** (DOI 10.17605/OSF.IO/BRKGD) – conducted by researchers at multiple institutions. I am contributing as a coordinator from Ukrainian side

Previous national projects

Fundamental and applied researches under the state order of Ukrainian Ministry of Education and Science (“**Involvement of elderly people in physical education and health educational programs for improving the health and quality of life**” (2015-2017) “**Monitoring of somatic health of the population of the Western region of Ukraine**” (2011 – 2012).

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Pavlova I, Zikrach D, Mosler D, Ortenburger D, Góra T, Wąsik J (2020) Determinants of anxiety levels among young males in a threat of experiencing military conflict—Applying a machine-learning algorithm in a psychosociological study. PLoS ONE 15(10): e0239749. <https://doi.org/10.1371/journal.pone.0239749>

*We aimed to identify hidden patterns of **mental conditions** and create male **profiles** to illustrate the different subgroups as well as **determinants of anxiety levels** among them in accordance with proximity to a possibility of **direct exposure to military action***

Life is not
perfect,
but you data
could be

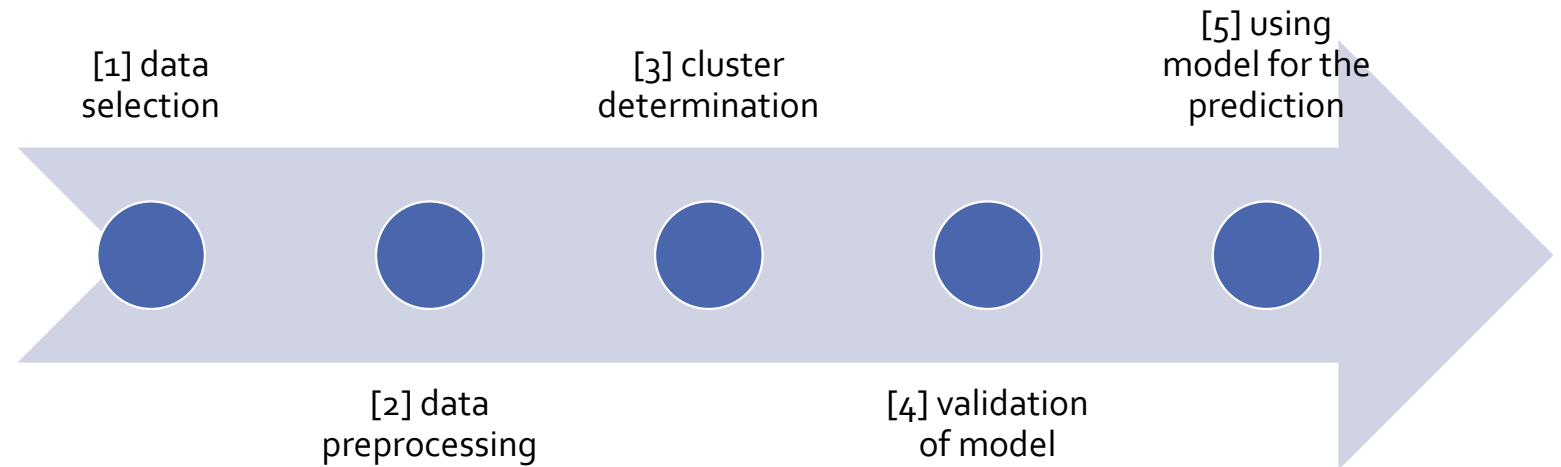
Make it work for you!

- **QUO VADIS?**

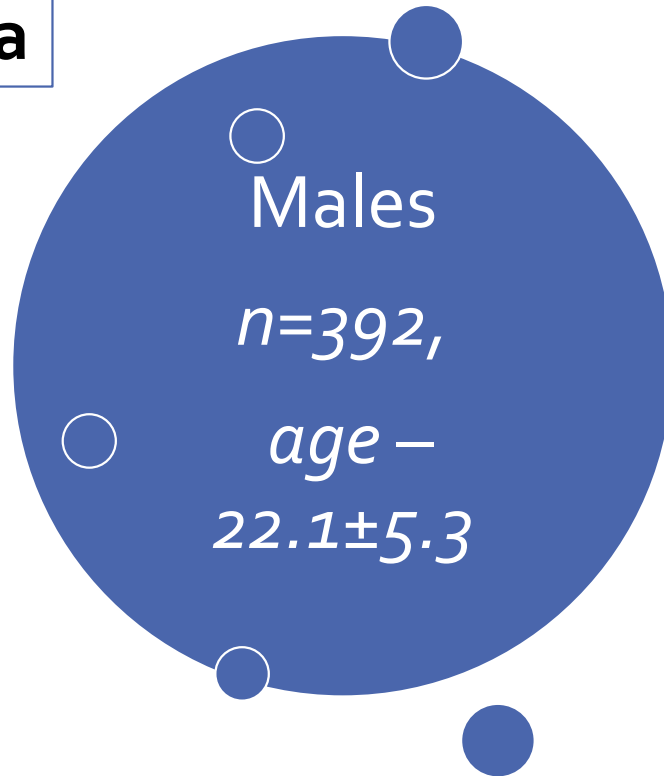
- *The term used to describe "data explosion" and its Big Brother type uses, "Big Data", was cited 40,000 times in 2017 in Google Scholar, about as often as "happiness"!*
- *This data explosion was accompanied by the rise of statistical techniques coming from the field of computer science, in particular machine learning. The later provided methods to analyse and exploit large datasets for prediction purposes, justifying the accumulation of increasingly large and detailed data*

- World Happiness Report, 2019

The framework was composed of several phases



Main data



military specialization

- $n=123,$ age – $21.2 \pm 5.8,$ duration of military service – 0–276 months, residence stay in war zone – 0–38 month

internal affairs specialization

- $n=101,$ age – 19.1 ± 0.5

sport specialization

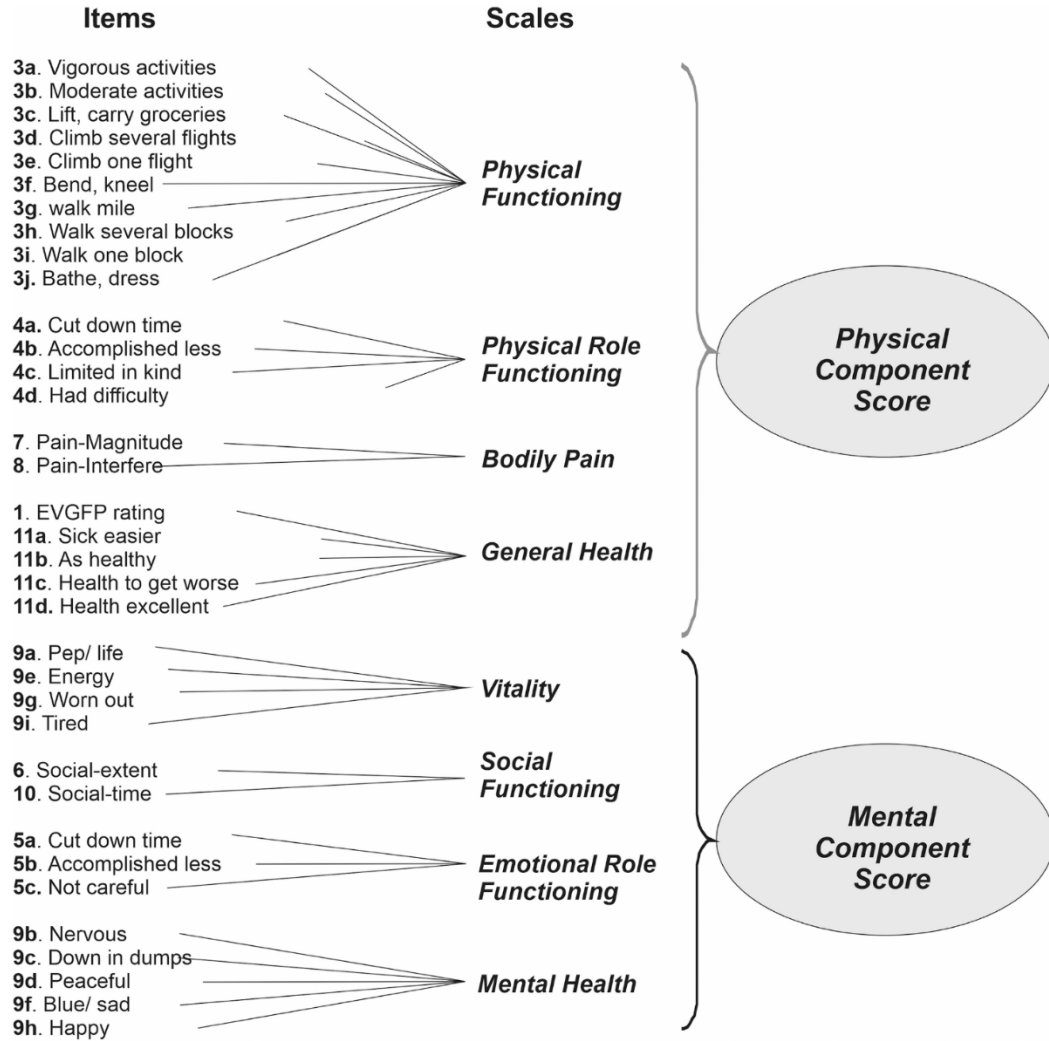
- $n=64,$ age – 19.5 ± 0.7

military service personnel

- $n=104,$ age – $25.3 \pm 4.7,$ duration of military service – 0–288 months, residence stay in war zone – 0–71 month

Collected data: gender, age, education level, marital status, length of military service, residence time in conflict zone, the existence of war injuries, duration of rehabilitation

SF-36 questionnaire structure



STAI questionnaire structure

SELF-EVALUATION QUESTIONNAIRE STAI Form Y-1

Please provide the following information:

Name _____ Date _____ S _____

Age _____ Gender (Circle) **M** **F** T _____

DIRECTIONS:

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

| | NOT AT ALL | SOMEWHAT | MODERATELY SO | VERY MUCH SO |
|---|------------|----------|---------------|--------------|
| 1. I feel calm..... | 1 | 2 | 3 | 4 |
| 2. I feel secure..... | 1 | 2 | 3 | 4 |
| 3. I am tense..... | 1 | 2 | 3 | 4 |
| 4. I feel strained..... | 1 | 2 | 3 | 4 |
| 5. I feel at ease..... | 1 | 2 | 3 | 4 |
| 6. I feel upset..... | 1 | 2 | 3 | 4 |
| 7. I am presently worrying over possible misfortunes..... | 1 | 2 | 3 | 4 |
| 8. I feel satisfied..... | 1 | 2 | 3 | 4 |
| 9. I feel frightened..... | 1 | 2 | 3 | 4 |
| 10. I feel comfortable..... | 1 | 2 | 3 | 4 |
| 11. I feel self-confident..... | 1 | 2 | 3 | 4 |
| 12. I feel nervous..... | 1 | 2 | 3 | 4 |
| 13. I am jittery..... | 1 | 2 | 3 | 4 |
| 14. I feel indecisive..... | 1 | 2 | 3 | 4 |
| 15. I am relaxed..... | 1 | 2 | 3 | 4 |
| 16. I feel content..... | 1 | 2 | 3 | 4 |
| 17. I am worried..... | 1 | 2 | 3 | 4 |
| 18. I feel confused..... | 1 | 2 | 3 | 4 |
| 19. I feel steady..... | 1 | 2 | 3 | 4 |
| 20. I feel pleasant..... | 1 | 2 | 3 | 4 |

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STAI-AD Test Form Y
www.mindgarden.com

K-nearest Neighbors

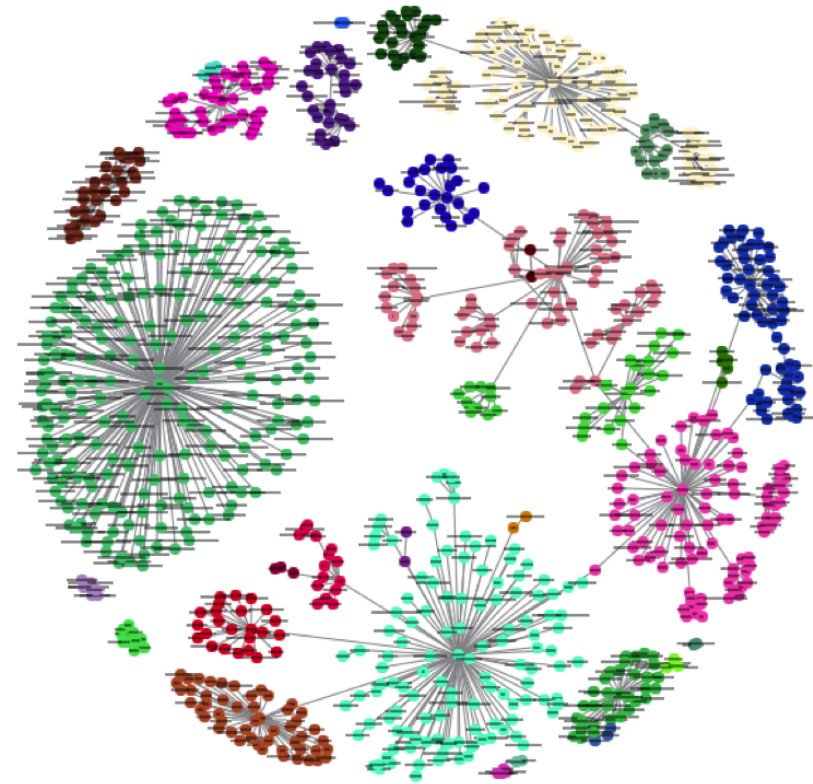
KNN is a *non-parametric, lazy learning* algorithm. Its purpose is to use a database in which the data points are separated into several classes to predict the classification of a new sample point.

non-parametric

- algorithm does not make any assumptions on the underlying data distribution - the **model structure** is determined from the **data**

lazy learning

- algorithm does not use the training data points to do any generalization - there is *no explicit training phase* or it is very minimal. All (or most) the training data is needed during the testing phase



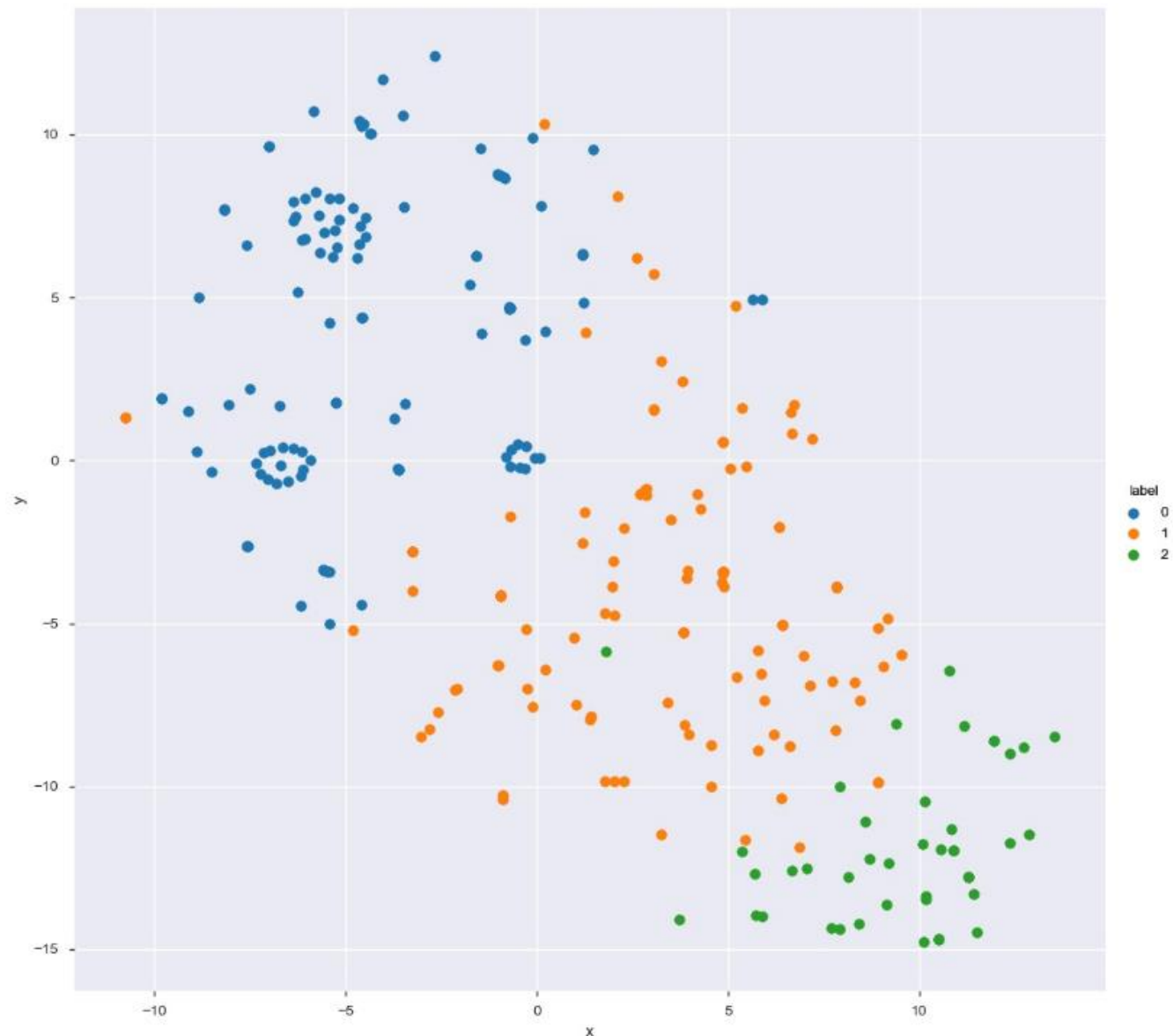
KNN Algorithm is based on feature similarity: How closely out-of-sample features resemble our training set determines how we classify a given data point

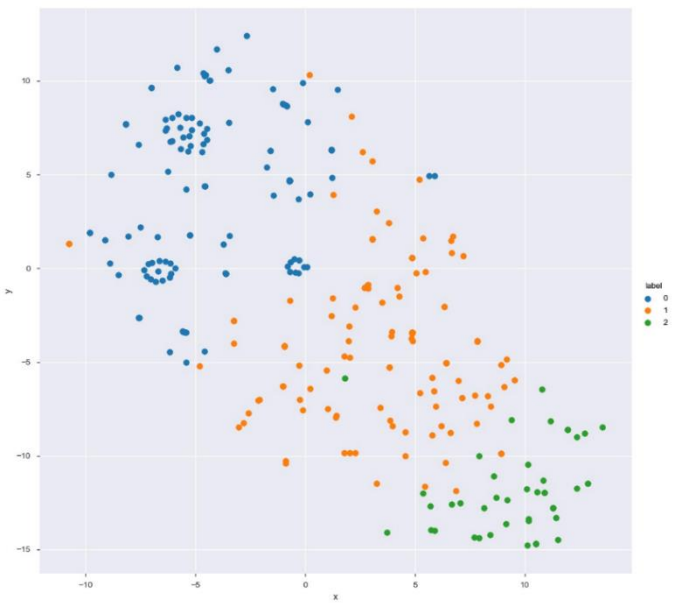
Used data:

1. *Quality of life* (Physical Functioning, Physical Role Functioning, Bodily Pain, Vitality, Social Activity, Mental Health, Emotional Role Functioning, General Health)

2. *Anxiety level* (S- and T-anxiety)

We did not use socio-demographic data!





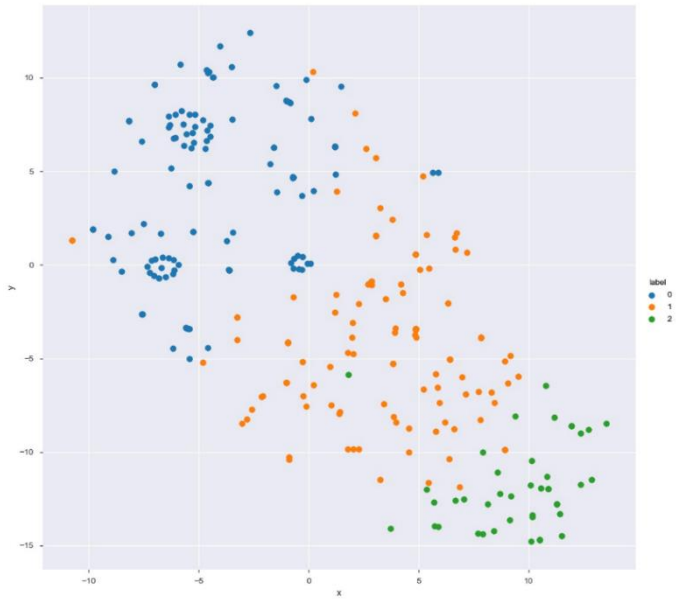
| | Subgroup 1*, % (n) | Subgroup 2**, % (n) | Subgroup 3***, % (n) |
|-------------------------------------|--------------------|---------------------|----------------------|
| Students of Military specialization | 27.43 (31) | 34.17 (41) | 42.22 (19) |
| Students of sport specialization | 23.89 (27) | 10.83 (13) | 20.00 (9) |
| Students of internal affair | 27.43 (31) | 25.00 (30) | 17.78 (8) |
| Military service personnel | 21.24 (24) | 30.00 (36) | 20.00 (9) |
| Marital status | | | |
| Divorced/live separate | 2.65 (3) | 1.67 (2) | 0 (0) |
| Single | 87.61 (99) | 94.17 (113) | 82.22 (37) |
| Civil marriage | 2.65 (3) | 0.83 (1) | 0 (0) |
| Marriage | 7.08 (8) | 3.33 (4) | 17.78 (8) |
| Quality of life | | | |
| Physical functioning | | | |
| Low | 1.77 (2) | 0 (0) | 28.89 (13) |
| Medium | 2.65 (3) | 0 (0) | 26.67 (12) |
| High | 95.58 (108) | 100 (120) | 44.44 (20) |
| Physical role functioning | | | |
| Low | 25.66 (29) | 10.83 (13) | 68.89 (31) |
| Medium | 23.89 (27) | 15.83 (19) | 22.22 (10) |
| High | 50.44 (57) | 73.33 (88) | 8.89 (4) |
| Bodily pain | | | |
| Low | 18.58 (21) | 4.17 (5) | 46.67 (21) |
| Medium | 50.44 (57) | 16.67 (20) | 40 (18) |
| High | 30.97 (35) | 79.17 (95) | 13.33 (6) |
| General health | | | |
| Low | 4.42 (5) | 5 (6) | 80 (36) |
| Medium | 84.07 (95) | 20 (24) | 15.56 (7) |
| High | 11.5 (13) | 75 (90) | 4.44 (2) |
| Vitality | | | |
| Low | 20.35 (23) | 1.67 (2) | 46.67 (21) |
| Medium | 70.8 (80) | 43.33 (52) | 53.33 (24) |
| High | 8.85 (10) | 55 (66) | 0 (0) |
| Social Functioning | | | |
| Low | 7.96 (9) | 1.67 (2) | 64.44 (29) |
| Medium | 30.09 (34) | 5 (6) | 33.33 (15) |
| High | 61.95 (70) | 93.33 (112) | 2.22 (1) |
| Emotional role functioning | | | |
| Low | 17.7 (20) | 7.5 (9) | 57.78 (26) |
| Medium | 19.47 (22) | 6.67 (8) | 26.67 (12) |
| High | 62.83 (71) | 85.83 (103) | 15.56 (7) |
| Mental health | | | |
| Low | 6.19 (7) | 1.67 (2) | 71.11 (32) |
| Medium | 69.03 (78) | 7.5 (9) | 24.44 (11) |
| High | 24.78 (28) | 90.83 (109) | 4.44 (2) |

*Subgroup 1 = males with low anxiety and depression, and moderate quality of life;

**Subgroup 2 = males with high quality of life, and low anxiety and depression;

***Subgroup 3 = males with high anxiety and depression, and very low quality of life.

WHO ARE THIS PEOPLE?



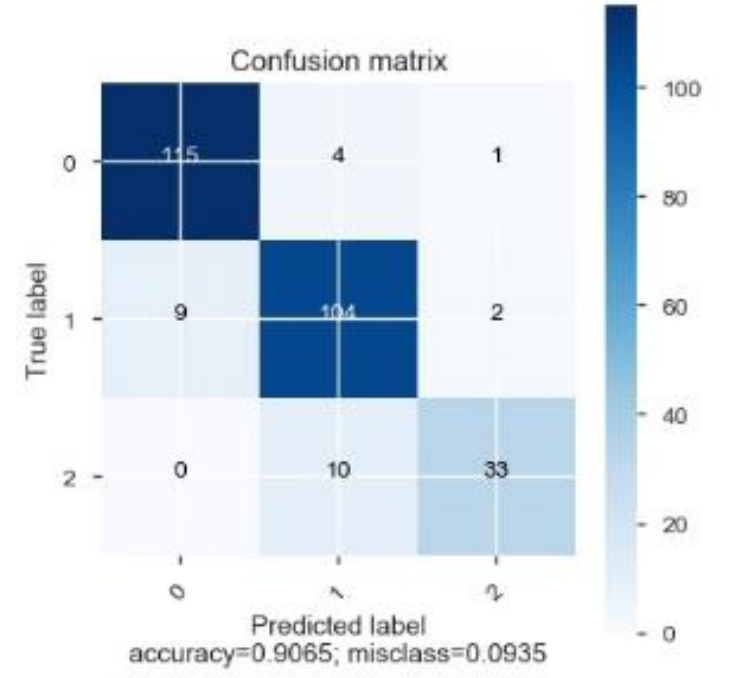
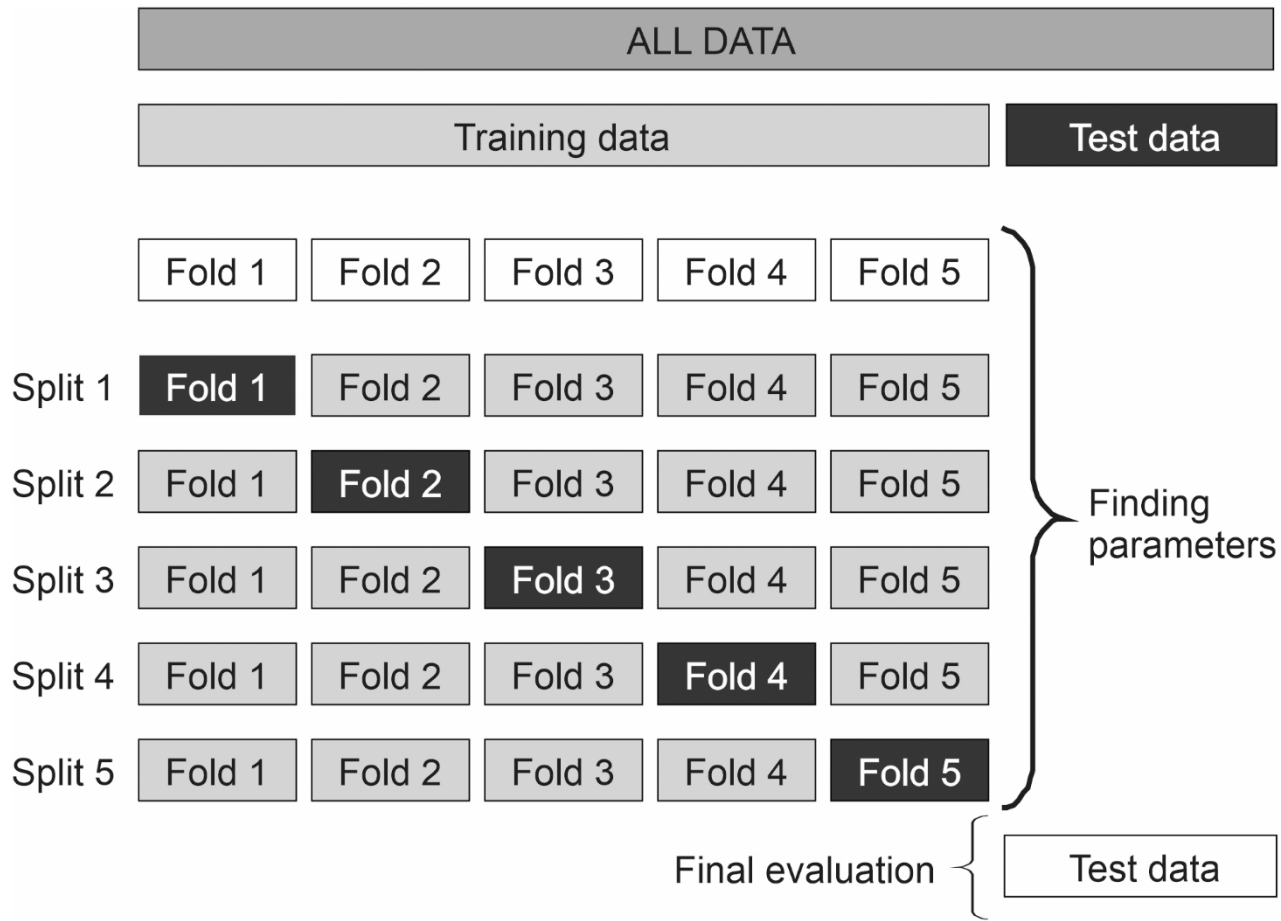
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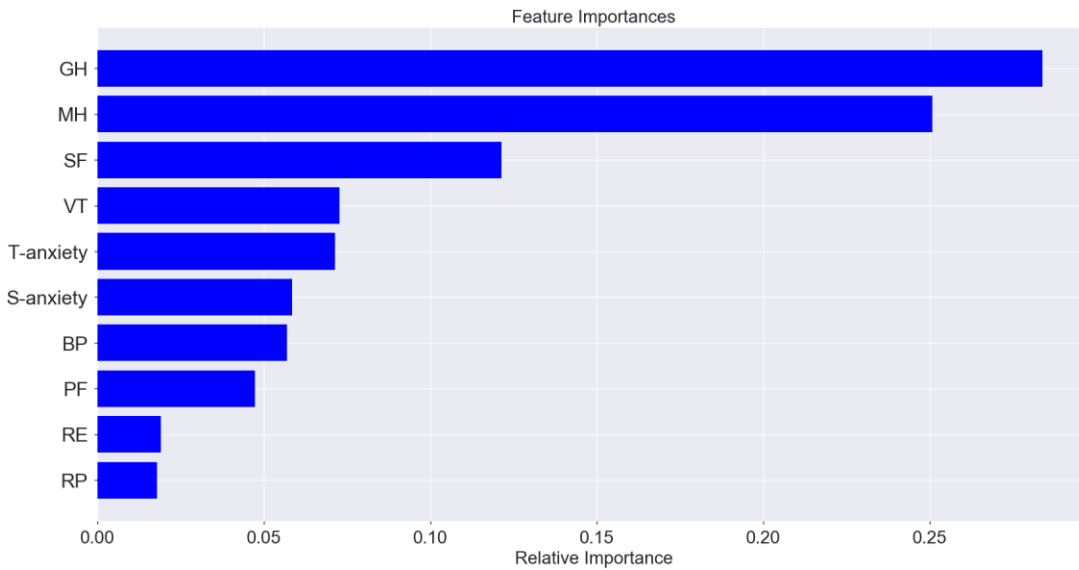
†minimum – maximum.

| | Subgroup 1* | Subgroup 2** | Subgroup 3*** |
|----------------------------|----------------------------------|----------------------------------|---------------------------------|
| Age | 20.29±2.52 | 20.70±2.85 | 20.79±3.5 |
| Military duration | 23.84±47.60 | 26.66±37.29 | 22.38±36.65 |
| Conflict duration | 2.19±4.53 (0-25) [†] | 4.02±8.29 (0-48) [†] | 2.6±5.26 (0-24) [†] |
| Injuries | 0.044 | 0.042 | 0.067 |
| Rehabilitation duration | 0.097 | 0.1 | 0.15 |
| T-anxiety | 44.33±5.93 | 37.37±7.46 | 50.36±6.64 |
| S-anxiety | 42.73±5.93 | 35.35±6.69 | 49.76±7.27 |
| Physical functioning | 95.40±9.73 | 98.42±3.94 | 67.44±28.46 |
| Physical role functioning | 77.00±29.53 | 89.58±19.87 | 46.11±28.68 |
| Bodily pain | 65.64±20.58 | 82.76±15.13 | 47.33±24.05 |
| General health | 65.40±10.10 | 80.52±14.23 | 44.4±13.66 |
| Vitality | 62.84±11.69 | 79.38±12.36 | 51.07±12.95 |
| Social Functioning | 83.30±16.59 | 95.42±9.71 | 50.55±17.66 |
| Emotional role functioning | 78.76±32.44 | 92.50±20.02 | 43.70±34.69 |
| Mental health | 66.41±12.84 | 83.17±10.12 | 47.55±11.97 |



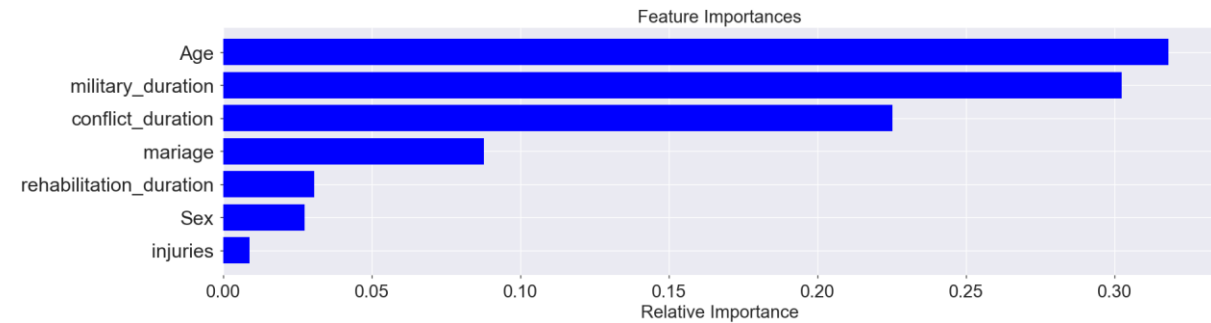
Model that used only quality of life and anxiety features

Predicted label of accuracy – 86.33%



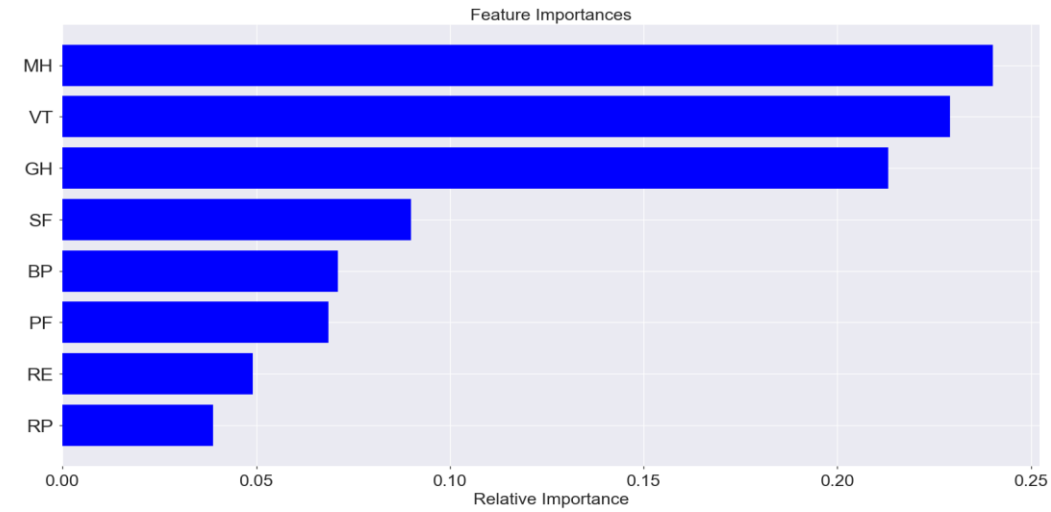
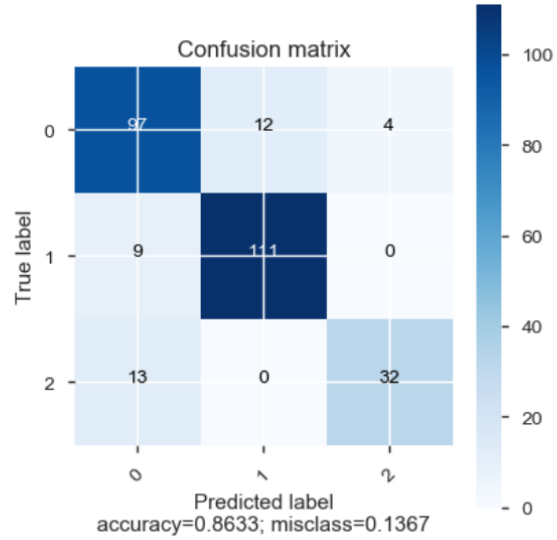
Model that used socio-demographic data

Predicted label of accuracy – 45.32%

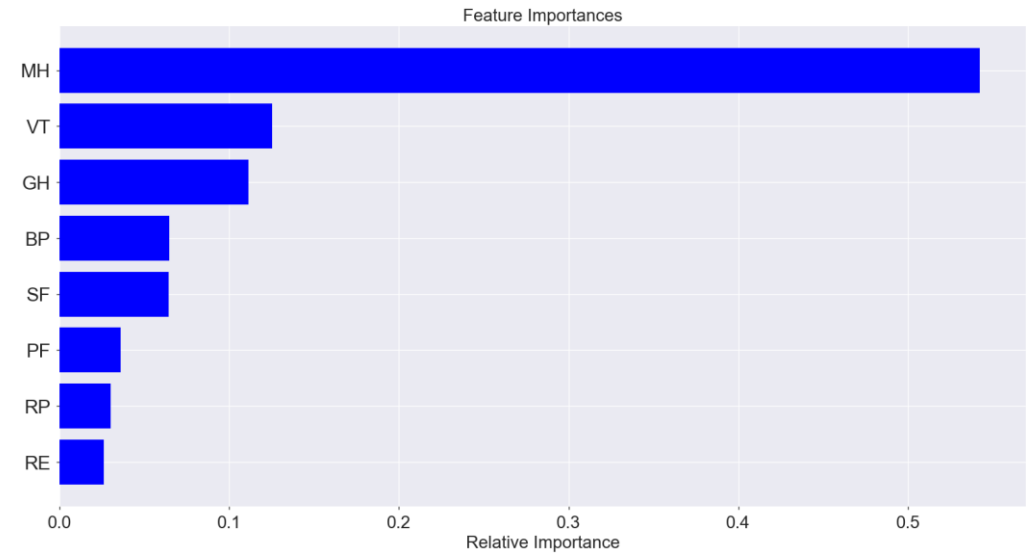


Model that used only quality of life and anxiety features

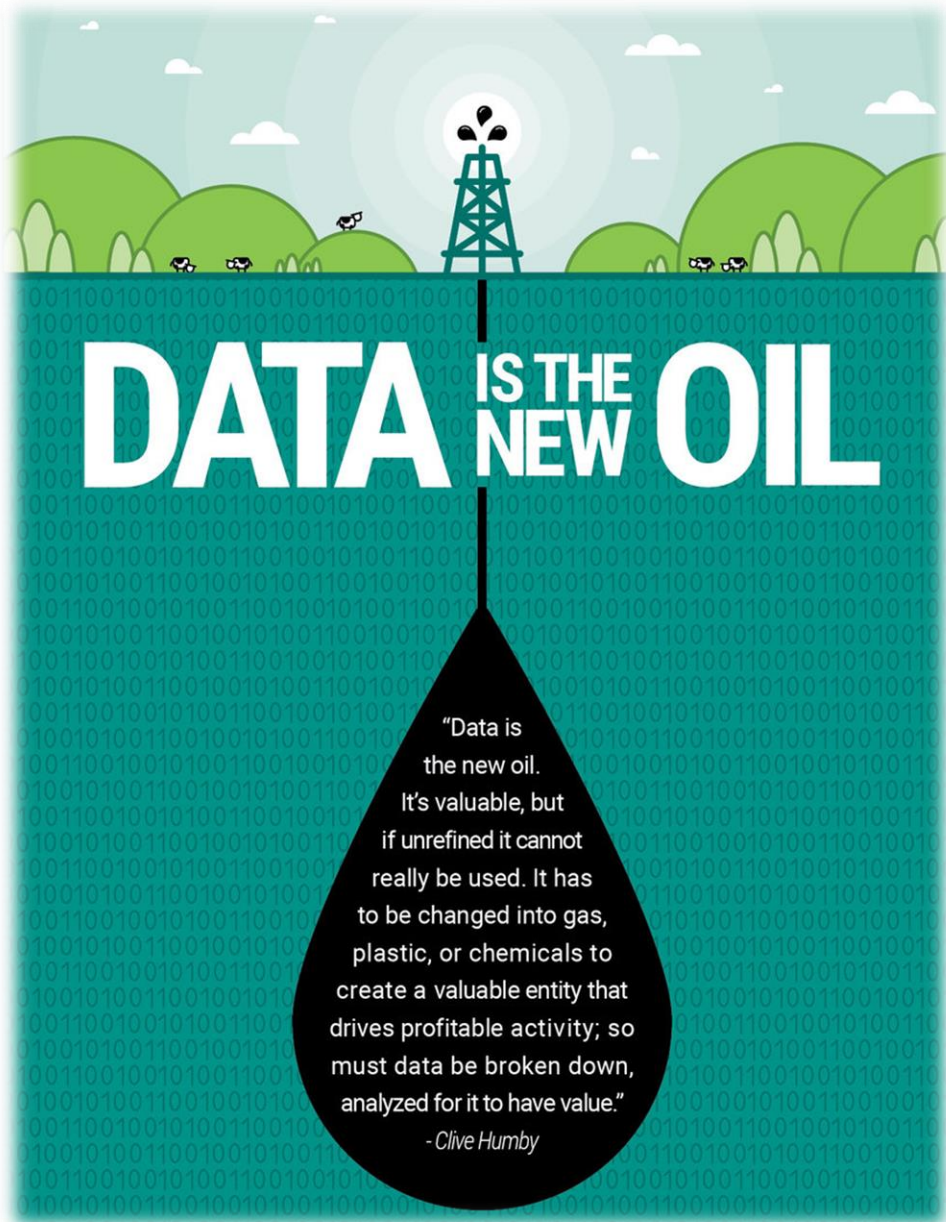
Predicted label of accuracy – 86.33%



Feature importance for T-anxiety prediction among quality of life indices



Feature importance for S-anxiety prediction among quality of life indices.



**THANK YOU
FOR
YOUR
ATTENTION!**