Influence of the Education Level on Health of Elderly People

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***Abstract*—In the present work, the relation between the level of education of elderly people and their health and quality of life has been studied. The studies have been performed in Poland. The collected data have been analyzed using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire (an abbreviated version of the WHOQOL-100), and the Geriatric Depression Scale. In both cases, we have observed a large influence of the education level on health. In most cases, the higher the education, the more positive the results. A large influence of the marital status on the overall quality of life and general health of the Polish pensioners has also been observed.**

Keywords–Social medicine; Biomedical datasets; Medical informatics; Visualizing data; Correspondence analysis; World Health Organization Quality of Life-BREF (WHOQOL-BREF); Geriatric Depression Scale (GDS)

I. INTRODUCTION

Naturally, the human health deteriorates with passing time. What is the influence of different factors on this natural process? For instance, Cho et al. consider such factors as education and past life experiences on successful aging and subjective well-being among oldest-old adults [1]. Johnson et al. study the influence of education and personality on health in the oldest old [2]. The authors also consider other factors, for example physical activity [3][4] or the attendance of lectures at the University of the Third Age [5]-[8], which help in successful aging.

In the present work, we study the influence of the education level and the marital status of elderly people on the overall quality of life and general health. We also examine the influence of the education on the level of depression. The studies have been performed on a group of retired residents of Poland.

In Section II we describe the methods. The results in the form of maps obtained using the correspondence analysis and the spine plots are shown in Section III. Section IV summarizes the results.

II. METHODS

The studies were performed from February 2017 to May 2017 in Bydgoszcz, the eighth largest city in Poland, about 350 000 citizens. The studied group consists of 289 retirees (186 females and 103 males). All the participants were evaluated using the Polish version of the World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire [9][10] and using the Geriatric Depression Scale (GDS) [11]. They could declare their education as: elementary school, vocational education, high school, or university education. We applied the correspondence analysis for the graphical representation of the results. Originally, this method was introduced by Hirschfeld [12]. Later, the method has been improved by many authors [13][14]. In these methods, one creates maps in which the objects under consideration are represented by points distributed in a specific way. Distances between these points are related to properly defined similarity classes of the objects. Thus, by studying the distribution of the distances one can classify the objects according to some selected similarity criteria. This methodology may be applied in many areas of science. In particular, we have recently created an analog of this kind of approach in bioinformatics [15].

In this work, the points on the maps represent different groups of individuals and their answers to questions. In order to classify the set of studied individuals, we analyze the distribution of the distances between the points representing the answers and the points representing groups of individuals.

III. RESULTS AND DISCUSSION

Figures 1, 2 and 3 show 2D-maps derived from the correspondence analysis. They show the relations between the general satisfaction of the retirees with the quality of life and health and their age, marital status, and education, respectively.

There are two different kinds of points denoted in the maps. Empty rectangles denote groups of individuals. In Figure 1, empty rectangles correspond to the groups of individuals of different age: 51-64; 65-79, and above 80. In Figure 2, these symbols correspond to the groups with different marital status:

 ISBN: 978-1-61208-618-7

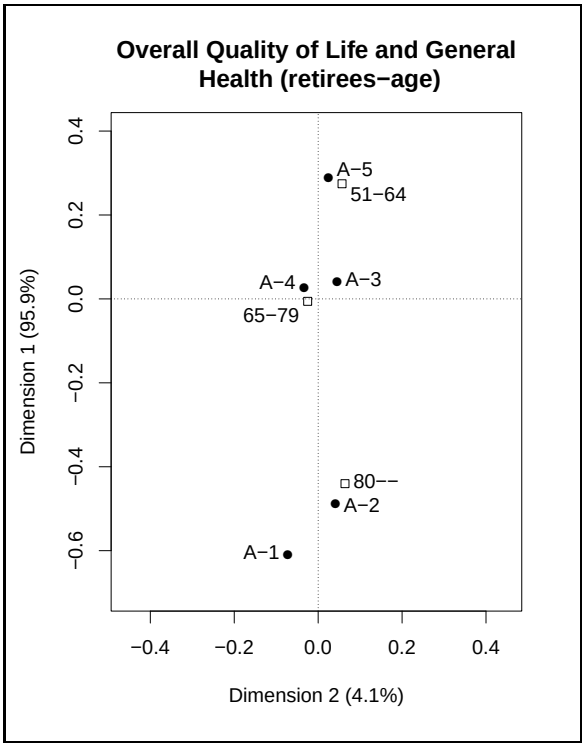

Figure 1. 2D-map obtained using the correspondence analysis method (circles denote answers, rectangles denote groups of individuals of different age).

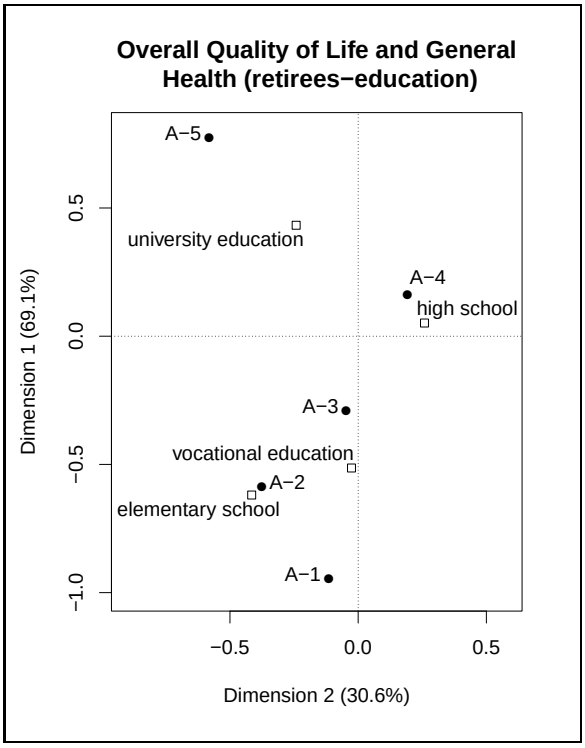

Figure 3. 2D-map obtained using the correspondence analysis method (circles denote answers, rectangles denote groups of individuals with different education).

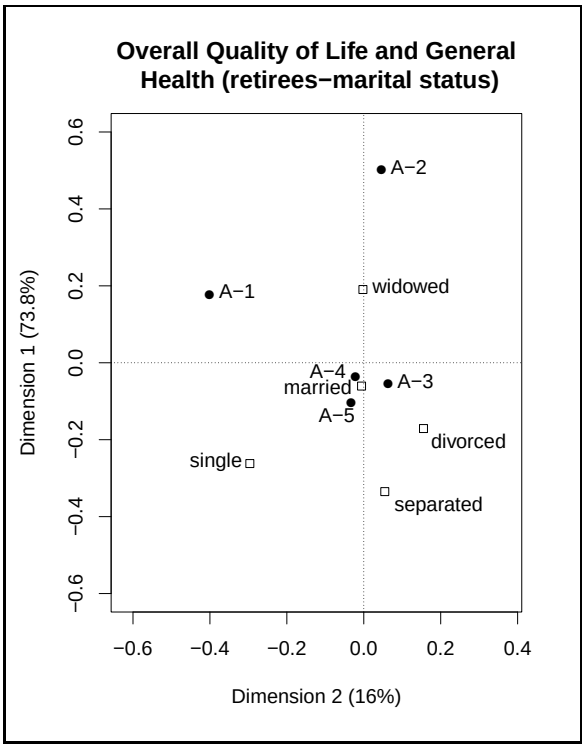

Figure 2. 2D-map obtained using the correspondence analysis method (circles denote answers, rectangles denote groups of individuals with different marital status).

single, married, widowed, divorced, separated. In Figure 3, the groups of individuals with different education are considered: elementary school, vocational education, high school, and university education. Full circles denote answers to the questions in the WHOQOL-BREF questionnaire about overall quality of life and general health. One can choose between five answers denoted in the figure as *A-1*, *A-2*,...*A-5*. *A-1* corresponds to the least favorable quality of life and *A-5* to the most favorable one.

As expected, the closest point to *A-5* is the youngest group *51-64*. The oldest group *80 - –* estimates its overall quality of life and general health as the worst compared to other groups (Figure 1).

Considering the marital status, the group *married* estimates its overall quality of life as the best compared to other groups and *widowed* as the worst (Figure 2).

Considering the education, the closest point to *A-5* is *university education*. It means that this group of individuals estimates their overall quality of life and general health as the best compared to other groups. The closest point to *A-1* is *elementary school* (Figure 3).

Figures 4, 5 and 6 show the results obtained using the Geriatric Depression Scale.

We used the 15-item version of GDS. The questions are the following:

1) Are you basically satisfied with your life? yes / **no**
2) Have you dropped many of your activities and interests? **yes** / no
3) Do you feel that your life is empty? **yes** / no

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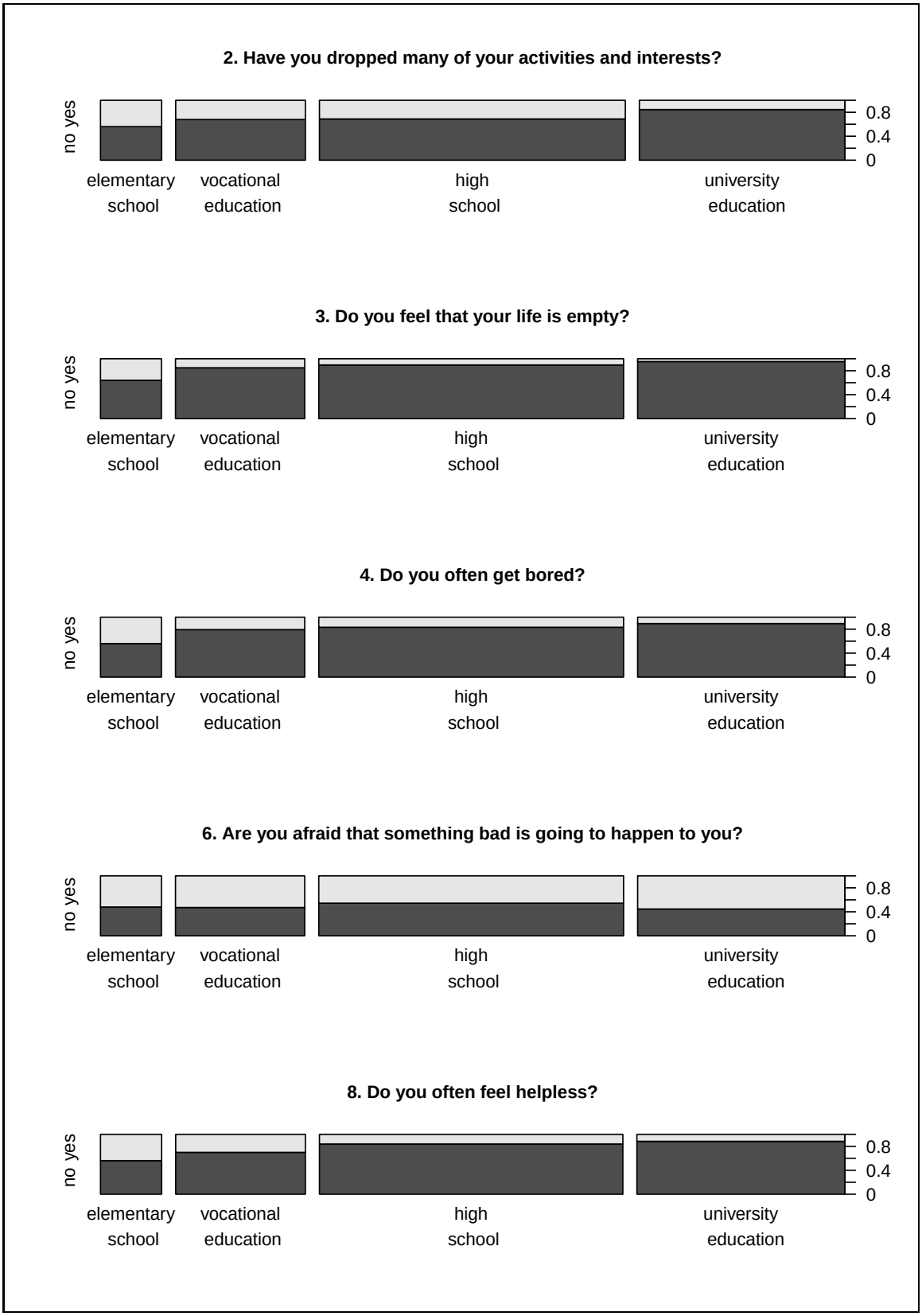

Figure 4. Spine-plots showing the dependence of the percentage of positive and negative answers to a particular question on the education level of the respondents (questions No. 2,3,4,6,8 for which answer 'yes' indicates depressive symptoms).

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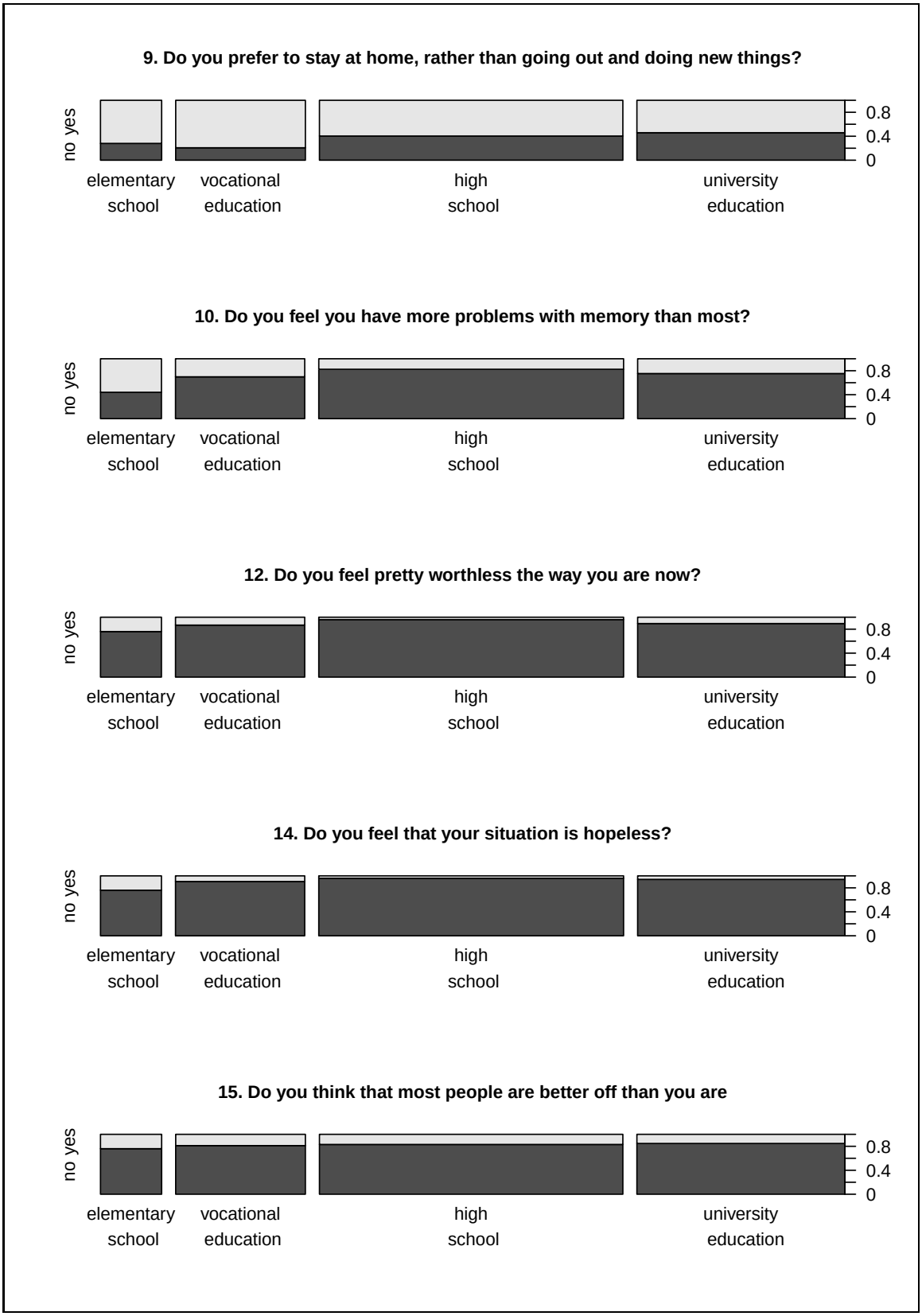

Figure 5. Spine-plots showing the dependence of the percentage of positive and negative answers to a particular question on the education level of the respondents (questions No. 9,10,12,14,15 for which answer 'yes' indicates depressive symptoms).

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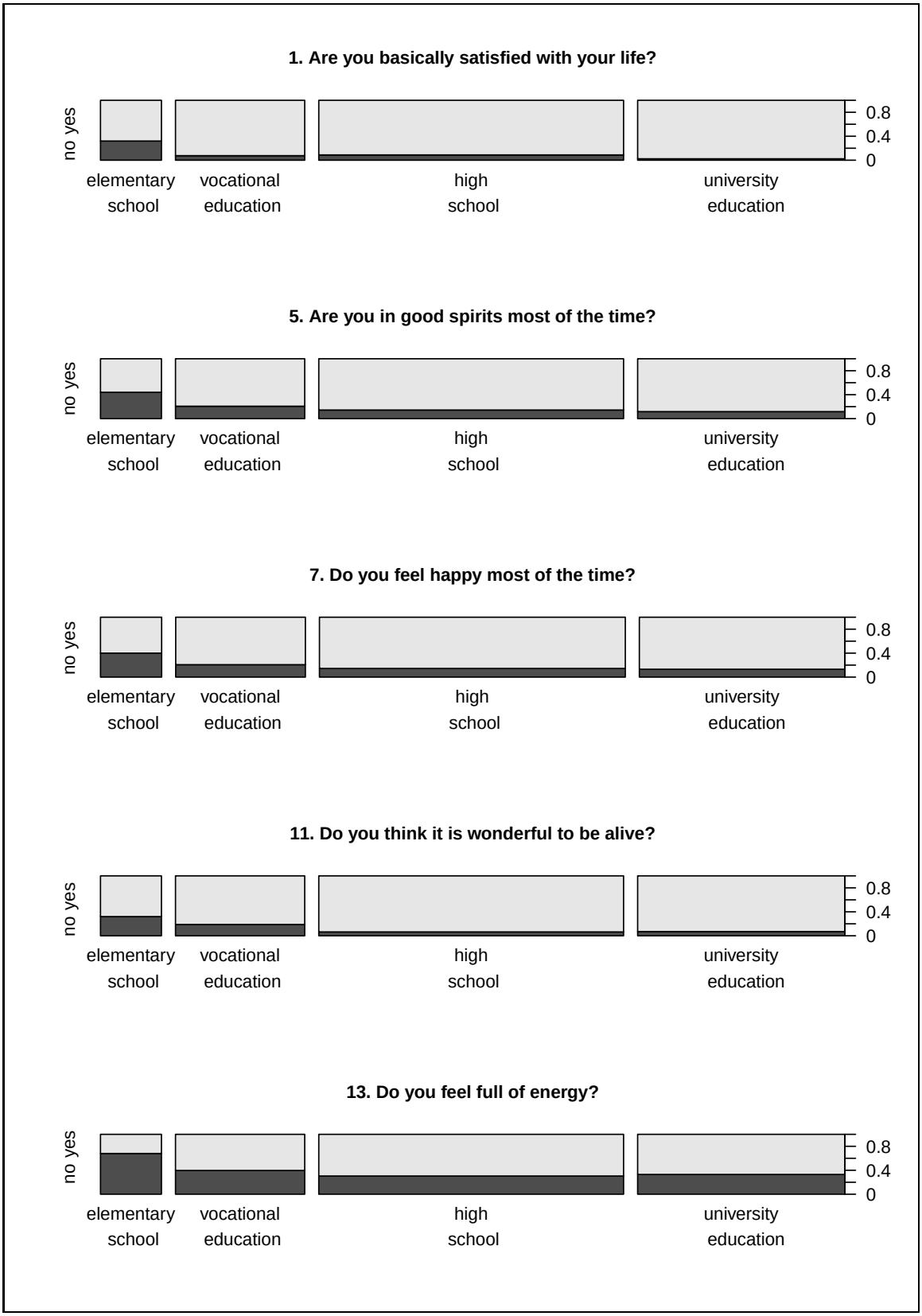

Figure 6. Spine-plots showing the dependence of the percentage of positive and negative answers to a particular question on the education level of the respondents (questions for which answer 'no' indicates depressive symptoms).

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4) Do you often get bored? **yes** / no
5) Are you in good spirits most of the time? yes / **no**
6) Are you afraid that something bad is going to happen to you? **yes** / no
7) Do you feel happy most of the time? yes / **no**
8) Do you often feel helpless? **yes** / no
9) Do you prefer to stay at home, rather than going out and doing new things? **yes** / no
10) Do you feel you have more problems with memory than most? **yes** / no
11) Do you think it is wonderful to be alive? yes / **no**
12) Do you feel pretty worthless the way you are now? **yes** / no
13) Do you feel full of energy? yes / **no**
14) Do you feel that your situation is hopeless? **yes** / no
15) Do you think that most people are better off than you are? **yes** / no

Answers in bold indicate depressive symptoms. Answer **yes** means depressiveness in questions No: 2,3,4,6,8,9,10,12,14,15 (Figures 4 and 5). Answer **no** means depressiveness in all other cases, i.e., questions No: 1,5,7,11,13 (Figure 6). For each bolded answer is given 1 point.

A score greater than 5 points suggests mild depressive symptoms. If the score is greater than 10 points it may be depressive disorder. Such individual should be tested for depression.

Figures 4, 5 and 6 show the spine-plots. The width is the largest for *high school* so the largest number of individuals declare this kind of education. The smallest number of individuals declare *elementary school* education (the smallest width in the spine-plots). Dark color represents the answer no. In all the questions in which answer 'no' means depression (1,5,7,11,13) the percentage of answers 'no' is the largest for individuals having elementary education compared to other groups (Figure 6). Analogously, in other questions in which answer 'yes' indicates depression 2,3,4,8,10,12,14,15 also the largest percentage of answers 'yes' is for individuals with elementary education compared to other groups (Figures 4 and 5). The exceptions are only two questions: No. 6 and 9. For these questions, the answer 'yes' indicates depressive symptoms. In question No. 6 all the groups answer approximately in a similar way. In question 9 the differences between groups are also not large but *vocational education* has slightly larger percentage of 'depressive' answers (yes) comparing to other groups.

IV. Conclusion

Summarizing, the education and the marital status strongly influence the overall quality of life and general health. We have also shown that among Polish elders, the depressive symptoms are related to the education. Higher education represents an important positive factor affecting this problem. Generally, the higher the education, the better the overall quality of life and health.

In future work, we will concentrate on studies related to the influence of factors other than education on depressive symptoms. In particular, we will check the significance of sex and marital status.

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 ISBN: 978-1-61208-618-7