Relationship between Handedness and Stress level by Fuzzy Approach

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Abstract: Measuring criteria of Handedness and Stress are fuzzy and ambiguous but available methods measuring them generally are classic kind. In this research, the goals are evaluation of relationship handedness and level stress factors, and then comparison between two Fuzzy and Classic numbers to determine which approach is more appropriate.

Briggs and Nebes and Eliot questionnaire used to respectively for handedness measurement and stress level measurement.

Hypotheses testing show that between Handedness and Stress level doesn’t exist significant relationship by fuzzy and classical approach.

Then Fuzzy and Classic numbers compared with two criteria (skewness coefficient & kurtosis coefficient), that deviation of normal in fuzzy numbers is less than Classic numbers which resulting that fuzzy numbers is better than Classic numbers.

Key words: Handedness, stress level, fuzzy approach.

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1 Introduction

Most humans are right-handed while a minority is left-handed or ambidextrous, although the incidence of left-handedness can vary in different cultures [1]. Left handedness is more common in males than in females. Studies have indicated that the rate of left-handedness is approximately 13% in males and 11% in females [2].

Handedness has been studied for years and several theories of the origins of left-handedness have been proposed, yet the determinants of human handedness are not clearly known.

It is suggested that left-handedness can be attributed to pregnancy and birth risk factors. A theory of pathological left handedness has gained support, for example, from observations that left-handedness is over represented in schizophrenic patients [3] or after childhood meningitis [4].

Also, one study indicated that left-handedness, at 5 years age, was almost two times more likely in infants who had required resuscitation after delivery [5]. But another study in contrast indicated that of 25 potential pregnancy or birth stressors, only maternal age had a weak association with left-handedness [6]. One factor that may relate to pregnancy risk events is seasonal variation in viral infections. Two studies with small samples [7] have yielded contradictory results, while a study of >15 000 subjects found no evidence of a relationship between handedness and season of birth [8].

Carolyn J. Choudhary and Ronan E. O’Carroll [9] were identified that Posttraumatic Stress Disorder (PTSD) was significantly associated with the left handedness, and left handedness has Posttraumatic Stress Disorder symptoms more than right handed and Mixed – Handedness and concluded that Left handedness associated with the prevalence of PTSD symptoms.

The current study finds that strong left handedness is associated with increased prevalence of PTSD compared to both weak and right handers.

In contrast to Saltzman et al.’s [10] conclusions, this suggests that it is not reduced lateralization, but rather leftward lateralization (in handedness) that is associated with PTSD prevalence and symptoms. Ongoing research into possible differences between right and left handers in these areas intends to explore these issues further.

Kevin [11] observed significant relationship between the handedness and depression and he expressed that left handedness have a symptoms of depression fully significant much more than the right handedness.

While some studies have found increased left-handedness in twins and triplets compared to singletons, a more
recent study of large numbers of twins and their siblings found no difference in left-handedness between twins and singleton sibs. Some speculate that the higher rate of left handedness in twins and triplets results from their more stressful pregnancy and traumatic delivery [12]. Yet, even if stressors related to pregnancy or birth trauma account for some left-handedness, not all left-handedness is of pathological origin. Thus, the origins of left-handedness in healthy humans remain unclear. Perhaps, the handedness causes to different issues in people, or it is related to various diseases and factors. Previous research has shown a robust association between schizotypy and mixed/ambiguous handedness. There is a considerable body of research arguing for an association between psychotic disorder and atypical brain lateralization – the latter usually being indicated by non-right handedness. By contrast, there has been less attention given to a possible link between handedness and affective stress.

The term stress was first employed in a biological context by the endocrinologist Hans Selye in the 1930s. He later broadened and popularized the concept to include inappropriate physiological response to any demand. In his usage stress refers to a condition and stressor to the stimulus causing it. It covers a wide range of phenomena, from mild irritation to drastic dysfunction that may cause severe health breakdown.

Signs of stress may be cognitive, emotional, physical or behavioral. Signs include poor judgment, a general negative outlook, excessive worrying, moodiness, irritability, agitation, inability to relax, feeling lonely, isolated or depressed, aches and pains, diarrhea or constipation, nausea, dizziness, chest pain, rapid heartbeat, eating too much or not enough, sleeping too much or not enough, social withdrawal, procrastination or neglect of responsibilities, increased alcohol, nicotine or drug consumption, and nervous habits such as pacing about or nail-biting[13]. The purpose of the present study is Relationship between Handedness and Stress level by Fuzzy Approach

2 Theoretical frameworks

2.1 Fuzzy set theory

“Not very clear”, “probably so”, “very likely”, these terms of expression can be heard very often in daily life, and their commonality is that they are more or less tainted with uncertainty. With different daily decision making problems of diverse intensity, the results can be misleading if the fuzziness of human decision-making is not taken into account. However, since Zadeh [14] was first proposed fuzzy set theory, and Bellman and Zadeh [15] described the decision-making method in fuzzy environments, an increasing number of studies have dealt with uncertain fuzzy problems by applying fuzzy set theory [16].

Fuzzy logic provides an inference morphology that enables approximate human reasoning capabilities to be applied to knowledge-based systems. The theory of fuzzy logic provides a mathematical strength to capture the uncertainties associated with human cognitive processes, such as thinking and reasoning.

Some of the essential characteristics of fuzzy logic relate to the following [14]:

- Exact reasoning is viewed as a limiting case of approximate reasoning;
- Everything is a matter of degree;
- Knowledge is interpreted a collection of elastic or, equivalently, fuzzy constraint on a collection of variables;
- Inference is viewed as a process of propagation of elastic constraints; and
- Any logical system can be fuzzified.

There are two main characteristics of fuzzy systems that give them better performance for specific applications:

1. Fuzzy systems are suitable for uncertain or approximate reasoning, especially for the system with a mathematical model that is difficult to derive; and
2. Fuzzy logic allows decision-making with estimated values under incomplete or uncertain information [17].

Fuzzy set theory has developed as an alternative to ordinary (crisp) set theory and is used to describe fuzzy sets. For example, the set of 30-year-old men is a crisp set. The boundaries are definite and a particular person is either in the set or not, is either a 30-year-old man, or is not. In contrast, a fuzzy set does not have clear boundaries. Membership in a fuzzy set is a matter of degree. For example, what would one say are the boundaries of the set of warm temperatures? When is a given centigrade temperature definitely in the set ± at 40o? At 50o? A fuzzy set such as warm temperatures can be illustrated as in Figure (1). A particular temperature is described by its degree of membership in the set.

Figure 1 shows that 40o is 100 percent a member of the set of warm temperatures, whereas 20o is only 50 percent a member of the set.
This fuzzy set example stands in contrast to a crisp set example, as shown in Figure (2). Figure (2) shows the crisp set of all temperatures in the 30 o to 40o range. In this set, 30o is 100 percent a member while 29o is not in the set at all; there is no in-between.

The nature of fuzzy sets allows something to be a member in more than one fuzzy set. For example, a 35-year-old person might be 20 percent a member of the set of young people and 40 percent a member of the set of middle aged people. Figure A3 shows the overlapping fuzzy sets of warm temperatures and hot temperatures [18].

So, Fuzzy numbers are a fuzzy subset of real numbers, and they represent the expansion of the idea of confidence interval. According to the definition made by those numbers that can satisfy these three requirements will then be called fuzzy numbers, and the following is the explanation for the features and calculation of the triangular fuzzy number (TFN) (Tsuar et al.,2002). If the membership functions of a fuzzy number A is defined as follows [19]:

According to the nature of TFN and the extension principle put forward by Zadeh [14], the algebraic calculation of the triangular fuzzy number (Tsuar et al., 2002).

Addition of triangular fuzzy number:
\[(L_1, M_1, U_1) + (L_2, M_2, U_2) = (L_1 + L_2, M_1 + M_2, U_1 + U_2)\]

(2)

Multiplication of a triangular fuzzy number:
\[(L_1, M_1, U_1) / (L_2, M_2, U_2) = (L_1 / L_2, M_1 / M_2, U_1 / U_2)\]

(3)

Any real number k:
\[K (L, M, U) = (KL, KM, KU)\]

(4)

Subtraction of a triangular fuzzy number:
\[(L_1, M_1, U_1) - (L_2, M_2, U_2) = (L_1 - L_2, M_1 - M_2, and U_1 - U_2)\]

(5)

3 Methodologies
3.1 Goals and hypotheses
This research has tow objects including:
1- Evaluation of relationship handedness and level stress factors by fuzzy and classical approach, and
2- Comparison between two fuzzy and classic numbers to determine which approach is more appropriate.

3.2 Hypothesis:
Since this research looking to identify relationship between handedness and level of stress, therefore Main hypotheses can be proposed as follows:
Significant relationships exist to Between Handedness and Stress level by fuzzy and classic approach. Since this study using two approaches will perform classical and fuzzy. Main hypotheses can be proposed as follows:

Main hypothesis 1: Significant relationships exist to Between Handedness and Stress level by classical approach.

Main hypothesis 2: Significant relationships exist to Between Handedness and Stress level by fuzzy approach.

3.3 Measures:
In this study, two questionnaires have been used: Briggs and Nebes standard questionnaire has been used for measuring the handedness that is consisting of 12 questions. Eliot questionnaire has been used for measuring the level stress that is consisting of 20 questions. Both questionnaires rearrange by fuzzy approach too.

Parts were added to the classical questionnaire is the following:

1-The third part of the questionnaire's handedness has been added, including of identifying the range of linguistic variables. While variables in mathematics usually take numerical values, in fuzzy logic applications, the non-numeric linguistic variables are often used to facilitate the expression of rules and facts [15].

A linguistic variable such as age may have a value such as young or its antonym old. However, the great utility of linguistic variables is that they can be modified via linguistic hedges applied to primary terms.

The spectrums components of a questionnaire may exist vary interpretations from responding to other respondents, for a word unit and when the number of samples increases, these different interpretations can be high.

When analyzing classical questionnaires consider numerical for each component of questionnaire Spectrum and its spectrum know with the number. This means that the difference interpretations don’t consider in classical questionnaires but in the fuzzy approach respondents are asked to determine his/her comment about the numerical range of each spectrum in other table to represent any numerical range defined by the respondents, not by the researcher.

2-In stress levels Questionnaire, addition to the above mentioned in the previous paragraph that including the identification range of stress-level language variables, column of importance degree added to the questionnaire too. For the researcher during analysis, each of the questions is of equal importance in Classical standard questionnaire, meanwhile, in reality; it’s may vary the importance degree of each question in terms of each respondent. Therefore, the other column will be added as the importance degree of each question in the fuzzy stress standard questionnaire because the respondent, Himself/Herself, state any questions importance, Not that Researcher consider same to all questions importance with Himself/Herself presumption.

In this research, participants are physical education and sport science students of Islamic Azad University in Mazandaran branch. The data collection tools are a questionnaire. Briggs and Nebes standard and Eliot questionnaire used to respectively for handedness measurement and stress level measurement. Sampling methods is stratification random sampling. According to formula, samples are 163 people who ultimately 194 analyzable questionnaires were collected.

3.4 Fuzzy analyze:
Then, Fuzzy has 4 steps which are consisting of:

Step 1- Determination of fuzzy numbers for each of the linguistic variables:
In this study in sequence:
For handedness: Right Always (RA), Right Usually (RU), Not Preference (NP), Left Usually (LU), and Left Always (LA),
And for stress level: Always (AL), Usually (US), Occasionally (OC), and Never (NE).

For gaining each of the linguistic variables’ fuzzy numbers, participants’ opinions were used, so each participant were asked to determine linguistic variables’ spectrum from 0 to 100. The sample of these opinions is shown in table 1.

<table>
<thead>
<tr>
<th>Spectrum linguistic variables(0-100)</th>
<th>Left Always (LA)</th>
<th>Left Usually (LU)</th>
<th>Not Preference (NP)</th>
<th>Right Usually (RU)</th>
<th>Right Always (RA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondent 1</td>
<td>0-25</td>
<td>25-4</td>
<td>40-55</td>
<td>55-75</td>
<td>75-100</td>
</tr>
<tr>
<td>Respondent 2</td>
<td>0-10</td>
<td>10-30</td>
<td>30-60</td>
<td>60-70</td>
<td>70-100</td>
</tr>
</tbody>
</table>
After achieving participants’ opinions by evaluation linguistic variables scale, we determine triangular fuzzy numbers (TFN) of each linguistic variable. According to the above mentioned, now TFN of each linguistic variable which is obtained as follows:

For example, TFN for Left Always (LA) linguistic variable with membership function is as the following:

Table 2- triangular fuzzy numbers (TFN) of LA linguistic variable using the comments of respondents

<table>
<thead>
<tr>
<th>Respondent</th>
<th>L</th>
<th>M=(L+U)/2</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>12/5</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>7/5</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>194</td>
<td>0</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

TFN (LA) min 7/88 average 25 max

Figure 4-Memberships function of TFN for LA linguistic variable

Therefore, other linguistic variables’ fuzzy numbers are obtained in this way, both handedness and stress. These numbers with their membership function are in the following:

(Right Always) RA = (60; 90/6; 100)
(Right Usually) RU = (40; 70/92; 90)
(Not Preference) NP = (20; 47/77; 70)
(Left Usually) LU = (10; 25/87; 50)
(Left Always) LA = (0; 7/88; 25)

Figure 5-Memberships function of TFN for Handedness linguistic variable
Step 2 – opinion conversion of each participant who answer the questionnaire according to the obtained TFN in previous step:

The following is displayed for hypothetical respondent that answered to first and second stress question from stress questionnaire:

<table>
<thead>
<tr>
<th>DATA COLLECTION BY FUZZY APPROACH</th>
<th>FIRST AND SECOND QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using fuzzy numbers</td>
<td>answer</td>
</tr>
<tr>
<td>(0 · 10/5 · 40)</td>
<td>never</td>
</tr>
<tr>
<td>(30 · 62/14 · 90)</td>
<td>usually</td>
</tr>
</tbody>
</table>

Step 3 – Defuzzification:
Obtained results in the previous steps for 5dimensions of CSQ have been like TFN that for analysis and test of hypothesis and decision making should be changed from triangular number to the crisp number which is called defuzzification.

There are several available methods serve this purpose. Mean-of-Maximum, Center-of-Area, and a-cut Method is the most common approaches. This study utilizes the Center-of-Area method due to its simplicity and does not require analyst’s personal judgment [16].

The defuzzified value of fuzzy number can be obtained from Eq. 6.

\[ A= \left( L_1, M_1, U_1 \right) \]

\[ NFA= \left( \left( U_1-L_1 \right) + \left( M_1-L_1 \right) \right)/3 + L_1 \]

Now in the following part, defuzzification by the way of center of area is for handedness can be calculated as follows:

1-NFA RA = [(100-60) + (90-60)] / 3 + 60 = 83/5
2-NFA RU = [(90-40) + (70-92-40)] / 3 + 40 = 66/97
3-NFA NP = [(70-20) + (47-77 -20)] / 3 +20 = 45/92
4-NFA LU = [(50-10) + (25/87-10)] / 3 + 10 = 28/62
5-NFA LA = [(25-0) + (7/88 -0)] / 3 + 0 = 10/96

Also, defuzzy numbers for stress levels calculated respectively as follows:
1-NFA NE = [(40-0) + (10/5-0)] / 3 + 0 = 16/83
2-NFA OC = [(65-10) + (34/57-10)] / 3 + 10 = 36/52
3-NFA US = [(90-30) + (62/14 -30)] / 3 +30 = 60/71
4-NFA AL = [(100-60) + (88/07-60)] / 3 + 60 =82/69

Step 4- Enter weight of each option:
This section, the significant point is that because the definitions presented by scientists of stress, Stress is the internal sense and for each individual has a known sense, although its amount is not clear and it is different from person to person but handedness is not such. But handedness itself is an external factor that will be determined only after filling out the questionnaire, even before answering the questionnaire, also handedness concept not known for a number of respondents.

Therefore, researcher has used weight stress questionnaire. In this step, defuzzy number of each question will be multiplied by the coefficient of its importance that a sample is shown on the below table:
Table 4-The Sample of weight and non-weight defuzzy numbers

<table>
<thead>
<tr>
<th>FUZZY DATA</th>
<th>ANSWER</th>
<th>QUESTION 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>defuzzy numbers after applying weight</td>
<td>Important degree</td>
<td>Non-weight defuzzy numbers</td>
</tr>
<tr>
<td>16/83×0/7=11/78</td>
<td>0/7</td>
<td>16/83</td>
</tr>
<tr>
<td>never</td>
<td>I'm exhausted from performing daily tasks at work place, school and home</td>
<td></td>
</tr>
</tbody>
</table>

The following table is presented the importance degree from viewpoint of each respondent:

Table 5-importance degree of each question

<table>
<thead>
<tr>
<th>QUESTION NUMBER</th>
<th>AVERAGE OF IMPORTANCE DEGREE (IN PERCENT)</th>
<th>QUESTION NUMBER</th>
<th>AVERAGE OF IMPORTANCE DEGREE (IN PERCENT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>85/96</td>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>75/12</td>
<td>62/5</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>65/29</td>
<td>81/25</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>70/45</td>
<td>65/83</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>90/1</td>
<td>94/73</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>93/7</td>
<td>76/65</td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>95/28</td>
<td>51/23</td>
<td>7</td>
</tr>
<tr>
<td>18</td>
<td>87/18</td>
<td>61/79</td>
<td>8</td>
</tr>
<tr>
<td>19</td>
<td>60/92</td>
<td>55/20</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>50/61</td>
<td>67/31</td>
<td>10</td>
</tr>
</tbody>
</table>

3.5 Statistical methods:
3.5-1-Normality test (Kolmogorov-Smirnov test): it is better before using parametric statistical methods; its presumptions should be tested.
3.5-2- In this study, to measure the correlation between stress levels and handedness has been used Pearson’s coefficient of correlation. Significant level is 5%.

3.5-3-For Comparison between fuzzy and classical approach are used two Measures of Dispersion (skewness coefficient & kurtosis coefficient) [17].

4 Findings:
-Kolmogorov-Smirnov test amount are shown in the table below:

Table 6-Kolmogorov-Smirnov test amount

<table>
<thead>
<tr>
<th>Stress (fuzzy)</th>
<th>Stress (classic)</th>
<th>Handedness (fuzzy)</th>
<th>Handedness (classic)</th>
<th>index</th>
</tr>
</thead>
<tbody>
<tr>
<td>194</td>
<td>194</td>
<td>194</td>
<td>194</td>
<td>Number of respondent</td>
</tr>
<tr>
<td>2.154</td>
<td>41.185</td>
<td>67.785</td>
<td>1.208</td>
<td>average</td>
</tr>
<tr>
<td>0.283</td>
<td>6.298</td>
<td>16.729</td>
<td>0.903</td>
<td>standard deviation</td>
</tr>
<tr>
<td>0.911</td>
<td>0.757</td>
<td>0.931</td>
<td>1.133</td>
<td>Kolmogorov-Smirnov test amount</td>
</tr>
<tr>
<td>0.377</td>
<td>0.616</td>
<td>0.375</td>
<td>0.245</td>
<td>Probability amount</td>
</tr>
</tbody>
</table>

As a result of the Kolmogorov-Smirnov test is clear that all the variables follow the normal distribution.

4.1 Hypothesis test: In this section, hypotheses are tested with fuzzy and classical approach.
a- Main Hypothesis 1:
Significant relationships exist to Between Handedness and Stress level by classical approach.

H₀: A significant relationship doesn’t exist Between Handedness and Stress level by classical approach.

H₁: A Significant relationships exist Between Handedness and Stress level by classical approach.

As the table below shows the correlation coefficient is a very small amount, since the amount and probability obtained (0.251) is greater than 0.05, So we can say that
Significant relationships don’t exist between Handedness and Stress level by classical approach.

### Table 7-Correlation amount between stress and handedness in classical approach

<table>
<thead>
<tr>
<th>number</th>
<th>probability</th>
<th>Coefficient Of Correlation</th>
<th>stress and handedness (classic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>194</td>
<td>0.251</td>
<td>-0.083</td>
<td>Pearson’s coefficient of correlation</td>
</tr>
</tbody>
</table>

In the next section, Scatter plot of two factors is also drawn.

**Figure 7-Scatter plot of stress and handedness (classic)**

As the chart above is clear, distribution between the two factors is not observed special relationship in the classical approach. Regression line is nearly horizontal and the slope is close to zero. Similar process is done with the fuzzy approach.

**b- Main Hypothesis 2:** Significant relationships exist to Between Handedness and Stress level by fuzzy approach.

**H0:** A Significant relationships doesn’t exist Between Handedness and Stress level by fuzzy approach.

**H1:** A Significant relationships exist Between Handedness and Stress level by fuzzy approach.

As the chart above is clear, distribution between the two factors is not observed special relationship in fuzzy approach. Regression line is nearly horizontal and the slope is close to zero.

### Table 8-Correlation amount between stress and handedness in fuzzy approach

<table>
<thead>
<tr>
<th>number</th>
<th>probability</th>
<th>Coefficient Of Correlation</th>
<th>stress and handedness (classic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>194</td>
<td>0.402</td>
<td>-0.061</td>
<td>Pearson’s coefficient of correlation</td>
</tr>
</tbody>
</table>

In the next section, Scatter plot of two factors is also drawn.

**Figure 8-Scatter plot of stress and handedness (classic)**

As the chart above is clear, distribution between the two factors is not observed special relationship in fuzzy approach. Regression line is nearly horizontal and the slope is close to zero.

4.2 Comparison between two fuzzy and classic numbers:

This comparative study carried out to determine which approach is more appropriate in assessment of relationship between handedness and stress levels.
Therefore, two criteria for this comparison is considered (skewness coefficient and kurtosis coefficient), which is shown in the table below.

<table>
<thead>
<tr>
<th>Coefficient factors</th>
<th>skewness coefficient</th>
<th>kurtosis coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuzzy</td>
<td>Classic</td>
</tr>
<tr>
<td></td>
<td>0/24</td>
<td>0/47</td>
</tr>
<tr>
<td>handedness</td>
<td>0/61</td>
<td>0/84</td>
</tr>
<tr>
<td>stress levels</td>
<td>0/35</td>
<td>0/53</td>
</tr>
</tbody>
</table>

Skewness Coefficient is first criterion for comparison that it shows asymmetrical curve. Considering the above, can be expressed that Skewness coefficient of fuzzy data was less than the classical data. Therefore, can be state that using the fuzzy data is appropriate from classical data in assessment of relationship between handedness and stress levels.

Kurtosis coefficient is second criterion for comparison that it measures degree of loudness or short in compared to the normal curve. Based on the results, Kurtosis coefficient of fuzzy data was less than the classical data. Thus, using the fuzzy data is appropriate from classical data in assessment of relationship between handedness and stress levels.

So, in total and by using two criteria above can be concluded that using fuzzy data is better than the classical data and the results are more accurate result.

5 Conclusions and recommendations:

The results show that is no significant relationship between the handedness and stress levels in both fuzzy and classical approach.

Mc Manus [20] points out there is very little relationship between birth stress and writing handedness. In this research too, there is little Relationship, or no relationship Between the written handedness (as part of the advantage) and level stress.

But Gutteling Barbara M., Weerth Carolina De, and Buitelaar Jan K [21] express that prenatal stress and daily disputes increases chance to the Mixed – Handedness and points out there is significant relationship between prenatal stress and Mixed – Handedness But they does not speak about the stress associated with handedness in the years after birth. As a result of this study was the lack of relationship between stress and handedness.

Carolyn J. Choudhary and Ronan E. O’Carroll [9] were identified that Posttraumatic Stress Disorder (PTSD) was significantly associated with the left handedness, and left handedness has Posttraumatic Stress Disorder symptoms more than right handedness and Mixed – Handedness and concluded that Left handedness associated with the prevalence of PTSD symptoms.

Also, Kevin observed significant relationship between the handedness and depression and he expressed that left handedness have a symptoms of depression fully significant much more than the right handedness.

But in this study, the correlation coefficient between two variables (stress level and handedness) and their Scatter plot in both fuzzy and classical approach indicates that does not exist the relationship between these two variables. And the different groups of handedness can be have different stress levels, regardless of the Considering to handedness.

Abdolvand M, A., Toloie A and Taghipouryan M.J [22]used skewness coefficient and kurtosis coefficient for comparison of classical and fuzzy data and concluded that, the use of fuzzy data is more appropriate than classical data for the evaluation quality of customs services. In this paper, too, based on data obtained from skewness coefficient and kurtosis coefficient, generally can be expressed that the use of fuzzy data is more appropriate than classical data for the evaluation of the relationship between handedness and stress level.

So, considering the above mentioned the following suggestions can be offered:

1- As, fuzzy data is more appropriate than classical data, and many of the linguistic variables are non-precise and non explicit in Physical Education Field, especially Motor Behavior Course, It is recommended that in research with these variables, it performed with the fuzzy approach.

2- Right handedness recommended in some cultures, thus, it is suggested that research to be done about the relationship between the handedness and stress levels in different countries and cultures.

3- Since, this research is limited to physical education students, and cannot be generalized to other groups, it is better that research to be done about the handedness and stress levels in different groups (different students, staff, and ...).
References:


