The Relationship between Physical Fitness and Mental Health of the Employees of A Medical Sciences University

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Abstract

Aims: Sport and physical activity are an important element in the general health and well-being of people. Sustained sporting results in a relative bodily fitness which allows people to fulfill their physical duties efficiently and without feeling unreasonably tired and to retain some energy for their leisure time. Therefore, the present study aims at examining the relationship between physical fitness and mental health of the employees of Baqiyatallah University of Medical Sciences, Tehran, Iran.

Methods: This research was a correlational study with 326 subjects (213 male and 113 female) selected randomly from Baqiyatallah University’s staff who individually took physical fitness tests and completed SCL 90-R questionnaires.

Results: Data analysis indicated that physical fitness and mental health levels were higher in men than in women. There was a significant relationship between physical fitness and mental health. The flexibility test results explained a great part of mental health variance (especially in terms of somatization, obsessive-compulsiveness, depression, anxiety and hostility). There was also a significant positive correlation between the Body Mass Index (BMI) and somatization, that is, higher levels of somatization symptoms were reported in more obese people.

Conclusion: The results of this research confirmed the positive role of physical fitness and sport in mental health and also revealed that some physical fitness components (such as flexibility) have a greater influence on mental health than other components. Thus it seems to be necessary to pay more attention to sports activities and physical fitness of employees because this will help improve their mental health.

Keywords: Physical Fitness, Mental Health, Sport, Physical Activity

Introduction

Psychology and psychotherapy issues have recently caught more attention than before. Researches show that the number of psychological disorders is increasing and, therefore, it is important to identify the factors affecting mental health in terms of both prevention and treatment. Sports and physical activities and the resulted fitness have recently been emphasized as effective, inexpensive and accessible tools used in preventing and curing psychological disorders and enhancing mental and physical health.

Today’s sedentary lifestyle has a role in bringing about disorders such as cardiovascular diseases, poor ability to tackle tension, higher risk of depression, low efficiency in work and more absence from work. On the other hand, many studies have shown that moderate regular and sustained sports activity has a significant effect upon keeping healthy. People who are engaged in sports activities have a better feeling about their body image and physical health [1].

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Sport has been proven to have a positive role in feeling good about oneself and in improving self-esteem, mood [2-6], self-efficacy, self-confidence [7], high social adjustment and better cognitive performance [3-6]. Physical fitness exercises help cure panic, reduce depression symptoms, increase emotional responses in depressed people [8-15], decrease anxiety [16,17], cure psychosomatic disorders, obsession and psychosis [18-20], increase life expectancy [13] and improve the quality of life [21].

In spite of so many previous studies about the usefulness of sports activities for mental health, the exact mechanism of relation between these two phenomena is still being studied. Butchard and Shepherd (1993) have introduced a model in which physical fitness is considered to be a mediating variable between sport and health [22]. These researches state that people who take part in sports activities believe that they have improved their physical fitness and think themselves fitter than those who do not participate in such activities. Pastor et al.’s study results[22] support this hypothesis, showing that participation in sports activities helps reduce smoking, alcohol consumption, depression and other psycho-physical symptoms in teenagers and enhances their physical fitness and thus these researchers argue that participating in sports activities improves the (morphological, muscular-kinetic, cardiovascular and metabolic) factors involved in health. Physical fitness, as an indicator of sports activities, is a relative bodily preparation which allows people to adjust themselves to their physical duties, so that they may accomplish those duties efficiently and without feeling unreasonably tired and moreover to retain a surplus of energy for their leisure time [23]. After a few weeks of regular sporting activity, the muscles will be strengthened, flexibility and endurance will increase, and their bodily balance and reaction time will be improved [13]. Creating and maintaining good levels of physical fitness subscales such as cardiovascular and muscular endurance, good physical form and flexibility help human health by reducing the risks of cardiac diseases, obesity, psychological problems especially depression [24] and anxiety [25] and by improving life quality, even in the elderly [26]. Physical fitness is influenced not only by sport but also by other bodily activities. There may be people who do not regularly engage in sport but are physically fit because of their other physical activities. Although many have studied the role of sport and physical fitness in patients, it is still not clear whether physical fitness is reduced as a result of diseases or acts as a preceding factor causing mental disorders. Therefore, the aim of this research is to study the effect of physical fitness as a factor influenced by sport and other bodily activities on the mental health of non-patients. The study was carried out on the employees of a University of Medical Sciences, which is a military-owned university and where employees are expected to have a minimum of physical fitness. Knowing that the employees of this university are strongly encouraged to keep fit and strong and even their job promotion is partly based on their fitness, we wanted to know how fit these employees were and whether their fitness is connected to their mental health.

**Methods**

This research was a correlational study with a population consisting of all the permanent (civilian, military, managerial and clinical) employees of Baqiyatallah University. In view of the population size, and using the Krejcie and Morgan table [27], the sample was made up of 326 people, including 113 women and 212 men of whom 66.86% were married and 34.15% single. Krejcie and Morgan have presented a model for calculating sample sizes for various
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populations: \( S = \frac{x^2 np(1-p)}{d^2(n-1)+x^2 p(1-p)} \), where \( S \) represents the sample size, \( N \) is the population size, \( d \) the degree of accuracy expressed as a proportion (0.05), and \( X^2 \) is the table value of chi-square for 1 degree of freedom at the desired confidence level (0.95). The population size was 2080, thus making for the sample size of 326 people. The SCL-90-R questionnaire was utilized to collect data regarding the mental health of the subjects. This questionnaire consists of 90 items for assessing the mental features which are reported by the respondent. The 90 items cover 9 symptom scales: somatization (12 items), obsessive-compulsive behavior (10 items), interpersonal sensitivity (9 items), depression (13 items), anxiety (9 items), hostility (6 items), phobic anxiety as (8 items), paranoid ideation (6 items) and psychoticism (10 items), & items are not classified in any of these scales but are clinically important and help clarify the general factors in the test. Each question is evaluated by responses ranging from 0 to 4, representing “not at all” to “extremely.” The scored collected for each scale were added up and then divided by the number of items in that scale to determine the mean score for the scale. The general clinical symptomatic score was calculated by dividing the aggregate total of all scales scores by 90. A score equal to or above 1 would mean a symptomatic condition and showing bigger issues and a score less than 1 would mean good mental health or very small problems. Dergatis et al. (1976) tested the validity of this questionnaire using the Cronbach’s alpha and reported it to be acceptable. Esmaieli (1998) reported the validity of the SCL-90-R questionnaire as follows: somatization 0.85, obsessive-compulsive symptom 0.78, interpersonal sensitivity 0.79, depression 0.86, hostility 0.77, anxiety 0.78, phobic anxiety 0.70, paranoid ideations 0.77 and psychoticism 0.75 [28].

In order to assess the subjects’ level of physical fitness, the following valid tests were used:

1. A 3200-meter run for men and a 1600-meter run for women, in order to determine their cardiorespiratory endurance (aerobic system)
2. Doing push-ups for one minute to assess the endurance of upper body muscles
3. Doing curl-ups for one minute to assess the endurance of the abdominal muscles
4. Vertical jumping to determine the power of the lower body muscles
5. A Finnish agility test and a 4x9 meter run to assess the women’s and men’s agility, respectively.

In addition to the carrying out physical fitness tests, the body mass indexes (BMI) of the subjects were measured based on their weight to height ratio. The BMI was taken as the basis to measure if they are overweight. The test items were chosen according to the guidelines provided by the Islamic Republic of Iran’s Islamic Revolution Guards Corps. The collected records of each subject were evaluated based on the existing norms and each subject was given a score. After measuring each index score, the physical fitness average was also calculated based on the norm.

After determining the numbers of male and female subjects, all University employees were called to be tested in terms of physical fitness for job promotion purposes, and thus all of them were considered as subjects. All subjects were thus individually tested in terms of their physical fitness. After a short rest and refreshments, the subjects filled out the SCL-90-R questionnaire. In order to respect information privacy, no personal detail was recorded. Each person was given a code number or assigned himself or herself a nickname when taking test or filling out the questionnaire so that their two variables’ values could be separately retrieved. Because both sets of tests were given individually,
there was no need to take the subjects’ names and addresses, and information was kept private.

After assigning scores to the questionnaires and determining the subjects’ level of physical fitness, the collected data were analyzed using SPSS1, descriptive statistics methods, Pearson correlation coefficient and stepwise multiple regression analysis.

**Results**

The findings of this research are given in tables below. Table 1 depicts the subjects’ descriptive indexes in the physical fitness and mental health tests.

According to results given in Table 1, as far as mean physical fitness score is concerned, men are in a better position (72.01) than women (61.64), and the women’s general symptomatic conditions’ mean (0.453) was higher than that of men (0.384). These findings show that the men were physically fitter and mentally healthier than women.

In order to show the situation of the subjects in terms of the studied variables in a better way, they were divided into two groups of healthy and unhealthy based on the mental health questionnaire cross-sectional score. The details of this classification are given in Table 2.

Table 2 reveals that 7.1% of the subjects showed symptoms of mental disorders. For women this figure was 11.5% and for men 4.7%. The table also shows that the subjects fared worst in the scales of obsessive-compulsive behavior, paranoid ideation and interpersonal sensitivity and fared best in phobic anxiety.

Table 3 illustrates the relationship between physical fitness and mental health, physical fitness correlation matrix, and the 9 scales of mental health.

In the physical fitness correlation matrix, the average physical fitness value is the mean score of all subjects’ 6 physical fitness tests (namely agility, flexibility, vertical jumping, push-ups, curl-ups and endurance run), used for assessing the correlation between physical fitness and mental health. The correlation of each test to the above variables was also determined. The body mass indexes (weight to height ratio) of all subjects are also given in Table 3. When this ratio is high, the person is considered obese. The general symptomatic index score is the person’s general score in the SCL-90-R questionnaire and the indicator of the person’s mental health. The higher this index value, the less healthy the person and the lower this figure the healthier the person. In addition to the general symptomatic index, the subjects’ scores in the 9 subscales are also measured where a higher score represents a more severe symptom of the relevant disorder. As far as mental health was concerned, the goal was to measure the correlation between the general symptomatic index and physical fitness. Also, the relationship between each of the 9 mental health scales and physical fitness was studied using the Pearson correlation coefficient. According to Table 3, there is a significant (p<0.05) inverse correlation (r=−131) between the general symptomatic index and physical fitness. In view of the above explanations regarding the mental health score, it is revealed that higher physical fitness leads to better mental health (i.e., their general symptomatic index (GSI) is lower). There are significant negative correlations between physical fitness and the scales of somatization, obsessive-compulsive behavior, depression, anxiety, and the GSI (p<0.05). Also, a look at the relationship between each of the physical fitness tests scores and those of the 9 scales reveals that there are significant inverse correlations between agility and somatization, agility and depression, agility and anxiety, flexibility and somatization, flexibility and obsessive-compulsive behavior, flexibility and depression, flexibility and anxiety, flexibility and hostility, push-ups and somatization,
curl-ups and somatization, curl-ups and anxiety, the running test and somatization (p<0.05). The higher the scores in these tests, the lower the levels of the relevant problems. The only physical fitness test that showed no significant correlation with and mental health scale was vertical jumping. Also, interpersonal sensitivity, paranoid ideation, phobic anxiety and psychoticism had no significant correlation with any of the physical fitness tests.

As for the BMI, it had a positive significant correlation with somatization only (p<0.01, r=0.166). This meant that the higher the BMI value (that is, the more obese the person), the more inclined he or she would be to somatize the mental problems.

Because of the significant correlation between physical fitness and mental health, a stepwise multiple regression analysis was carried out to further the predicting power of the average physical fitness score and each of its various tests (agility, flexibility, push-ups, curl-ups and running) for mental health, as presented in Table 4. As shown in Table 4 and according to the regression analysis, the flexibility test alone could explain a considerable share of the significance of the mental health variance and 5 scales of that factor. The percentages of the GSI, somatization, obsessive-compulsiveness, depression, anxiety and hostility were 3.4%, 10.5%, 2.2%, 1.8%, 5.3% and 3.1%, respectively. In addition to flexibility, the curl-up test also presented a significant explanation of this variance (18.3%). In spite of a positive correlation with mental health, other physical fitness tests (agility, push-ups, curl-ups and running) could not on themselves explain a significant share of the variance of these scales.

Discussion
The role of sport and physical fitness has long been considered as an effective factor in mental health. Because of the sedentary jobs and occupational stress, the mental health of the University employees is particularly exposed to threats. Therefore, the aim of the present study was to consider the relationship between physical fitness and mental health in the employees of Baqiyatallah University of Medical Sciences. Our study showed that there is a significant correlation between physical fitness and mental health and that physical fitness explains a considerable part of the variance of somatization, obsessive-compulsiveness, depression, anxiety and hostility. These findings are in agreement with those of Hands and Larkin [29], Schott et al. [30], Straub [1], Carless and Sparks [31], Ramirez-Marrero et al. [32], Schmitz et al. [33], Thøgersen-Ntoumani et al. [34], Spano [35], Biddle and Mutrie [36], Lander and Arent [10], Arent et al. [11], Aslankhani [37], Esfahani [6], Fathi Ashtiani and Asgari [38], Asadi and Ahmadi [5] and others.

Sports activities help the blood reach the brain, provokes the automatic nervous system, and facilitates the release of certain hormones. For these reasons, sport may activate a level of neurophysiological factors which help reduce depression in some and anxiety in some others. The least effect of sport on health is increasing well-being in most people [1]. Although the exact mechanism of the effect of sport on mental health is not still clear, it is presumed that a few physiological and psychological mechanisms, such as an increasing sense of self-efficacy, self-control, lessened emotional stress and physiological responses to tension and better functioning of neurotransmitters are influenced by sport and physical activities. Some others argue that sport and physical activities help keep negative thoughts away. It may also help social interaction [33], and it makes people feel better about their appearance [1]. Thus, sport can be a great complement to psychotherapy, improving self-esteem and reducing anxiety and depression. Salehi
Tooka [39] believes that after a few weeks of regular sporting, muscles will be strengthened, flexibility and endurance will be enhanced and reaction time and body balance will be improved. These, in turn, lead to higher perceived self-efficacy and perceived strength, which bring about better physical and mental health. Creating and keeping a level of physical fitness in terms of cardiovascular endurance, muscular strength, body anabolism and flexibility helps reduce cardiovascular diseases, obesity and mental problems such as depression, anxiety and mental atrophy [24]. In general, sport may have biological, psychological and social benefits [1]. The important point in the findings of this study is that physical fitness, particularly flexibility, has the greatest role in explaining the variance of somatization. It could be argued that people who are not able to react reasonably to their mental problems and cannot externalize their negative emotions tend to express themselves verbally, which make for more somatization in such people. Sitting too long at desks, insufficient activity, and enclosed work offices (keeping alone for a few hours in an office) are probably factors worsening somatization. People who take part in sports activities or are physically active enough externalize their mental problems through such activities. Such activities also gives a chance to people to be with others, talk about their problems and seek help for solving them, thus preventing the deterioration of mental problems or somatization. On the other hand, sporting and other physical activities increase the body’s flexibility and strengthen its immunity system against harmful agents. There was also a significant positive correlation between body mass and somatization, meaning that the more obese the people, the higher possibility of mental problems for them. Therefore, it is possible to prevent mental disorders in the employees by making them physically more active and encouraging sports activities. In this way, the employees’ morale and work quality can be improved, labor waste will be eliminated, and the high expenses of diseases and mental problems may be removed.

Conclusion
Based on the findings of this research, it could be argued that a higher level of physical fitness helps enhance mental health, prevent mental disorders and create higher life quality. Physical fitness can be enhanced by regular sporting and other physical moderate activities. Once physical fitness, as a factor influenced by sport, is improved, society’s mental health can be expected to be attained. Since sport, as a tool in managing tension, can reduce the effects of tenseness, increase positive emotions and since it can enhance people’s physical and mental health and, as a result, their happiness in life, more sporting events and activities in office environments and an emphasis on increasing physical fitness are recommended.

This study was concerned with the employees of an administrational-educational establishment and so the results could not be applicable to employees who are physically more active in their jobs. It is recommended that future studies will be done on employees that are engaged in more physical activities in other kinds of offices and agencies. As this research used an ex-post-facto design to study the relationship between physical fitness and mental health and it was not possible for the researchers to provide physical education for the subjects and consider the effect of improved physical fitness on their mental health, it is suggested that a similar research project with an experimental design will be carried out to study this effect.
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Table 1) Indexes of the Sample Subjects’ Scores for Physical Fitness and Mental Health

<table>
<thead>
<tr>
<th>GENDER</th>
<th>VARIABLE</th>
<th>NUMBER</th>
<th>MINIMUM SCORE</th>
<th>MAXIMUM SCORE</th>
<th>MEAN</th>
<th>STANDARD DEVIATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMEN</td>
<td>General physical fitness average</td>
<td>113</td>
<td>5</td>
<td>100</td>
<td>61.64</td>
<td>11.09</td>
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<tr>
<td></td>
<td>General symptomatic index</td>
<td>113</td>
<td>0.03</td>
<td>1.80</td>
<td>0.453</td>
<td>0.329</td>
</tr>
<tr>
<td></td>
<td>General physical fitness average</td>
<td>213</td>
<td>3.30</td>
<td>100</td>
<td>72.01</td>
<td>17.49</td>
</tr>
<tr>
<td></td>
<td>General symptomatic index</td>
<td>213</td>
<td>0.02</td>
<td>2.23</td>
<td>0.384</td>
<td>0.324</td>
</tr>
<tr>
<td>MEN</td>
<td>General physical fitness average</td>
<td>213</td>
<td>3.30</td>
<td>100</td>
<td>68.41</td>
<td>16.32</td>
</tr>
<tr>
<td></td>
<td>General symptomatic index</td>
<td>213</td>
<td>0.02</td>
<td>2.23</td>
<td>0.408</td>
<td>0.327</td>
</tr>
<tr>
<td>ALL</td>
<td>General physical fitness average</td>
<td>326</td>
<td>3.30</td>
<td>100</td>
<td>68.41</td>
<td>16.32</td>
</tr>
<tr>
<td></td>
<td>General symptomatic index</td>
<td>326</td>
<td>0.02</td>
<td>2.23</td>
<td>0.408</td>
<td>0.327</td>
</tr>
</tbody>
</table>

Table 2) Subjects’ Healthy and Symptomatic Statistics

<table>
<thead>
<tr>
<th></th>
<th>Men Healthy</th>
<th>Men Symptomatic</th>
<th>Women Healthy</th>
<th>Women Symptomatic</th>
<th>All Healthy</th>
<th>All Symptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatization</td>
<td>203</td>
<td>95.3</td>
<td>10</td>
<td>4.7</td>
<td>100</td>
<td>88.5</td>
</tr>
<tr>
<td>Obsessive-compulsiveness</td>
<td>196</td>
<td>92</td>
<td>17</td>
<td>8</td>
<td>95</td>
<td>84.1</td>
</tr>
<tr>
<td>Depression</td>
<td>202</td>
<td>94.8</td>
<td>11</td>
<td>5.2</td>
<td>97</td>
<td>85.8</td>
</tr>
<tr>
<td>Anxiety</td>
<td>204</td>
<td>95.8</td>
<td>9</td>
<td>4.2</td>
<td>106</td>
<td>93.8</td>
</tr>
<tr>
<td>Hostility</td>
<td>201</td>
<td>94.4</td>
<td>12</td>
<td>5.6</td>
<td>103</td>
<td>91.2</td>
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<tr>
<td>Interpersonal sensitivity</td>
<td>174</td>
<td>81.7</td>
<td>39</td>
<td>18.3</td>
<td>93</td>
<td>82.3</td>
</tr>
<tr>
<td>Phobic anxiety</td>
<td>206</td>
<td>96.7</td>
<td>7</td>
<td>3.3</td>
<td>112</td>
<td>99.1</td>
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<tr>
<td>Paranoid ideation</td>
<td>170</td>
<td>89.8</td>
<td>43</td>
<td>20.2</td>
<td>88</td>
<td>77.9</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>202</td>
<td>94.8</td>
<td>11</td>
<td>5.2</td>
<td>110</td>
<td>97.3</td>
</tr>
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</table>

Table 3) The Matrix for the Correlation of the Sample Mental Health and Physical Fitness

<table>
<thead>
<tr>
<th></th>
<th>GSI</th>
<th>Somatization</th>
<th>Obsession</th>
<th>Interpersonal sensitivity</th>
<th>Depression</th>
<th>Anxiety</th>
<th>Hostility</th>
<th>Phobic anxiety</th>
<th>Paranoid ideation</th>
<th>Psychoticism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical fitness average</td>
<td>-0.133*</td>
<td>-0.343*</td>
<td>-0.116*</td>
<td>0.010</td>
<td>0.069</td>
<td>-0.168*</td>
<td>0.052</td>
<td>0.00</td>
<td>-0.006</td>
<td>0.017</td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.044</td>
<td>-0.166**</td>
<td>0.018</td>
<td>-0.030</td>
<td>0.019</td>
<td>0.050</td>
<td>-0.013</td>
<td>-0.041</td>
<td>-0.024</td>
<td>-0.011</td>
</tr>
<tr>
<td>Agility</td>
<td>-0.120*</td>
<td>-0.304*</td>
<td>-0.091</td>
<td>0.034</td>
<td>-0.119*</td>
<td>-0.135*</td>
<td>-0.075</td>
<td>-0.012</td>
<td>-0.021</td>
<td>-0.028</td>
</tr>
<tr>
<td>Flexibility</td>
<td>-0.162*</td>
<td>-0.338*</td>
<td>-0.123*</td>
<td>0</td>
<td>-0.168*</td>
<td>-0.210*</td>
<td>-0.109*</td>
<td>0.022</td>
<td>-0.061</td>
<td>-0.033</td>
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</table>

Table 4) Results for the Stepwise Regression Analysis of Mental Health Scales in Terms of Physical Fitness Variables

<table>
<thead>
<tr>
<th>Criterion variable</th>
<th>Step</th>
<th>Predicting variable</th>
<th>Coefficient $\beta$</th>
<th>Determination coefficient</th>
<th>$F$</th>
<th>$F$ significance level</th>
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<tbody>
<tr>
<td>GSI</td>
<td>1</td>
<td>Flexibility</td>
<td>-0.18</td>
<td>0.034</td>
<td>8.12</td>
<td>0.005</td>
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<td>Obsession</td>
<td>1</td>
<td>Flexibility</td>
<td>-0.149</td>
<td>0.022</td>
<td>5.254</td>
<td>0.023</td>
</tr>
<tr>
<td>Depression</td>
<td>1</td>
<td>Flexibility</td>
<td>-0.135</td>
<td>0.018</td>
<td>4.332</td>
<td>0.039</td>
</tr>
<tr>
<td>Anxiety</td>
<td>1</td>
<td>Flexibility</td>
<td>-0.230</td>
<td>0.053</td>
<td>12.974</td>
<td>0.001</td>
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<tr>
<td>Hostility</td>
<td>1</td>
<td>Flexibility</td>
<td>-0.177</td>
<td>0.031</td>
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<td>Flexibility</td>
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<td>27.29</td>
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<td>2</td>
<td>Flexibility</td>
<td>-0.270</td>
<td>0.133</td>
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<td></td>
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<td>Curl-ups</td>
<td>-0.175</td>
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References

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