Relationship between active lifestyle and mental health in Isfahan Citizenship

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Abstract

**Background:** There is widespread recognition of the effect of Active lifestyle on mental health. The authors examined the relationships between physical activity and mental health.

**Materials and methods:** Participating in the study were 677 voluntary subjects (49% men, 51% women) with a mean age of 39 years. The short form of the International Physical Activity Questionnaire was used to estimate the level of physical activity. Mental health was assessed using the Composite International Diagnostic Interview, the Epidemiological Studies Depression Scale (CES-D), and the General Health Questionnaire (GHQ). Logistic regression analysis was used to compare the prevalence of CES-D and GHQ cases and psychiatric disorders among the following physical activity categories: inactive, minimally active, and health-enhancing physical activity (HEPA) active.

**Result and discussion:** Association was observed between physical activity and general mental health. The optimal threshold volume for mental health benefits was of 2.5 to 7.5 h of weekly physical activity. The associations varied by gender, age, and physical health status. Individuals who engaged in the optimal amount of physical activity were more likely to have reported better mental health. Light to moderate physical activity that is performed regularly seems to be associated with more favorable mental health pattern compared with physical inactivity. No support was found for the mediating effect of AF of the physical activity mental health relationship.

**Conclusion:** The results indicate a negative association between physical activity and depressive and anxiety disorders.

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Introduction

Previous studies have mostly found that active lifestyle is associated with improved psychological well-being, life satisfaction, cognitive functioning, and decreased psychiatric symptoms, especially depression and anxiety, in various populations (Andrews and Slade, 2001). The effects of physical activity on mental health have also been investigated in national surveys (Rizzo et al., 2008). The evidence linking regular active lifestyle to mortality, morbidity, and health is today well documented (Blair, Cheng, & Holder, 2001). Mental health problems can impair physical health and social and occupational functioning (Bhui and Fletcher, 2000; Korniloff et al., 2012; Murray and Lopez, 1997; Wells et al., 1989). Thus, the development of preventive strategies has been advocated (McLaughlin, 2011).

The beneficial effect of physical activity for different dimensions of mental health (MH) has also become increasingly evident and the inverse association between physical activity (PA) and symptoms of depression is well known (Teychenne, Ball, & Salmon, 2008). The literature also supports a negative relationship between PA and level of anxiety symptoms, although less studied than depression (Strohle, 2009). We also showed that self-rated participation in PA lowered the risk of developing mental health problems, including burnout in a two year follow-up (Jonsdottir, Rodjer, Hadzibajramovic, Borjesson, & Ahlborg, 2010). For example, active lifestyle can reduce depressive symptoms in individuals diagnosed with major depression, in healthy adults, and in medical patients with diabetes and cancer survivors (U.S. Department of Health and Human Services, 2008b). Regular physical activity appears to be protective against anxiety disorders (Carek et al., 2011; Strohle, 2009; U.S. Department of Health and Human Services, 2008b). The optimal dose of physical activity needed to improve or sustain mental health is unknown (Carek et al., 2011; U.S. Department of Health and Human Services, 2008b).

The effects of active lifestyle on mental health have also been investigated in national surveys. Abu-Omar and colleagues (Abu-Omar et al., 2004; Dinas et al., 2011; Dunn et al., 2001, 2005), working with a large European Union sample found that those who were more physically active enjoyed generally better mental health. Hassmen and colleagues, (Blair et al., 2001; Myers et al., 2004; Williams, 2001) studying a large Finland sample also found an association between increased psychological well-being and regular physical exercise.

Here, we determined (Brosse, Sheets, Lett, & Blumenthal, 2002; Morgan, 1997) the relationship between levels of physical activity and psychiatric symptoms such as anxiety and depression, and (Astrand & Rodahl, 2003) the relationship between levels of physical activity and the 1-year prevalence of psychiatric disorders in a citizen representative sample of citizen of Isfahan adults, using a validated instrument to measure levels of physical activity.

Materials and methods

The study population of the longitudinal cohort study comprises a random sample of 677, and the participants in the present study fulfilled the following primary inclusion criteria: in general good health, not taking any medication, aged 25e50, and having a body mass index between 18.5 and 30 kg/m².

Self-reported physical activity (SRPA) the participants rated their physical activity level according to an adapted version of the widely used four-level scale originally developed by Saltin and Grimby (Saltin & Grimby, 1968). This simple instrument has been shown to discriminate between sedentary and active counterparts regarding maximal oxygen uptake (Saltin, 1977) and has been validated against biological measures (Aires, Selmer, & Thelle, 2003). The participants reported the level that best corresponded to their SRPA during the last three months: (a) mostly sedentary (group 1); (b) light physical activity (such as gardening or walking or bicycling to work) at least 2 h a week (group 2); (c) moderate physical activity (such as doing aerobics, dancing, swimming, playing football, or heavy gardening) at least 2 h a week (group 3); or (d) vigorous physical activity several times a week, at least 5 h with high intensity (group 4). Due to few responses in the fourth category, we reduced the four categories to three distinctive groups of sedentary, light physical activity (LPA), and moderate to vigorous physical activity (MVPA), which includes both groups 3 and 4. This item has a clear dimension of intensity and in the statistical analysis is referred to as physical activity intensity level.

The IPAQ short form16 asks respondents to rate frequency and duration of walking, and moderate-intensity and vigorous-intensity activities performed for at least 10 minutes per session. Weekly minutes of walking, and moderate-intensity and vigorous intensity activities, were calculated separately by multiplying the number of days per week in which the activity took place by the duration of the activity in
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an average day. In each category, minutes of exercise per week were weighted by a metabolic equivalent (i.e., MET; multiples of resting energy expenditure) (Scully, Kremer, Meade, Graham, & Dudgeon, 1998; Teychenne et al., 2008). Studies Depression Scale (CES-D) was used to assess depressive symptoms. The CES-D is a self-reported depression scale with 20 items used for research in the general population. Scoring ranges from 0 to 60, with a higher score indicating a greater degree of depression. We considered scores of 21 and above to indicate “caseness (depressed state)”, based on a previous validation study in a general population of citizen of Isfahan.

**Result and discussion**

The mean unstandardized mental health score was 4.233 (95% confidence interval), and ~30% had poorer mental health. Table 1 shows the percentage of respondents by categories of mental health and physical activity per week. The weighted proportion of adults with poorer mental health was significantly different than those with better mental health by physical activity categories. Participants with better mental health more commonly engaged in more physical activity, with an apparent threshold for effect. The largest mental health differences occurred with 2–4 h of physical activity per week. Less than 10% of those with poorer mental health exercised 2–4 h per week, compared to 17% of adults with better mental health. Beyond 4 h of physical activity per week, the trend reversed: ~65% of adults with poorer mental health exercised >4 h, compared to 55% of adults in better mental health. Irrespective of gender, age or physical health status, similar trends were observed (data not shown).

Also the number of physical activity hours per week versus mental health in the unweighted sample; this relationship was curvilinear, with individuals at very low (≤2 h per week) and high levels (≥7 h per week) of physical activity having poorer mental health. Better mental health occurred among those who exercised 2–7 h per week, but the relationship was convex, with individuals who engaged in 5–7 h of physical activity per week showing the best mental health (~5 h per week). Polynomial functional relationships between physical activity and mental health were comparable when examined by gender, age, and physical health. Univariate comparisons in Table 2, show that the association between general mental health scores, demographic variables, factors relating to cancer, levels of physical activity and general mental health, verifies that adults b50 years had poorer mental health status than older people. Similarly, men, employed, married, and college educated respondents had better mental health. There were differences in mental health among racial and ethnic groups and according to household income. Among variables relating to physical health and activity, respondents engaging in 2.5–7.5 h of physical activity had Adults with good physical health also had better mental health; current smokers and overweight/obese persons had poorer mental health.

Table 1. Hours of weekly moderate to vigorous leisure and non-leisure physical activities by categories of general mental health

<table>
<thead>
<tr>
<th>Physical activity (Hours per week)</th>
<th>Poorer</th>
<th>Better</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to ≤2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted count</td>
<td>16,299,358</td>
<td>41,143,596</td>
<td>57,442,954</td>
</tr>
<tr>
<td>Unweighted</td>
<td>(511)</td>
<td>(1594)</td>
<td>(2105)</td>
</tr>
<tr>
<td>Column %</td>
<td>25.3</td>
<td>27.6</td>
<td>26.9</td>
</tr>
<tr>
<td>2 to ≤4</td>
<td>6,344,573</td>
<td>26,296,868</td>
<td>32,641,441</td>
</tr>
<tr>
<td>Unweighted</td>
<td>(206)</td>
<td>(1018)</td>
<td>(1224)</td>
</tr>
<tr>
<td>Column %</td>
<td>9.9</td>
<td>17.6</td>
<td>15.3</td>
</tr>
<tr>
<td>&gt;4</td>
<td>41,869,911</td>
<td>81,667,689</td>
<td>123,537,600</td>
</tr>
<tr>
<td>Unweighted</td>
<td>(1115)</td>
<td>(2844)</td>
<td>(3959)</td>
</tr>
<tr>
<td>Column %</td>
<td>64.9</td>
<td>54.8</td>
<td>57.8</td>
</tr>
<tr>
<td>Total</td>
<td>64,513,842</td>
<td>149,108,153</td>
<td>213,621,995</td>
</tr>
<tr>
<td>Unweighted</td>
<td>(1832)</td>
<td>(5456)</td>
<td>(7288)</td>
</tr>
<tr>
<td>Column %</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 2. Socio-demographics, health-related characteristics, and volume of physical activity associated with better mental health

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Better mental health</th>
<th>Better mental health</th>
<th>Total</th>
<th>Total</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–34</td>
<td>67.6</td>
<td>65.1</td>
<td>14.7</td>
<td>30.6</td>
<td>0.001</td>
</tr>
<tr>
<td>35–49</td>
<td>73.4</td>
<td>68.6</td>
<td>24.1</td>
<td>29.2</td>
<td></td>
</tr>
<tr>
<td>50–64</td>
<td>74.8</td>
<td>72.7</td>
<td>32.3</td>
<td>23.4</td>
<td></td>
</tr>
<tr>
<td>65–74</td>
<td>83.0</td>
<td>82.4</td>
<td>15.7</td>
<td>8.3</td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td>76.8</td>
<td>71.7</td>
<td>13.3</td>
<td>7.9</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>78.0</td>
<td>72.9</td>
<td>38.7</td>
<td>48.4</td>
<td>0.002</td>
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</table>

<table>
<thead>
<tr>
<th>Employment</th>
<th>Unemployed</th>
<th>Employed</th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>72.1</td>
<td>65.0</td>
<td>47.7</td>
<td>40.6</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Single</th>
<th>Married</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>69.2</td>
<td>79.3</td>
<td>43.4</td>
<td>46.2</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>No college</th>
<th>College</th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>68.0</td>
<td>79.5</td>
<td>39.5</td>
<td>60.5</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Conclusion

This study demonstrates a curvilinear association between optimal levels of physical activity and mental health, while previous studies have shown linear trends (Abu-Omar et al., 2004; Bhui and Fletcher, 2000; Dunn et al., 2005; Paffenbarger et al., 1994; Sieverdes et al., 2011). This is probably accountable to the larger and more representative sample, continuous measures, and a statistical analytic methodology allowing for detection of the curvilinear associations. An optimal range of 2.5–7.5 h of physical activity (~150–450 min) per week was identified, supporting a dose response association between physical activity and mental health. A lower and upper threshold for mental health benefits is suggested in this study. After controlling for demographic and physical health factors, individuals optimally active more likely had better mental health than individuals who engaged in physical activity below or above this range. The lower end of this range is similar to current physical activity targets (Garber et al., 2011; U.S. Department of Health and Human Services, 2008a), and the upper end could be attained, for instance, by a daily one-hour run. A lower threshold of benefit for mental health benefits has been suggested (Dunn et al., 2001; Garber et al., 2011). That there may be an upper limit for mental health benefit is new, bolstered by work on excessive exercise (Bamber et al., 2000; Berczik et al., 2012; Meyer et al., 2011; Naylor et al., 2011). An upper limit of physical activity for physical health benefits has been hypothesized but never documented (Garber et al., 2011).

Many variables were associated with mental health, including physical activity. The associations between mental health and most socio demographic variables disappeared when physical activity was added to the models; only older age (65–74 years), college education, higher household income, good physical health, and optimal volume of physical activity were associated with better mental health. Conversely, in the same analysis, poorer mental health was associated with smoking. These results are similar to the findings of previous studies where individuals of higher socioeconomic position and more physically active have better physical and mental health (Blazer et al., 1991; Creed et al., 2012; Delisle et al., 2012; Groffen et al., 2012; Kawada et al., 2011; Khouzam, 2009; Knox et al., 2006; Kritz-Silverstein et al., 2001; Massie, 2004; Mather, 2012; McDaniel et al., 1995; Scott et al., 2007; Spiegel and Giese Davis, 2003; Wang et al., 2011). Other studies support the lack of a gender effect on these associations, as found in the present study. For example, a recent study matching men and women on somatic and cognitive depressive symptoms revealed that there are only small differences between men and women (Delisle et al., 2012).

Not surprisingly, levels of mental health differed significantly by physical health status, where healthier respondents had better mental health scores on average. Physical health conditions are associated with depressive disorders, with the magnitude of association depending on the disease condition (Massie, 2004; McDaniel et al., 1995; Scott et al., 2007). Multiple somatic symptoms more often are reported when mental health and physical health problems co-exist, or in individuals of lower educational attainment (Creed et al., 2012). Age moderated the association between physical activity and mental health in people with and without medical conditions; this is consistent with known differences.
in mental health in older versus younger adults, particularly in somatic and depressive symptoms (Khouzam, 2009; Mather, 2012). These findings may have important implications from a public health perspective, because mental health disorders, particularly depression and anxiety, are so common in adults and adolescents (Baxter et al., 2012; Kessler et al., 2005, 2012; Murray and Lopez, 1997), combined with the high prevalence of physical inactivity (World Health Organization, 2012). If physical activity can prevent or improve mental health, the public health impact of promoting physical activity could be enormous. Depression is a highly debilitating illness (American Psychiatric Association, 2000; Pratt and Brody, 2008), which is not only a major cause of suicide, but also results in significant impairment in social and occupational functioning (Wells et al., 1989). The World Health Organization (WHO) projects depression to be among the top three leading disease burdens by 2030 (Mathers and Loncar, 2006). The global prevalence of anxiety disorders is estimated between 4.8 and 10.9% (Baxter et al., 2012) and over 30 million people in the U.S. will suffer from anxiety disorder at some point in their lives (Lepine, 2002). The direct and indirect costs of anxiety disorders in the U.S. in 1990 were estimated to be about $42 billion dollars per year (Greenberg et al., 1999). These findings show that there is a dose response relationship between physical activity and better mental health. In addition physical activities are associated with poorer mental health. These findings provide support for the notion that regular activity may lead to prevention of mental health disorders, but these findings need to be confirmed by randomized control trials.

Acknowledgment

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References


