WORKING PAPER

MENS SANA IN CORPORE SANO! THE HIRING PREMIUM FOR PHYSICAL VERSUS MENTAL EXERCISE IN DIFFERENT OCCUPATIONS

Dieter Verhaest
Stijn Baert

December 2023
2023/1080

GHENT UNIVERSITY

Department of Economics

Faculty of Economics and Business Administration
Campus Tweekerken, St.-Pietersplein 5, 9000 Ghent - BELGIUM

Mens Sana in Corpore Sano! The Hiring Premium for Physical versus Mental Exercise in Different Occupations*

Dieter Verhaest†, Stijn Baert‡

December 2023

Abstract

We investigate the impact of participation in physical and mental exercise activities on hirability. Besides by comparing both forms of exercising, we innovate against the existing literature by comparing their impact between different types of jobs, where other effects could be expected. To this end, an audit experiment is conducted in which we send 2184 fictitious applications of young job seekers to real job vacancies. On average, the estimated effect of both physical and mental exercise activities is small and statistically insignificant. However, the effect of participation in any exercise activity is significantly positive for jobs combining low cognitive with low physical demands. These findings are not consistent with the common consideration of physical exercise activities being used by employers as signals of physical fitness and appearance.

Keywords: sports, mental fitness, skills, employment, field experiments

JEL: J24, J63

---

* We express our gratitude to Michiel Clyncke, Florence Dobbenie, Louis Favere, Maaike Moerman, and Maarten Quintiens for their contributions to the collection and coding of the data.

† KU Leuven, ECON and Leuven Economics of Education Research (LEER); Ghent university; GLO; Dieter.Verhaest@kuleuven.be; Corresponding author: KU Leuven, campus Brussels, Warmoesberg 26, B1000, Belgium.

‡ Ghent University, University of Antwerp, Université catholique de Louvain, IZA; Stijn.Baert@ugent.be.

1. Introduction

While the bulk of the human capital literature focusses on education and (on-the-job) training, also participation in activities outside these contexts may contribute to one's productivity. One such activity is sports and physical exercise. The evidence suggests that the productivity effects of these activities go well beyond an improvement of one's physical fitness and appearance, and may also include improvements of one's mental health, cognitive skills and (other) non-cognitive skills such as team work and self-discipline (Lechner, 2015). In line with this, sports participation is usually also found to be positively correlated with earnings and employment (e.g. Lechner, 2009; Hyytinen and Lahtonen, 2013).

As most studies on this topic rely on non-experimental data, their results may also be explained by other unobserved characteristics (Lechner, 2015). To address this problem, a few studies have adopted instrumental variable estimation. Based on this approach, the evidence is more mixed as these studies find positive effects for particular groups (Eide and Ronan, 2001) or outcomes (Barron et al., 2000; Stevenson, 2010) only. However, the adopted exclusion restrictions in some of these studies may be open to debate. As an alternative, Rooth (2011) and Paul et al. (2023) have therefore relied on experiments in which fictitious resumes were sent to real vacancies. Also their results are mixed as the former study found a small but meaningful effect of sport participation among Swedish college graduates while the latter did not detect any effect for US graduates.

Given this hitherto limited and inconclusive evidence on the causal effect of sport participation on labour market outcomes, we run another correspondence experiment with Belgian labour market entrants. Different from Rooth (2011) and Paul et al. (2023), we test whether and how the returns of physical exercise activities differ from those of mental exercise activities (e.g. chess or mindfulness). If the labour market effects of physical exercise activities are explained by other channels than physical health and appearance, one may expect participation in similar non-physical exercise activities to be at least as effective. Finally, we investigate whether the exercise effects differ depending on whether jobs are physically and/or cognitively demanding. To this end, we merge the experimental data with external survey data regarding the physical challenging nature of the jobs for which fictitious applications were made. If physical exercise signals physical fitness, as is usually presumed, one may expect its effect to be stronger in physically demanding

jobs as also found by Rooth (2011). Moreover, if they also signal mental fitness and higher cognitive abilities, one may expect physical exercise activities to be also more effective in cognitively demanding jobs.

2. Data and methods

We conducted our experiment between November 2015 and March 2016 in Flanders, Belgium. We selected 1096 vacancies from the job board of the Public Employment Agency of Flanders: 338 vacancies targeting high-school graduates, 504 targeting bachelor's degree graduates and 250 targeting master's degree graduates[4]. The selected vacancies required a degree in a number of fields within the following broad occupational domains: (i) business and trade, (ii) technology and engineering, and (iii) health care.

To each vacancy, we sent a pair of resumes and cover letters (Type A and Type B) that only differed on inessential details such as lay-out or name of the candidate. Within such a pair at the vacancy level, we randomly assigned the treatment condition of physical and/or mental exercise activities to one of both pair members and the control condition of no exercise activities to the other pair member. We randomly assigned to the 'treated' member either one physical or mental exercise activity, two physical or mental exercise activities, or a combination of one physical and one mental exercise activities. These (randomly) assigned physical and mental activities were fitness, badminton or volleyball, and mindfulness, chess or bridge respectively. For each group of activities, we thus selected a purely individual activity (fitness, mindfulness), an individual but non-solitary activity (badminton, chess) and a team-sport activity (volleyball, bridge). As is usual in Flanders, these exercise activities were mentioned at the end of the resumes.

Between these pairs of fictitious candidates, the applications for both candidates were always similarly adjusted to match them with the required level of degree, required field of study and the location of the job. All candidates had obtained their degree from a school or institution with a similar reputation. Moreover, for each vacancy, we randomly chose a pair of either male or female candidates.

[4] We exclude four vacancies from our analysis either because resumes erroneously were not sent out or because information was lacking to code the occupation.

The application pairs were sent out in random order, with about 24h in between. Thereafter, employers' reactions were collected by email and voice mail. We define a positive callback as any positive response; this includes an invitation for a job interview, an alternative job offer or a request for further information or to call back. In a sensitivity analysis, we also rely on another definition that only includes direct invitations for a job interview in the positive response category. The responses are analyzed both based on standard bivariate analyses and linear probability models, with fixed effects and clustered standard errors at the vacancy level.

This letter is the first for which these experimental data are exploited. To identify heterogeneous treatment effects by the physical demands of the jobs, we coded all tested vacancies according to the International Standard Classification of Occupations and relied on additional information from the Belgian wave of the PIAAC data. PIAAC includes the following survey question: "How often does your job usually involve working physically for a long period? (1) Never, (2) Less than once a month, (3) Less than once a week but at least once month, (4) At least once a week but not every day, (5) Every day. For each three digit-occupation, we calculated the average answer on this question and merged this to the occupational codes in our experimental database. The top three deciles of observations in terms of this average score (i.e. an average score of at least 2.89) are presumed to be physically demanding. Further, we define cognitively demanding jobs as jobs requiring at least a bachelor's degree (69.1% of our sample).

3. Results

Table 1 includes our linear probably regression results. For detailed bivariate results, which largely mimic our conclusions based on this benchmark analysis, we refer to Appendix A1.

We first estimate a model that includes a single dummy for any exercise activity. This estimate suggests that any exercise activity improves one's positive call-back on average by 1.5 pp. Besides being small in terms of economic significance, this estimate is statistically insignificant. Including separate dummies for physical and mental exercise activities (Model 2) does not alter this conclusion. For both, the estimated effect is about 1.0 pp and statistically insignificant.

In Model 3 and 4, we add interactions between the treatment variables and dummies for cognitively- and physically-demanding jobs. Model 3 suggests exercise activities to increase one's

call-back only in jobs that combine low levels of cognitive and physical demands. Further, even if Model 4 suggests this result to be more strongly driven by physical exercise, the estimates for mental exercise are statistically insignificantly different from those for physical exercise.

We conduct several sensitivity analyses. First, we investigate whether the results on the average callback depend on the number of activities mentioned, whether a combination of a physical and mental activities was mentioned, and the specific physical and/or mental activity mentioned (Appendix A2). We do not find heterogeneous treatment effects by those dimensions. Second, we change the outcome variable by only including immediate job invitations in the positive call-back definition (Appendix A3). While the point estimates and significance levels (in the case of the interactions) are usually somewhat lower, the results are qualitatively similar. Third, as the cut-off to distinguish between physically demanding and other jobs is somewhat arbitrary, we replace the dummy on these jobs by the (continuous) average physical score of the occupation (Appendix A4). Also this does not change our conclusions. Fourth, as the cognitive and physical dimensions of jobs may correlate with other job dimensions, we further add interactions between the treatment dummies and dummies for broad fields of study (Appendix A5). If any, these results reinforce our conclusion that exercise activities are mainly valued in jobs that combine low cognitive and physical demands.

4. Discussion and conclusion

This study complemented two earlier audit studies on the effects of physical exercise on employment chances. While our insignificant average point estimate of 1.0 pp is higher than the insignificant estimate of Paul et al. (2023) (-1.5 pp), it is below the significant estimate of Rooth (2011) (+1.9 pp). Moreover, it is also below the estimated effect of graduating with honors or engaging in the board of a student organization (+1.6 pp for each activity), as found in a similar Flemish experiment (Baert and Verhaest, 2021). Overall, this suggests that the average callback effect of physical exercise is moderate at best.

We also investigated the effects of mental exercise activities and whether the results depend on the cognitive and physical job requirements. Surprisingly, we found the effects of exercise activities to be only positive for jobs with low cognitive and physical demands. Moreover, we did not find evidence of differences in this respect between physical and mental exercise activities.

The latter finding is consistent with the non-experimental results of Hyytinen and Lahtonen (2013), which suggested that physical exercise activities mainly improve one's productivity through other channels than physical fitness and attractiveness. A potential explanation for the lack of effects in cognitively or physically demanding jobs may be that all fictitious applicants possessed a matching qualification. Employers may consider these qualifications to provide much more accurate signals of the cognitive and physical requirements of the job. However, as these explanation are speculative and as our result on the effect of physical exercise in physically demanding jobs deviates from that of Rooth (2009), we advise further research that investigates this in a more direct way.

5. References

Baert, S., Verhaest, D. (2021). Work Hard or Play Hard? Degree Class, Student Leadership and Employment Opportunities. *Oxford Bulletin of Economics and Statistics*, 83(4), 1024–1047.

Barron, J.M., Ewing, B.T., Waddell, G.R. (2000). The Effects of High School Athletic Participation on Education and Labor Market Outcomes. *Review of Economics and Statistics*, 82(3), 409–421.

Eide, E.R., Ronan, N. (2001). Is participation in high school athletics an investment or a consumption good?: Evidence from high school and beyond. *Economics of Education Review*, 20(5), 431–442.

Hyytinen, A., Lahtonen, J. (2013). The effect of physical activity on long-term income. *Social Science & Medicine*, 96, 129–137.

Lechner, M. (2009). Long-run labour market and health effects of individual sports activities. *Journal of Health Economics*, 28(4), 839–854.

Lechner, M. (2015). Sports, exercise, and labor market outcomes. *IZA World of Labor*, No. 126.

Paul, J.D., Cheng, A.A., Greene, J.P., McGee, J.B. (2023). The Value of College Athletics in the Labor Market: Results from a Resume Audit Field Experiment. *Journal of Sports Economics*, 24(3), 329–351.

Rooth, D.-O. (2011). Work out or out of work—The labor market return to physical fitness and leisure sports activities. *Labour Economics*, 18(3), 399–409.

Stevenson, B. (2010). Beyond the Classroom: Using Title IX to Measure the Return to High School Sports. *Review of Economics and Statistics*, 92(2), 284–301.

Table 1 . Effects of exercise on any positive callback – linear probability estimates

	(1)	(2)	(3)	(4)
Exercise	0.015 (0.010)		0.076*** (0.024)	
Mental exercise		0.010 (0.015)		0.045 (0.037)
Physical exercise		0.010 (0.015)		0.071** (0.035)
Exercise x Tertiary education job			−0.064** (0.025)	
Mental exercise x Tertiary education job				−0.022 (0.038)
Physical exercise x Tertiary education job				−0.076** (0.037)
Exercise x Physically demanding job			−0.058** (0.025)	
Mental exercise x Physically demanding job				−0.050 (0.038)
Physical exercise x Physically demanding job				−0.037 (0.039)

Notes. N=2,184; all models include vacancy fixed effects; standard errors are clustered at the vacancy level. *** (**) ((*)) indicates significance at 1% (5%) ((10%)) level.

Appendix

Table A1. Bivariate Analysis: any positive response

Subsample by vacancy characteristics	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Treatment: any exercise				**Treatment: at least mental exercise**				**Treatment: at least physical exercise**			
	N	**Treated resume**	**Control resume**	**Call-back ratio**	**N**	**Treated resume**	**Control resume**	**Call-back ratio**	**N**	**Treated resume**	**Control resume**	**Call-back ratio**
Full sample	1092	0.382	0.367	1.040	757	0.391	0.375	1.042	778	0.379	0.364	1.042
Tertiary education	754	0.411	0.407	1.010	539	0.425	0.417	1.018	538	0.405	0.407	0.995
Secondary education	338	0.317	0.278	1.138*	218	0.307	0.271	1.136	240	0.321	0.267	1.203**
Physically demanding job	334	0.371	0.374	0.992	243	0.354	0.366	0.966	226	0.381	0.381	1.000
No physically demanding job	758	0.387	0.364	1.062*	514	0.409	0.379	1.077*	552	0.379	0.357	1.061

Notes. * (**) ((***)) indicates significance at the 10% (5%) ((1%)) level (based on a t-test testing the null hypothesis that the callback ratio is not significantly different from 1).

Table A2. Effects of exercise on any positive callback – linear probability estimates (more specific treatment effects)

	(1)	(2)	(3)
Only one exercise activity	0.009 (0.018)		
Two exercise activities	0.017 (0.013)		
Only Physical exercise activities		0.005 (0.020)	
Only Mental exercise activities		0.006 (0.020)	
Both Physical and Mental exercise activities		0.015 (0.014)	
Fitness			−0.010 (0.020)
Badminton			0.020 (0.020)
Volleyball			0.010 (0.020)
Mindfulness			−0.002 (0.020)
Chess			0.010 (0.021)
Bridge			0.026 (0.020)

Notes. N=2,184; all models include vacancy fixed effects; standard errors are clustered at the vacancy level. *** (**) ((*)) indicates significance at 1% (5%) ((10%)) level.

Table A3. Effects of exercise on an immediate job invitation – linear probability estimates

	(1)	(2)	(3)	(4)
Exercise	0.012 (0.009)		0.057*** (0.022)	
Mental exercise		0.008 (0.014)		0.046 (0.034)
Physical exercise		0.007 (0.013)		0.039 (0.032)
Exercise x Tertiary education job			−0.040* (0.023)	
Mental exercise x Tertiary education job				−0.033 (0.035)
Physical exercise x Tertiary education job				−0.034 (0.034)
Exercise x Physically demanding job			−0.055** (0.023)	
Mental exercise x Physically demanding job				−0.043 (0.034)
Physical exercise x Physically demanding job				−0.030 (0.035)

Notes. N=2,184; all models include vacancy fixed effects; standard errors are clustered at the vacancy level. *** (**) ((*)) indicates significance at 1% (5%) ((10%)) level.

Table A4. Effects of exercise on any positive callback – linear probability estimates (continuous measure for physical demands[#])

	(1)	(2)	(3)	(4)
Exercise	0.015 (0.010)		0.089*** (0.032)	
Mental exercise		0.010 (0.015)		0.051 (0.049)
Physical exercise		0.010 (0.015)		0.088* (0.046)
Exercise x Tertiary education job			−0.069** (0.028)	
Mental exercise x Tertiary education job				−0.024 (0.043)
Physical exercise x Tertiary education job				−0.086** (0.041)
Exercise x Physical demands			−0.023* (0.012)	
Mental exercise x Physically demands				−0.017 (0.018)
Physical exercise x Physically demands				−0.018 (0.018)

Notes. N=2,184; all models include vacancy fixed effects. standard errors are clustered at the vacancy level. *** (**) ((*)) indicates significance at 1% (5%) ((10%)) level. [#]To ease the interpretation of the main effect, the original 1-5 scale has been rescaled to a 0-4 scale.

Table A5. Effects of exercise on any positive callback – linear probability estimates (additional interactions with occupational field)

	(1)	(2)
Exercise	0.111*** (0.032)	
Mental exercise		0.065 (0.047)
Physical exercise		0.111** (0.044)
Exercise x Tertiary education	−0.071*** (0.026)	
Mental exercise x Tertiary education		−0.029 (0.039)
Physical exercise x Tertiary education		−0.083** (0.037)
Exercise x High physical activity	−0.070*** (0.026)	
Mental exercise x High physical activity		-0.060 (0.039)
Physical exercise x High physical activity		−0.050 (0.039)
Exercise x Economic occupation	−0.046* (0.026)	
Mental exercise x Economic occupation		−0.023 (0.038)
Physical exercise x Economic occupation		−0.010 (0.038)
Exercise x Technical occupations	−0.032 (0.025)	
Mental exercise x Technical occupation		−0.052 (0.037)
Physical exercise x Technical occupation		−0.043 (0.037)

Notes. N=2,184; all models include vacancy fixed effects; standard errors are clustered at the vacancy level. *** (**) ((*)) indicates significance at 1% (5%) ((10%)) level.