Inequalities in maintenance of health and performance between young adult women and men in higher education

Jesper Löve, Lotta Dellve, Mats Eklöf, Mats Hagberg

Background: Because of ageing populations, most high-income countries are facing an imminent scarcity of labour. Maintenance of health and performance in young adults therefore becomes a crucial prerequisite for sustainable societies. One major obstruction to this accomplishment is the striking health inequalities between young women and young men. Previous studies have mainly been conducted in a cross-sectional way, focusing on ill-health. In this study, we compared the prevalence of maintained health and performance between young adult women and men and the predictors for this outcome. Methods: The cohort consisted of 1266 participants from a homogenous sample of university students in Sweden. A combined assessment of self-rated ‘very good’ health and un-impaired performance took place at three time points (i.e., maintained health and performance). Potential predictors covered stable conditions in health-related behaviours, conditions at work/school and work-home interference. Results: Young women had less maintained health and performance than young men. No major differences in predictors were found. However, there was a tendency for psychosocial factors to be the most important predictors, especially in women. Conclusions: That young women had less maintained health and performance in a homogenous sample beyond well-known differentiating factors suggests explanations other than observable structural differences between the sexes. This was also indicated by the importance attached to perceived demands and work-home interference, especially in women. The combination of less scheduled, and more unscheduled, schoolwork (i.e., time-flexibility) negatively affected the maintenance of health and performance in our study population, suggesting a focus for future studies.

Keywords: gender, health inequalities, performance, positive health, well-being.
the five cities, using college and university enrolment lists. Of the 1436 invited medical students 74% participated in the study and of the 1832 invited computer science students 71% participated. Dropout analyses revealed no major differences according to sex among individuals who did not participate. A web-based questionnaire was used for the data collection.

**Material**

The baseline sample consisted of 1045 women and 1312 men aged 19–25 years, and the cohort was followed up with the same web-based questionnaire 1 and 2 years later. Respondents who were not studying at the time the questionnaires were sent out were excluded to obtain a more homogenous sample (figure 1). At baseline, the participating women and men were fairly homogenous in most background variables; only slight differences were apparent, including that the women spent more time on their studies compared with men and that a greater number of the women than of the men were married or cohabiting (table 1). The prevalence of respondents who were married or cohabiting increased at each follow-up, while the differences between women and men decreased somewhat.

**Outcome measure**

A combined assessment of very good health and no performance impairment was based on two components: the first of these was, a self-rated health question (‘How do you rate your general state of health?’), with the response alternatives ‘very good’, ‘pretty good’, ‘neither good nor bad’, ‘pretty bad’ and ‘bad’). Single items of general self-rated health are widely used and have been shown to be robust predictors of both subsequent morbidity and all-cause mortality. The second component was, a question concerning health-related impairment of performance (‘Have any of the following symptoms affected your general level of performance over the past 30 days: skin troubles; eye troubles; pain in the muscles/joints; pain in the neck, back, shoulders, arms, hands; anxiety, depression; stress (a definition, distinguishing stress from stressors, preceded this question); sleeping disorders; other symptoms?’), with the response alternatives ‘yes’ or ‘no’). Individuals would be considered to have the outcome of very good health and no performance impairment if they reported ‘very good’ health and did not report lower levels of performance due to health problems. The outcome was dichotomized since we wanted to discern a group maintaining both health and performance, in contrast to the previous dominating focus on symptoms of ill-health.

The main outcome in the present study was stability of health and performance over 2 years—that is, maintained health and performance, with respondents categorized as having very good health and no performance impairment at three time points: baseline (T1), the 1-year follow-up (T2), and the 2-year-follow-up (T3). To simplify the reference group respondents not having ‘very good’ health and no performance impairment—at T1 but gaining it at T2 and T3 (and maintaining it) were excluded (women n = 102, and men n = 75). Hence, the reference group consisted of respondents (1) who did not have very good health and no performance impairment—at any time point or (2) who had had it and lost it. The final study sample consisted of 575 women and 691 men. Maintenance of health and performance over 1 year was also analysed.

**Explanatory factors**

Most longitudinal studies use explanatory factors measured at one point in time. However, if health promotion is the objective, the aim would be to reach stability in health-related behaviours and conditions (e.g. exercise, not smoking, healthy weight). Stability in a variable was defined as having answered in the same way on three (T1, T2 and T3) or two (T1 and T2) occasions, respectively. All other alternatives were used as reference. The variables were dichotomized according to scientific or clinical practice [i.e. smoking, body mass index (BMI), exercise] or distribution. The potential predictors concerned stability in marital status (married/cohabiting, ‘yes’/’no’);

**Table 1** Participant flow through the stages of the study

<table>
<thead>
<tr>
<th>Time &amp; process</th>
<th>Medicine</th>
<th>Computer science</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 Answers N=2357</td>
<td>n=1966</td>
<td>n=1291</td>
</tr>
<tr>
<td>T2 Answers N=2098</td>
<td>n=971</td>
<td>n=1127</td>
</tr>
<tr>
<td>Excluded</td>
<td>65(n=906)</td>
<td>159(n=968)</td>
</tr>
<tr>
<td>T3 Answers minus excluded N=1681</td>
<td>n=810</td>
<td>n=871</td>
</tr>
<tr>
<td>Excluded</td>
<td>64</td>
<td>174</td>
</tr>
<tr>
<td>Material N=1443</td>
<td>n=746</td>
<td>n=697</td>
</tr>
<tr>
<td>Excluded2</td>
<td>113</td>
<td>64</td>
</tr>
<tr>
<td>Study sample N=1266</td>
<td>n=633</td>
<td>n=633</td>
</tr>
</tbody>
</table>

1 Non-students were excluded in order to attain a more homogenous sample.
2 Respondents who gained very good health and no performance impairment (and maintained it) were excluded to simplify the reference group (see under “outcome measure”).

**Table 1** Descriptive data on women and men at baseline (study sample n = 1266)

<table>
<thead>
<tr>
<th>Background variables</th>
<th>Women (n = 575)</th>
<th>SD</th>
<th>Men (n = 691)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (mean)</td>
<td>21.7</td>
<td>2.7</td>
<td>22.8</td>
<td>2.7</td>
</tr>
<tr>
<td>Exercise (h/week; mean)</td>
<td>3.9</td>
<td>3.9</td>
<td>4.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Not smoking (%)</td>
<td>94.6</td>
<td>–</td>
<td>95.9</td>
<td>–</td>
</tr>
<tr>
<td>Children (%)</td>
<td>1.4</td>
<td>–</td>
<td>1.7</td>
<td>–</td>
</tr>
<tr>
<td>Married or cohabiting (%)</td>
<td>25.3</td>
<td>–</td>
<td>17.0</td>
<td>–</td>
</tr>
<tr>
<td>Gainful employment (h/week; mean)</td>
<td>2.5</td>
<td>6.2</td>
<td>3.1</td>
<td>7.4</td>
</tr>
<tr>
<td>Scheduled schoolwork (h/week; mean)</td>
<td>15.8</td>
<td>9.8</td>
<td>13.6</td>
<td>9.8</td>
</tr>
<tr>
<td>Unscheduled schoolwork (h/week; mean)</td>
<td>19.1</td>
<td>16.2</td>
<td>16.2</td>
<td>13.1</td>
</tr>
<tr>
<td>Non-profit work (h/week; mean)</td>
<td>2.1</td>
<td>4.8</td>
<td>2.3</td>
<td>5.4</td>
</tr>
</tbody>
</table>
scheduled schoolwork (<20 h/week), unscheduled schoolwork (<25 h/week); health-related behaviours: not smoking, sufficient exercise (>3.5 h/week), not being overweight (BMI < 25 kg/m²); ergonomic exposure: low computer use (fewer than two episodes of using the PC/laptop for > 4 h without a break, during the previous week); perceived demands [different levels of the same question]: ‘How do you feel about the demands in your study/work situation?’: not too high demands (‘completely agree’ and ‘partly agree’), in balance with demands (‘neither too high’, ‘nor too low’), good relations with the teachers/supervisors, good relations with classmates; work-home interference: study demands do not affect home/family life negatively, demands from home/family do not affect school/work negatively.

**Statistics**

To compare the prevalence of maintained health and performance, prevalence ratios (PRs) with 95% confidence intervals (95% CIs) were calculated for women in relation to men. Predictors of maintained health and performance were examined through calculating PRs in bivariate and multivariate analyses. Since power was lower among the women, a 90% CI was used in this group for all separate analyses (95% CI was used for the men). This was done to lower the risk of falsely accepting the null hypothesis and is supported by recent trends in epidemiology emphasizing the importance to interpret the magnitude together with the CI and not always look for a 5% significance level. All PRs were calculated via survival analyses with the time set to 1 using the PHREG procedure in SAS. Analyses of proportions and their differences were calculated using CI analysis outlined in Altman et al. All other analyses were processed in SAS, version 9.1 (SAS Institute, Inc., Cary, NC, USA).

**Results**

**Maintained health and performance**

Fewer women (10.4%) than men (17.9%) had maintained health and performance over 2 years; the PR was 0.58 (0.35–0.74). This result was even more prominent when the two educational courses were analysed separately; the PR for computer science was 0.39 (0.19–0.79) (4.5% for women and 11.6% for men) and that for medicine was 0.51 (0.35–0.74) (13.9% for women and 27.2% for men).

**Differences in stability of explanatory variables between women and men**

More women than men had stable conditions (2-year stability) regarding: relationships (19% versus 14%), not being overweight (87% versus 74%), not working too long on the computer without a break (53% versus 25%), and perceiving too high demands (30% versus 10%). More men than women had stable conditions regarding not having unscheduled schoolwork of > 20 h/week (34% versus 25%), perceiving a balance in demands (37% versus 19%) and not having study demands negatively affecting home/family life (27% versus 14%).

**Predictors of maintained health and performance in women and men**

In both women and men, studying computer science rather than medicine, having less scheduled schoolwork, and perceiving too high demands were predictors for less maintained health and performance, while not too much unscheduled schoolwork, low computer use, balance in demands, good relations with teachers/supervisors, good relations with classmates/co-workers and less work-home interference predicted maintained health and performance. In men but not women, not smoking, not being overweight and getting sufficient exercise predicted maintained health and performance. There was a pattern where the psychosocial predictors such as perceived demands, relations with teachers/supervisors and the two items related to work-home interference seemed to be stronger than the variables covering more clear or objective circumstances, especially in women. The size of the point estimates did not differ much for the predictors between men and women except for the two variables covering work-home interference, where women’s point estimates were clearly higher (table 2).

**Interaction analyses**

To further investigate whether the predictors for maintained health and performance differed between the women and men, interaction analyses were performed. In each analysis, interactions and 95% CIs were calculated between the women/men variable and the explanatory variables. No statistically significant interactions were found.

**Table 2** Bivariate associations between 2-year stable predictors and maintained health and performance analysed with prevalence ratios (PR, 90% CI for women; PR, 95% for men)

<table>
<thead>
<tr>
<th>Stable predictors over 2 years</th>
<th>Maintained health and performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational course (computer science–medicine)</td>
<td>0.32 (0.18–0.59)*</td>
</tr>
<tr>
<td>Married or cohabiting (stable relationship)</td>
<td>0.81 (0.45–1.48)</td>
</tr>
<tr>
<td>Not smoking</td>
<td>2.51 (0.77–8.20)</td>
</tr>
<tr>
<td>Scheduled schoolwork (&lt;20 h/week)</td>
<td>0.34 (0.16–0.74)*</td>
</tr>
<tr>
<td>Unscheduled schoolwork (&lt;25 h/week)</td>
<td>1.70 (1.07–2.72)</td>
</tr>
<tr>
<td>Not being overweight (BMI &lt;25)</td>
<td>1.90 (0.81–4.45)</td>
</tr>
<tr>
<td>Sufficient exercise (3.5 h/week)</td>
<td>1.41 (0.85–2.33)*</td>
</tr>
<tr>
<td>Low computer use (few long episodes)</td>
<td>1.81 (1.13–2.91)*</td>
</tr>
<tr>
<td>Too high demands</td>
<td>0.28 (0.14–0.57)*</td>
</tr>
<tr>
<td>Balance in demands</td>
<td>2.32 (1.47–3.67)*</td>
</tr>
<tr>
<td>Good relations with teachers/supervisors</td>
<td>2.29 (1.40–3.77)*</td>
</tr>
<tr>
<td>Good relations with classmates/co-workers</td>
<td>1.70 (1.09–2.65)*</td>
</tr>
<tr>
<td>Study demands do not affect family/private life neg.</td>
<td>3.83 (2.43–6.03)*</td>
</tr>
<tr>
<td>Family/private life demands do not affect studies neg.</td>
<td>3.27 (1.92–5.61)*</td>
</tr>
</tbody>
</table>

Values with a CI not including one are identified in bold
a: Significant factors for 1-year maintained health and performance
Good relations with classmates/co-workers 1.07 (0.63–1.83)

In this sample, young adult women had less maintained health and performance than men. This becomes yet more problematic in a situation where most high-income countries are facing imminent scarcity of labour due to ageing populations.

Multivariate analyses

To adjust for covariance and elicit the most important predictors for women and men separately, multivariate analyses were performed. All predictors which were significant in the bivariate analyses were entered into the two models, respectively.

Sufficient exercise and good relations with classmates/co-workers predicted maintained health and performance in men and good relations with teachers/supervisors predicted maintained health and performance in women. As in the bivariate analyses, the work-home interference variables were strong predictors of maintained health and performance, especially in women. For men, only ‘study demands do not affect family/private life negatively’, predicted maintained health and performance. The tendency seen in the bivariate analyses for the psychosocial variables to appear more central as predictors of maintained health and performance was observable even in the multivariate analyses (table 3).

To examine whether the investigated variables could explain the differences in maintained health and performance between women and men, all variables were entered into a multivariate model with both women and men. Since the statistical significance (95% CI) and the size of the point estimate for the women/men variable remained almost the same as in a bivariate analysis, the investigated variables did not explain the prevalence difference in maintained health and performance between women and men. A similar multivariate model was set up to examine possible explanations for educational course being a strong predictor for maintained health and performance in both women and men. Since more scheduled schoolwork worked as a predictor for maintained health and performance and the structure of the schoolwork seemed to differ a great deal between the educational courses [computer science students had less scheduled (46% versus 92% > 20 h/week) and more unscheduled schoolwork (62% versus 45% > 25 h/week) compared with medical students] the two schoolwork variables were entered into the model together with the educational course variable. Since, educational course became statistically insignificant (95% CI) in the model the differences in scheduled and unscheduled schoolwork between computer science students and medical students seemed to explain the prevalence difference in maintained health and performance.

Discussion

In this sample, young adult women had less maintained health and performance than men. This becomes yet more obvious structural differentiation. For example, the concept of a ‘chilly climate’ describes how women in a male-dominated group or organization may be overlooked in discussions, or excluded from information provision and networks. This also seems to be an issue for students, since the presence of a chilly classroom climate for female undergraduate students was recently observed. Furthermore, sexual harassment, which is more prevalent among women in male-dominated workplaces, can result in women believing that they have to over-perform, which in turn has been associated with subsequent morbidity. The fact that women in the present study perceived higher demands than men over time may be related to a male-dominated climate. That computer science in relation to medicine was a strong predictor of less maintained health and performance, especially among female students, could point in this direction since men dominate computer science both numerically and hierarchically. As there are currently more women than men undergoing medical training in Sweden, it is possible that these forces do not apply equally strongly here. However, even if a profession is numerically dominated by one sex, vertical segregation often result in domination by the other according to power structures and culture. Differences in sources of anxiety for female and male medical students have been shown, especially in contact with consultants and clinical practice. A recent study even
confirmed that different levels of sexual harassment occurred in different medical specialties during education.40

Keeping the low statistical power among the women in mind, psychosocial variables such as relations with teachers/supervisors, perceived level of demands and work-home interference, seemed to be more important than more directly health-related factors such as patterns of computer use, exercise and being overweight. University students have previously been shown to report higher levels of psychological distress compared with the general population41 and even though the design of the present study does not allow any conclusions on exact predictors the results suggests a future focus in the work of maintaining health and performance in this group. This tendency towards the importance of psychosocial factors might be specific to university students, a more privileged group with better objective health-related circumstances compared with young adults from other strata of society. The particular clarity of this trend in women could indicate that female and male students face different psychosocial exposures (e.g. chilly climate).

That work-home interference were indicated as more important predictors in women than in men could be associated with the results of previous experimental studies reporting that women became more stressed by having responsibility for children while men were more stressed by more specific performance tasks.42 Even though almost none in the present cohort had children it may be that young women have a greater focus on caring, even without children43 influencing their perceived responsibility for siblings, parents, friends, etc.

The fact that educational course, i.e.—computer science in relation to medicine,—was a predictor for less maintained health and performance raises several queries for further examination. The findings of the present study indicate the importance of computer science students having less scheduled, and more unscheduled, schoolwork. This point towards a U-shaped relation to decision latitude (i.e. unscheduled schoolwork) in this group. Stress theory illustrate that high control in relation to demands may buffer stress. The present results suggest that too high decision latitude (in specific time-flexibility) is not by nature positive. However, lack of scheduled schoolwork may also be interpreted as a lack of support. Since today the transition to adult status is becoming increasingly diversified and individualized due to a de-standardization44 the importance of a daily structure may be more important than ever before. Health inequalities between medical and computer science students may already exist at the time when they apply for their studies; other potential and complementary explanations are the role of the future labour market; and a possible bias due to medical students being exposed to a great deal of illness and impairment and hence being likely to overrate their own health, which has previously been shown in practicing physicians.45

Methodological discussion

Even though the explanatory factors investigated in this study covered important health and performance-related fields such as health-related behaviour, conditions at work/school and issues of work-home interference, they did not explain the inequality in maintained health and performance between women and men in this sample. However, the focus of most previous studies has been on predictors of negative self-rated health and since at least some the factors associated with positive self-rated health have been observed to be different from factors associated with negative self-rated health46 it is possible that the present study lacks predictors specifically relevant for positive health.

Since the majority of theories and instruments for assessing the workplace environment are based on or are developed at a time when most workers were men, they may fail to capture important gender-based circumstances (e.g. a chilly climate).47 It is also important to note that the present investigation did not include any previously reported variables showing potential differences in traits or coping methods between young women and men. Also, since circumstances in childhood or during adolescence may impact health in adulthood48,49 we cannot rule out the possibility that the inequalities found in the present study were a result of gender-based health-related factors during adolescence or childhood. Still, in the present cohort, several obvious differences were found between women and men in stable health-related variables. The women perceived higher demands and more work-home interference while the men had more overweight and a less healthy computer work situation.

The observed inequalities could also have resulted from a gender-based report bias. However, the literature is inconsistent and under-reporting of symptoms has been reported among both men50,51 and women.52,53

Furthermore, since the classification of individuals to ‘maintained health and performance’ could be regarded as extreme there may be a risk that individuals actually having positive health are misclassified and are included in the reference group. This extreme classification was chosen because we aimed to examine possible inequalities in a positive assessment, in contrast to previously shown inequalities of ill-health. Consequently respondents answering ‘pretty good’ to the general health question were excluded. Setting the cut-off to the highest response alternative found some support in a recent review showing that compared with persons reporting ‘excellent’ health, the relative risk for all-cause mortality was 1.23 [1.09–1.39] for those reporting ‘good’ health.54 A further limitation of this extreme classification may be that it is sensitive to daily fluctuations and may therefore be stronger for women because of fluctuations in well-being during the menstrual cycle. Also, limited reliability due to the single-item construct of the global health question may result in potential misclassifications.

When looking at the indicated differences in explorative factors between women and men it is important to take the large difference in power between the two groups in consideration. However, even though the results can not point out any specific difference in predictors between the two groups it is important to look for indications and patterns that can be further examined in future studies. Also, although the performed interaction analyses did not show any statistical significance it has been shown that power for testing interactions is probably low in many epidemiological studies,55 why having a too rigid focus on statistical significance could result in type 2 errors. Finally, it is important to note that the homogenous study sample in the present study bring about that generalizations to other groups should be made with caution. The results should be interpreted in light of these possible limitations.

Conclusions

The well-known inequalities in ill-health between young women and young men were demonstrated here in a longitudinal assessment of maintained health and performance. That this inequality was found in a homogenous sample of young adults suggests differentiating factors beyond the ones previously in focus (e.g. differentiation in exposures and access to resources due to different positions or occupations, double responsibility for both paid and unpaid work, etc.). The importance of widening our knowledge of
gender-based psychosocial and psychological factors was further indicated by the fact that the explanatory factors could not fully explain the found inequality. That stability in psychosocial factors seemed to be more important than stability in more directly health-related factors,—especially in women,—indicate a focus for future work in maintaining health and performance in young university students. The findings that the combination of more scheduled, and less unscheduled, schoolwork seemed to positively affect the maintenance of health and performance proposes that too high decision latitude (i.e. time-flexibility) is not by nature something positive in this group.

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Conflicts of interest: None declared.

Key points
- Since most high-income countries are facing an imminent scarcity in labour, maintenance of health and performance in both young women and young men will be one key challenge.
- The found inequality in this homogenous study sample suggests the importance of gender-based, psychosocial factors beyond previously well-known differentiating factors between the sexes.
- Psychosocial factors seemed to be more important than more directly health-related factors for maintenance of health and performance in this group, especially in women.
- The combination of less scheduled and more unscheduled work (i.e. time-flexibility) negatively affected the maintenance of positive health and performance.

References


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