

Girls rule, boys drool! A Systematic Review of Literature on the Effects of Gender on
Educational Outcomes

Eero Syrjä

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English Philology

Faculty of Humanities

University of Oulu

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Table of Contents

1. Introduction	2
1.1. Statistics on gender imbalance from Europe and Finland	2
1.2. Statistics graphs	3
2. Theoretical and Methodological Framework	8
2.1. Specify research questions	9
2.2. Develop review protocol	9
2.3. Validate review protocol	10
2.4. Identify relevant research	10
2.5. Selecting primary studies	12
2.6. Assessing study quality	12
3. Extracting required data and analysing	13
3.1. Study 1	13
3.2. Study 2	15
3.3. Study 3	16
3.4. Study 4	17
3.5. Study 5	18
3.6. Study 6	20
3.7. Study 7	21
3.8. Study 8	23
4. Synthesize and write review report	24
5. Conclusion	26
Works Cited	28
Appendices	29

1 Introduction:

The study of the influence of gender on academic attainment has, since the introduction of feminist dialogue, been mostly focused on the role of women in education (Eurydice 16). Generally speaking the focus of academic research being done on educational equality is mostly concerned with the role of women. This, however, ignores a rather large and worrisome effect of the “gender gap” of educational attainment, mainly that women outperform men at all but one level of secondary or tertiary education in Finland: it is only at the doctorate level of education where the number of men attaining a degree is higher than the number of women (see figures 1-6).

This “gender gap” is surprisingly large to most who are not familiar with the phenomenon. The discourse around gender equality in the zeitgeist has to do with helping the role and participation of women in education, and specifically in trying to break the old prejudices towards females in certain fields of study like maths and sciences (Eurydice 20). This thesis, however, will focus on the effect of “gender gap” as it relates to the superior performance of women in Finland, but the effect has been seen in practically all industrialised countries (Eurydice 23).

1.1 Statistics on gender imbalance from Europe and Finland

In Finland, the effect of this “gender gap” is quite marked. Statistics Finland collects and publishes data on this, among many other statistics available online. They divide educational attainment into six different categories depending on the number of years spent in education (see appendix A). The examination of these statistics allows us to grasp the extent of the “gender gap” that is found in Finland.

All of the figures that follow were taken from Statistics Finland’s online database, in a graphical representation, from a table called: “educational structure of population 1970-2014”. This table allows for different configurations to show the difference in educational attainment by gender and by level of education. In this thesis, there are separate graphs for genders and they show data for the years of

2005-2014. The graphs are exclusionary, as in, only those who attain 9 years of education are shown in figure 1, and those who study further are in different figures.

1.2 Statistics graphs

The first figure shows the difference between men and women at what is called *basic education* at nine years of education (see appendix A):

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot



Figure 1

The difference in group size diminishes as we get closer to current date, with 2014 having statistically insignificant difference between the two genders. This is reflected in the following data, as a higher percentage of the population attains a higher level of education.

The second figure shows what Statistics Finland defines as upper secondary education, that is 12 years of education (see appendix A):

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot

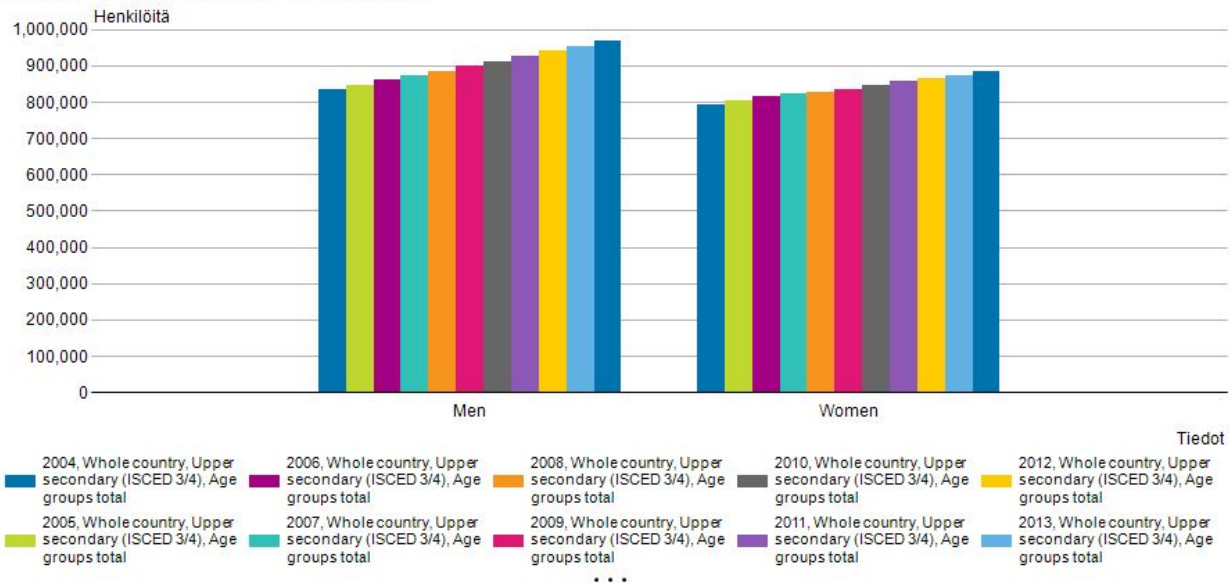


Figure 2

Here, interestingly enough, the effect seems to be opposite to the first figure, where there is a proportionally higher number of men than women. In fact, this supports the main argument, as it shows that men are significantly more likely to end their educational careers at the secondary level rather than achieving tertiary education.

Another interesting effect for this particular level of education is the division between academic and vocational schools in Finland. If one examines the statistics of graduates of the “academic” high schools (*lukio*), we again find the “gender gap” in full force: Between 2010 and 2015, the difference between male and female graduates from high school in absolute terms was at its lowest about 4500 more women than men. This with the total number of women graduating between 17 500 and 18 800 per year, and the number of men graduating between 13 027 and 13 850 per year (Ylioppilastutkintolautakunta 1). Perhaps even more significantly, the percentage of girls who failed to pass their exams remains between 6.2% and 6.8% of applicants, whereas for boys in the same time period, the failure rate was between 8.3% and 9.6% (Ylioppilastutkintolautakunta 1).

In figure 3, we find what Statistics Finland defines as the “lowest level of tertiary” education, which is 2 to 3 years of post-secondary education:

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot

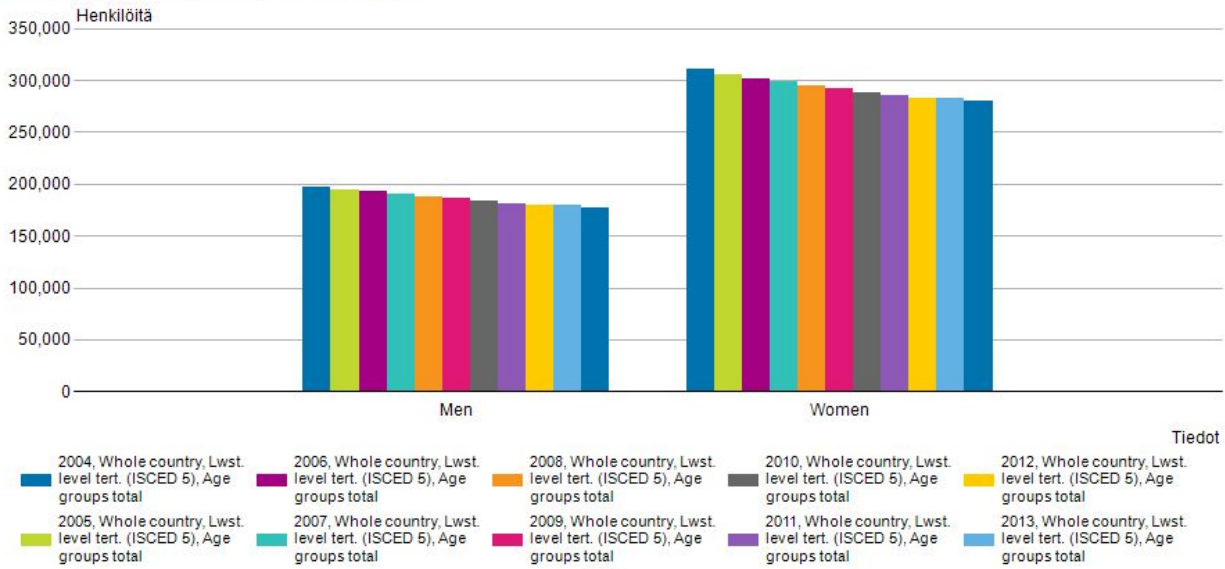


Figure 3

Here we start to see the true effect of the gender gap. Just at this level of education, the difference between the genders is higher than it was in the previous graph, even though the total number of people is a third of it. This figure is somewhat inflated by the fact that this particular definition includes nursing degrees, a field that traditionally has a higher number of women than men employed in it. The effect, however, continues as we go into higher levels of education.

In figure 4 we find data on lower level tertiary education that has three to four years of post-secondary education:

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot

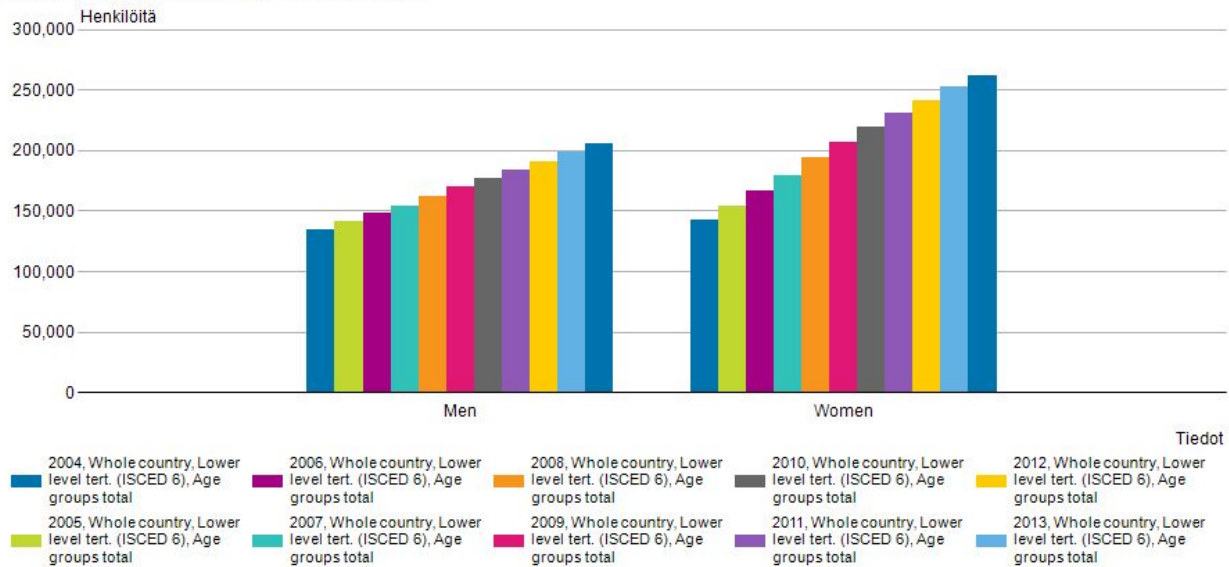


Figure 4

Figure 5 shows data on higher-degree tertiary education, which is five to six years of post-secondary education

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot

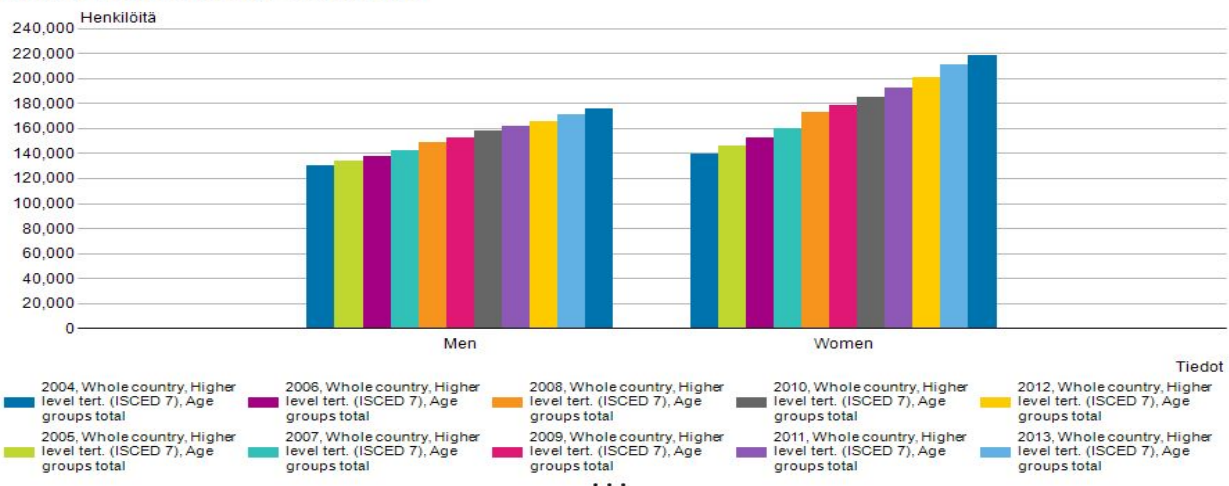


Figure 5

Finally, we have Figure 6, which shows doctorate degrees, which is the highest level of education tracked:

Population aged 15 or over by level of education, municipality, gender and age by Year, Area, Level of education, Age and Tiedot

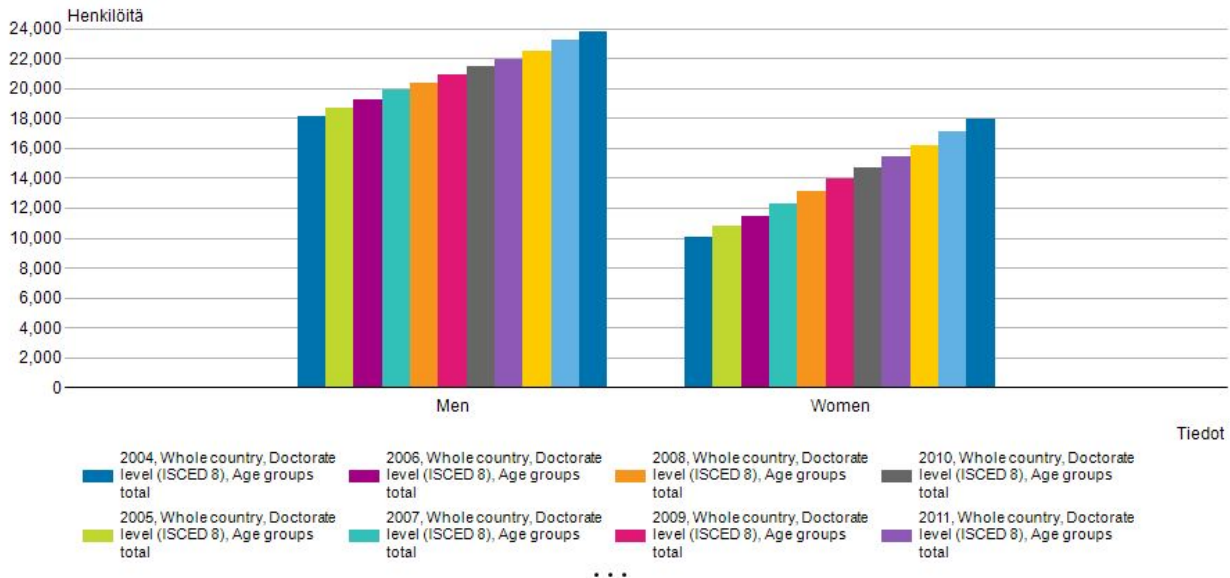


Figure 6

It is finally here that we have a reversal of the trend that the rest of the educational landscape follows. There are 25% more men with doctoral degrees than women in Finland’s population. This obvious outlier has some possible causes, such as academia being traditionally conservative and male oriented (Eurydice 103).

With the exception of doctoral degrees, as shown by the data, the effect is quite large. The aim of this thesis is to do a systematic review of literature regarding this phenomenon, and hopefully find common themes and areas of research that can be expanded on in later research. It is not, however, the aim of this thesis to look at classic feminist approach to this phenomenon.

This is not to say that there is no need for such research, as even though women are outperforming men in educational attainment, they are more likely to be unemployed, in poverty and still earn less for

equivalent jobs (Eurydice 19 and 31). While these facts remain, the focus of this thesis is on the causes behind the counter-intuitive “gender gap” of men underperforming in educational attainment.

There is an immediate, pragmatic and societal value to understanding the reason behind such a large gap in achievement. Not only in terms of future research, but also to direct educational practices and policy.

2 Theoretical and Methodological Framework:

A systematic review of literature is a method through which a comprehensive summary and analysis of current literature is done. It outlines methodical steps to define the parameters of the analysis, which studies to include and which not, and then allows for a synthesis based on the studies included. The main focus of the method is reproducibility: the steps must be clear and well enough defined that anyone can follow the steps later and arrive with the same data.

Although this method is more commonly found in the field of medicine and “hard” sciences, with slight adjustments to the methodology, it is readily usable in humanities as well.

This study will follow an eight step review process. The steps are as follows:

1. Specify research questions
2. Develop review protocol
3. Validate review protocol
4. Identify relevant research
5. Select primary studies
6. Assess study quality
7. Extract required data and analyse
8. Synthesise and write review report

These steps were adapted from Tuomo Toljamo's "*Digital language-based approaches for solving the zodiac z340 cipher*".

2.1 Specify research questions:

The question of the study is to understand the "gender gap" in educational achievement in Finland. Specifically, why is it that overall women graduate in larger numbers, with less drop outs and failed tests. Studies specifically relating to either the overall effect, or the differences in language skills are relevant to this review.

2.2 Develop review protocol

In order to find relevant studies for the review, a boolean phrase was constructed to focus and limit the results of searches for academic articles. The search phrase is multi-part, and is as follows:

1. (gender* OR sex*)
2. AND (gap OR differenc*)
3. AND (education* OR schoo*)
4. AND (finlan* OR finnis*)
5. AND (languag* OR readin*)
6. NOT (disabilitie* OR dropou*)

In addition to the search phrase, the results will be limited to published, peer-reviewed articles from 1.1.2000 to 31.12.2016 in order to find results that are as contemporary as possible.

The search using the terms outlined above will be conducted in two academic databases:

1. Ebsco (all databases) and
2. Proquest's ERIC database (educational resources)

2.3 Validate review protocol

In order to ensure validity of search phrase and limitations, a modification of the terms will be done in order to assure the functionality of each part of the protocol.

On ERIC database, when the fourth line in the search string was removed, the results changed from 50 to 8580 results. This change is due to the fact that line four limits the results to those that include Finnish participants, and since the database is in english, the number of results are very high.

When the fourth line was added back, the results changed back to the original 50, thus validating the string's functionality in ERIC's database.

With Ebsco, a search was performed with the second line removed to verify the function of the search string. As the original stands, Ebsco's all databases returned 48 results. With the removal of the second line, the search returned 140 results. With the addition of the second line back into the search, the results came back to the original 48.

2.4 Identify Relevant Research

As the number of results from the searches were relatively high for the size and scope of this thesis, it is necessary to identify the most relevant studies to include in this review. The studies will be chosen by these criteria:

1. Relevance directly to answering the main research question, namely the "gender gap".
2. Studies relating to difference in language skills and use between the genders.
3. Relevance in understanding underlying physiological, sociological, psychological, societal or religious phenomenon that could affect the phenomenon.

The results for these searches, as of the time of writing of this thesis, were:

1. 48 results from Ebsco and

2. 50 results from ERIC

The results in totality were then added to RefWorks as citations, in order to cross check and compare the lists, and see if any studies appear from both databases. There were four exact matches found in both searches:

1. Aunio, Pirjo, et al. "Children's Early Numeracy in England, Finland and People's Republic of China." *International Journal of Early Years Education*
2. Cardinal, Bradley J., Kaisa J. Tuominen, and Pauli Rintala. "Cross-Cultural Comparison of American and Finnish College Students' Exercise Behavior using Transtheoretical Model Constructs."
3. Gorard, Stephen, and Emma Smith. "An International Comparison of Equity in Education Systems."
4. Ojala, Mikko, and Leida Talts. "Preschool Achievement in Finland and Estonia: Cross-Cultural Comparison between the Cities of Helsinki and Tallinn."

Using the “close match” function in RefWorks, a further nine studies were found to be in both databases, mainly separate entries of the same study being published in different journals, and after close reading of the authors and titles, the duplicates were removed.

From the remaining 81 results, there were 44 that were determined by title of the study, and where necessary, reading of the abstract, to not be relevant to the topic at hand.

This leaves 37 studies to choose primary sources from (Appendix B). From these, a further close reading of the studies was conducted in order to determine their applicability to this thesis. From these 37 studies, a final group of 8 studies were selected for review.

2.5 Selecting Primary Studies

After close reading of the results of the search phrase from both databases, and comparing the results to the parameters of relevance set above, these 8 studies have been selected as primary sources:

1. Brozo, William G., et al. "Reading, Gender, and Engagement."
2. Clarkeburn, Henriikka, and Kirsi Kettula. "Fairness and using Reflective Journals in Assessment."
3. Karkkainen, Riitta, Hannu Raty, and Kati Kasanen. "How are Children's Perceptions of the Malleability of their Academic Competencies Related to their Teachers' and Parents' Views?"
4. Krkovic, Katarina, et al. "Teacher Evaluation of Student Ability: What Roles do Teacher Gender, Student Gender, and their Interaction Play?"
5. Lehto, Juhani E., et al. "National Survey of Reading Comprehension in Finland."
6. Linnakyla, Pirjo, Antero Malin, and Karin Taube. "Factors Behind Low Reading Literacy Achievement."
7. Linnakyla, Pirjo, and Antero Malin. "Finnish Students' School Engagement Profiles in the Light of PISA 2003."
8. Roivainen, Eka. "Gender Differences in Processing Speed: A Review of Recent Research."

2.6 Assess study quality

All of the studies are peer-reviewed, from established and credible sources. Here is a list of the journals that the studies were published in, in the same order as above:

1. *Journal of Adolescent & Adult Literacy*
2. *Teaching in Higher Education*
3. *Social Psychology of Education: An International Journal*
4. *Educational Research*
5. *Journal of Research in Reading*
6. *Scandinavian Journal of Educational Research*

7. *Scandinavian Journal of Educational Research*

8. *Learning & Individual Differences*

3 Extracting required data and analysis

In this section, the primary source studies will be presented, their specific findings and how they relate to the “gender gap”. There is a rather large variance with direct relatability, as studies tend to focus more on a specific issue (e.g. how literacy skill relates to 1st grader’s academic performance), but commonalities and repeating themes can be found in all of them. The eight primary sources will be covered one by one, and the relevance to this thesis will be stated.

3.1 Study 1:

Brozo, William G., et al. "Reading, Gender, and Engagement."

Summary:

This study specifically looks at reading skills gap in students, using PISA from 2009 as a source of data. Specifically, it is concerned with more of a policy oriented analysis, and the attempt of raising awareness of PISA testing in the United States. The study is the product of the members of PIRLS Task Force, that includes representatives from the United States, Ireland, Germany, Finland and Korea.

The study analyses the statistics of reading engagement and performance in PISA testing in the 2009 round, and trends from 2000 to 2009. It also looks more closely at possible situations in the 5 countries represented in the Task Force.

Findings:

The trend that has been seen since the start of PISA testing in 2000 continued in 2009. Girls outperformed boys on overall print reading in all 65 countries in 2009. This difference increased between PISA cycles in five of the six countries of the Task Force, only in the United States did the gap get smaller, but even in that case the change was statistically insignificant (Brozo et al. 586).

A digital literacy test was an optional portion in PISA 2009 testing that some countries opted for. The trend in reading skills gap continues here, but the gap between boys and girls is smaller than it was in print reading testing.

Reading engagement has its own section in the study. During the PISA testing, students were asked in questionnaires to rate the amount of time spent reading, the variety of texts read and the enjoyment derived from reading. Brozo et al. (p. 587) report that:

“ On all three dimensions of reading engagement, girls had significantly higher indices than boys for each of the five authors’ countries.”

Interestingly, even in the “best case” country of Korea, where the boys’ reading enjoyment was high overall and relative to the other countries considered, they were still lower than the girls’ rating of their levels of enjoyment.

Most significantly for this thesis, the differences in all three categories were the highest in Finland out of the five countries considered. This was the case despite the fact that in Finland the diversity of reading materials was the highest out of all five countries, and in the case of digital material variety, the boys diversity of reading material was rated actually higher than that of the girls. (Brozo et al. 587). This seems to suggest that there is a serious issue with male perception of, or manner of reading of books in Finland, and even though boys read a higher variety of digital material, they still perform worse than girls do in testing that uses digital material.

Relevance to this thesis:

This study specifically looks at the differences in reading performance and engagement in PISA 2009 results. In analysing the data from the study, it shows that the gender difference is quite universally in favour of girls, and that this effect has been increasing every new PISA cycle.

Specifically as it concerned Finland, it found that the gaps were some of the highest in PISA 2009, and that there is a severe lack of any real policy action to correct the issue. These findings seem to be supported by the following data.

3.2 Study 2:

Clarkeburn, Henriikka, and Kirsi Kettula. "Fairness and using Reflective Journals in Assessment."

Summary:

This study focuses on the use of journals in assessment of students at university level. The main thrust of the study is looking at the effectiveness and fairness of using this method of assessment, and as such, is outside the area of this thesis. However, the study still touches upon gender differences found within this particular method of assessments, and this section is of interest to us.

The study looked at four different groups of students that were assessed with this method of reflective learning journal. The groups were in Finland and Australia, over two years from 2007 to 2008 (Clarkeburn and Kettula 446). The study does both quantitative and qualitative analysis of the journals themselves, and defines the different types of entries by the level of cognitive processing required to create them. This is to reflect the function of a reflective journal, that is to have the student *reflect* on the content, rather than simply write down what happened that day. The main topic of interest, however, is the section on gender differences.

Findings:

The study found that in Finland, there was a statistically significant difference in both weekly and final entries of the learning journals between males and females (Clarkeburn and Kettula 447). The authors of the study analysed this to mean that female students were more likely to reflect on a higher level than their male peers (Clarkeburn and Kettula 447). Interestingly, this difference was not found in Australia, and when comparing Finnish males to both Australian groups (males and females), they were found to have lower levels of reflection (Clarkeburn and Kettula 447).

Relevance to this thesis:

While this study does not specifically look at overall attainment levels, or reading skill levels, it does have a good theoretical and data foundation that shows a significant difference in Finnish males' approach to a form of creative writing. There is no way to separate writing and reading, or their skills from language skills. The fact that Finnish males perform significantly worse in reflective learning journals is a reflection of a deficit in language skills.

3.3 Study 3:

Karkkainen, Riitta, Hannu Raty, and Kati Kasanen. "How are Children's Perceptions of the Malleability of their Academic Competencies Related to their Teachers' and Parents' Views?"

Summary:

This study looks at young children's perceptions of intelligence, and the relation that it has to their academic performance. It also looks specifically at how parents' and teachers' attitudes towards their children influence this view on competence.

Of particular interest is the section on gender, and how girls and boys are treated differently for the same academic performance. The study asserts that the two subjects that were being studied here, Finnish and mathematics, are gender biased from the start (Karkkainen, Raty, and Kasanen 559), with girls having better competence in language and boys in mathematics. In addition, when a child performed well, a girl would be thought to achieve this through effort and work, and a boy through talent (Karkkainen, Raty, and Kasanen 559).

The study looks at third and sixth graders from three different primary schools, as well as 97 parents, and eight teachers. The study used questionnaires and interviews to determine attitudes of both the children and their parents towards their academic performance potentials.

Findings:

Interestingly, this study finds that while there is no difference between the genders in the child's perception of their academic possibilities in either Finnish or mathematics (Karkkainen, Raty, and Kasanen 565), there was a difference in parents' and teachers' ratings, with boys having a better potential than girls in Finnish (Karkkainen, Raty, and Kasanen 568).

Relevance to this thesis:

This is particularly interesting as it seems to argue against the reality, mainly that girls actually outperform boys in Finnish at basically every level of schooling. This effect might be the result of parents' and teachers' attitudes towards academic success relative to gender. As was stated earlier, it was already claimed that a gender bias exists for these subjects in schools, and that girls are more likely to be seen as hard workers rather than gifted.

3.4 Study 4:

Krkovic, Katarina, et al. "Teacher Evaluation of Student Ability: What Roles do Teacher Gender, Student Gender, and their Interaction Play?"

Summary:

This study looks at the influence of gender on teacher evaluation, both from the gender of the student, and the gender of the teacher. It uses a sample of 1 500 sixth grade students and their teachers in Finland.

There seems to be a difference in how boys and girls are treated by their teachers. Citing a meta analysis of 32 empirical studies on gender differences, Krkovic et al. claims that:

“...male students have more interaction opportunities with their teachers and are more frequently called on and responded to in the classroom than females” (245).

Interestingly it seems that majority of the sources cited in this study suggest that girls are being rated better in languages than boys, and that this effect is seen in multiple countries (Krkovic et al. 246).

The focus of the study, however, is in determining whether or not there exists a gender induced influence on teacher evaluation of students. It also attempted to find any influence of teachers' expectations of academic performance. This of course is somewhat difficult to determine, as it is a bit of a "chicken and egg" situation: do teachers notice students who are able to succeed, or is the teacher's belief what allows a student to succeed?

Findings:

The study analyzed data concerning three different fields of testing: mathematics, first language and scientific reasoning. It found that the interplay between teacher and student genders did not affect the teachers' evaluations (Krkovic et al. 254).

The study did, however, find that teachers of both genders did in fact evaluate boys and girls differently. It found that girls' performance in language was actually overestimated, as well as their prediction of school success (Krkovic et al. 254).

Relevance to this thesis:

Although the main focus of the study is to determine whether or not there exists a gender bias to evaluation that is based on the teacher's gender, it includes important information regarding gender bias. The fact that even with such a large sample size and study, there was a clear tendency towards overvaluing the performance of girls relative to their actual objective performance, is inherently relevant to any discussion about educational achievement.

3.5 Study 5:

Lehto, Juhani E., et al. "National Survey of Reading Comprehension in Finland."

Summary:

This study looks at a large sample of sixth and ninth graders from Finland. It is a part of a evaluation of the Finnish comprehensive school, and looks at the results to determine what larger trends exist, and

specifically, it tries to look at higher levels of reading skills. The main focus of the study is to determine if the performance of Finland in international studies ranking students actually means that the reading-ability of students is high. It is suggested that a large portion of students may not have sufficient comprehension skills set by the curriculum (Lehto et al, 100).

Of particular interest is the difference between genders in higher level reading skills, and how it relates to educational attainment.

Findings:

In the hierarchy test, the girls outperformed the boys by a significant margin. This margin increased with the multiple choice test. The study asserts that the hierarchical test measures higher comprehensive macroprocessing, and that the multiple choice test measures lower level comprehension (Lehto et al 107).

Both tests correlated with school achievement, with the hierarchical test doing so more strongly. The study states that this is not necessarily a causal relationship, and that other factors may be at work, but acknowledges that reading skills are intimately related to school performance (Lehto et al 108).

Relevance to this thesis:

While the aim of the study was more towards a country-wide analysis of reading comprehension, and to provide a baseline from which educators can determine whether their students have low reading comprehension skills (Lehto et al 108), it is a large scale study that shows significant differences in performance between genders.

Interestingly, the study also specifically correlates reading comprehension to academic attainment. The fact that the differences are as large as they are, in combination with the size of the study is highly significant to the topic.

3.6 Study 6:

Linnakyla, Pirjo, Antero Malin, and Karin Taube. "Factors Behind Low Reading Literacy Achievement."

Summary:

This study looks at PISA data from 2000, and tries to identify those factors that influence low literacy achievement in Sweden and Finland. There have been many factors that have been found to influence reading performance, such as:

“...gender, self-esteem, motivation, reading interest and activities as well as parents’ education, economic and cultural resources in the home, and ethnic and language background” (Linnakyla, Malin and Taube 233).

Naturally that is by no means an exhaustive list. The study, however, highlights that the most significant factors, as determined by the Evaluation of Educational Achievements (IEA) Reading Literacy Study, were students’ self concept of reading, expectations towards further education and number of books at home (Linnakyla, Malin and Taube 234).

The way in which these factors influence the outcome of students, and specifically how they differ between the genders is what we are most interested in.

Findings:

The study found that one of the major risk factors of low literacy skills was being male. By analysing the questionnaire information in combination with the results of PISA 2000, the authors were able to determine the risks involved with different factors that influence low literacy skills. The odds ratio for the risk of low reading literacy achievement for being male in Finland was 2.3. In comparison, being in a single parent family was 1.4, socio-economic background rating at it’s worst at 15 (where reference point = 50) was an odds ratio of 2.8 (Linnakyla, Malin and Taube, p. 240). Simply being male in Finland has the same odds ratio towards the risk of low literacy skills than having 4 siblings has (Linnakyla, Malin and Taube 241).

Further, the study points out that it is specifically boys' interest and engagement with reading that is the issue. Whether it is because reading is seen as more of a feminist past time, or because of an attitude of reading only when necessary that seems to be common, these factors contribute to the significant difference between the genders in representation of low achieving readers in this study (Linnakyla, Malin and Taube 245).

Relevance to this thesis:

This study focused on low achieving readers specifically, but in doing so, it identifies one of the strongest determining factors to low reading achievement: being male.

3.7 Study 7:

Linnakyla, Pirjo, and Antero Malin. "Finnish Students' School Engagement Profiles in the Light of PISA 2003."

Summary:

This study looks at levels of school engagement in Finland. Even though PISA scores rate Finnish students quite highly, there are issues with how students approach, think of, and value school as a whole. Specifically we are interested in the division between genders and their engagement with, and approach to school.

The phenomenon of school engagement, naturally, is affected by a multitude of different factors (Linnakyla and Malin 584), and there are significant differences between schools, classes and students (Linnakyla and Malin 584). Studies have shown that Finnish students' relationships with their teachers are comparatively bad (Linnakyla and Malin 584), and WHO's study on student well being shows that student satisfaction is relatively low (Linnakyla and Malin 585).

The study defines school engagement as the students feelings towards their school, peers and teachers, and the perceived value of school in the future (Linnakyla and Malin 586). This factor has been shown

to influence things like future academic goals, psychological and social difficulties as adults and general well being and economic success (Linnakyla and Malin 587).

Findings:

The study ranked students into “clusters” by three factors: peer acceptance, student-teacher relations and attitude towards school (Linnakyla and Malin 590).

The difference between cluster’s makeup by gender is quite interesting. While the cluster that has the highest rating in all three categories has 54% girls to 46% boys, and the largest and most disengaged cluster has 49% girls to 51% boys, cluster 3 which has students who have high peer acceptance but low ratings on the other two factors is 35% girls to 65% boys. Furthermore, cluster 4 which has high attitude towards school, but lower peer acceptance is 62% girls and 38% boys (Linnakyla and Malin 592).

Cluster 3 which has the highest percentage of boys is also the cluster that has the lowest socioeconomic background out of all six clusters (Linnakyla and Malin 592). This cluster also scored significantly lower in all three subjects for which performance was measured (Linnakyla and Malin 593), where cluster four which is the cluster with the highest percentage of girls, scored the highest, even higher than the most engaged cluster 5.

Student’s educational aspirations follow similar patterns, with cluster 3 having the lowest expectation, and clusters 4 and 5 having the highest expectations.

Relevance to this thesis:

This study looked at overall school engagement and cognitive performance. We find that the results continue the trends we have seen thus far: the worst performing group (accounting for 14% of students) was 2/3rds male (Linnakyla and Malin 598). This group also had the lowest educational aspirations. This, in combination with the fact that the highest performing group, cluster 4 (13% of students) was 2/3rds female, shows that the differences in educational outcome can be seen already at age 15.

3.8 Study 8:

Roivainen, Eka. "Gender Differences in Processing Speed: A Review of Recent Research."

Summary:

This study does a review of studies relating to the cognitive processing speed differences that have been found between the genders. It sets out to first determine what factors can be seen to influence processing speed to begin with, and then to show what gender based differences can be found (Roivainen 146).

The main body of the article is a review of existing research, and as such, is outside the scope of this thesis. The complete methodology and which studies are chosen can be found in the paper, but they will not be covered here in great detail. The main interest for this thesis are the findings as they relate to genders, and possibly, the "gender gap" specifically in educational attainment. Of particular note are the results relating to language, reading, and general intelligence.

Findings:

The study finds that females have a significant advantage in multiple tests, including: processing speed involving digits and alphabets, reading and writing skills. Males were found to perform better with reaction time tests and finger tapping (Roivainen 148). Interestingly, there were no differences in general intelligence, and that age and education were significant factors in the results of most of all of the tests (Roivainen 148).

The study also discusses PISA student achievement gender differences (Roivainen 148). The study finds that there are significant differences in reading achievements, but that females were also more likely to study, spend time on school work, to spend time reading and to do more than the bare minimum of school work (Roivainen 148).

The authors do however point out that training influence on cognitive tests is large, and that the differences between genders cannot be said to have an influence to higher level cognitive functions (Roivainen 149).

Relevance to this thesis:

This review looked at biological differences between males and females. It tried to determine what, if any, difference gender had on processing speed of information. Of note to us are the findings as they relate to language skills. Although the study found that significant differences do exist between genders, these differences can be explained by societal factors and training. Where the differences could not be explained by training, the effect was so small that it would not have any real influence on the overall trend of educational attainment.

4 Synthesize and write review report:

The studies covered can be divided roughly into three different aspects that influence the “gender gap” in question: Biological and physiological differences, adult and teacher influence, and finally societal and peer influence.

Although study 8 looked specifically for possible biological and physiological differences between the genders, it found that there are no differences in terms of general intelligence. This supports a long history of studies done on gender differences in cognitive function. The study did also find that there is a difference to the advantage of females in language skills, and reaction tests for males.

It does not, however, seem that biological differences can explain the size and seeming universality of the “gender gap”.

Adult and teacher influence on pupils is enormous. Studies 3 and 4 looked at this influence in detail. Even if there is no bias in terms of evaluation, teachers of both genders rated girls’ competency higher than boys, regardless of objective levels of competence.

Perhaps the largest influence on this phenomenon can be found in the societal and peer influences on education. Studies 1, 2, 5, 6 and 7 all looked at different aspects of this. From PISA rankings to reading engagement, to low reading achievement, all studies point to a single common theme: boys do not like to read.

Without a doubt, the causes behind this phenomenon are varied and not easy to summarise. It is far outside the scope of this thesis to be able to sufficiently study and determine the causal nature of any one of these factors, not to mention all of them put together. The common themes do, however, seem to follow from study to study.

Reading skill, language skill and school success are intrinsically tied together. Yet time and again, we have seen that boys' skills in this area are falling behind girls' skills. The influence that this difference has is clear on the success that students will have in mandatory education. This success, or the lack thereof, in turn will determine the possibilities for future studies. Finland uses a merit based system to determine who can study in higher education. Students' grades from either high school or vocational school are taken into account, in combination with their scores in entrance exams.

Perhaps it is no wonder, then, that the number of women with tertiary education in Finland is so significantly higher than the number of men. School performance in comprehensive school influences which path you will take: academic high school or vocational school. That choice, in turn, will influence the type of tertiary education that a student can get into.

That is not to say that there are no other factors in play, but the most common theme found in all of the studies reviewed here is the lack of reading and language skills of males. The reason why this is the case are much more complex, but it seems that this fact is much more common than is generally understood.

5 Conclusion:

The “gender gap” that is found in educational attainment is a very complex issue. The number of factors that influence why any given person does what they do are enormous, and to try and definitively prove causality in a topic as complex as this would be extremely hard.

But try we must. The fact of the matter is that Eurydice, OECD through PISA and internal statistics collected by Statistics Finland all show objectively the size and scope of the problem. The issue is not so much the fact that there needs to be an equal outcome for all people, it is not necessary to have an even 50/50 division between the genders for graduates of secondary or tertiary education. Rather, the issue stems from the fact that having as large of gap as there is points to a symptom of some other underlying issue. There exists no basis in science to claim that the differences could be biological or physiological. Males and females have the same general intelligence, and socioeconomic difficulties care not for gender. As we saw in studies three and four, young students do not yet have this division between the genders saying that girls are better at languages and boys are better at mathematics. This difference seems to be introduced at early primary education, and the differences grow as the students advance in their formal schooling.

Because of all of this, there still exists an enormous gap between the genders as far as educational outcomes are concerned. It is of enormous importance to our society and educational systems to understand why this situation exists. While this thesis has covered some of the possible reasons, none of the studies found even through this specific of a review were precisely about the overall gender gap.

The issue seems to be begging for a study to determine the causal factors that influence educational attainment, and why it is that males are falling behind in such a dramatic way.

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Appendix A

Educational level as defined by Statistics Finland:

The data on education are based on Statistics Finland's Register of Completed Education and Degrees.

Six categories are used for the level of education in vital statistics: basic level, upper secondary level, lowest level tertiary, lower-degree level tertiary, higher-degree level tertiary and doctorate or equivalent level. Educational level is measured by the duration of education.

Those with basic level qualifications have had at most nine years of education, with leaving certificates from primary schools, middle schools and comprehensive schools.

Those having completed the upper secondary level of education have spent 11 to 12 years in education. These qualifications include matriculation examination, vocational qualifications attained in 1-3 years and further vocational qualifications.

Lowest level tertiary education lasts 2 to 3 years after upper secondary education. Examples of these qualifications include qualification of technician engineer, diploma in business and administration and diploma in nursing, which are not polytechnic degrees. Those having completed lower-degree level tertiary education have had 3 to 4 years of education after upper secondary education.

Lower-degree level tertiary education comprises polytechnic degrees and lower university degrees.

Higher-degree level tertiary education comprises education with a duration of 5 to 6 years after upper secondary education. This type of education leads to higher university degrees (master's degree) and specialist's degrees in medicine.

Completion of doctorate or equivalent level tertiary education requires independent research work or doctorate theses fit for publication. The degrees are scientific licentiate and doctorate degrees.

Source: http://www.stat.fi/meta/kas/koulutusaste_en.html

Appendix B

37 studies from which the final 8 were picked

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