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Female and Male Differences in Academic Achievement in Individuals With Cleft: A Population-Based Register Study

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Abstract

Objective: The focus of this study was to determine if there is any significant difference in academic achievement for girls and boys with a cleft compared to the general population of Swedish students at graduation from compulsory school.

Design: A retrospective population-based study using data obtained from the Swedish Medical Birth Register that was linked to the Swedish School–Grade Register.

Participants: Two hundred seventy girls and 241 boys with cleft palate (CP), 222 girls and 429 boys with cleft lip (CL), and 299 girls and 531 boys with cleft lip and palate (CLP) were compared with the compulsory school population comprising 609,397 girls and 640,007 boys.

Main Outcome Measures: (1) Odds of receiving the lowest grade and reduced odds in receiving high grades in Mathematics, English, and Swedish. (2) grade point average (GPA).

Results: In all 3 subject grades, for boys with cleft there was no difference when compared to the male population. Girls with cleft were similar to their peers with a few exceptions. Girls with CLP had lower Math grades, and girls with CP had lower Math, English, and Swedish grades. Girls with CP and CLP achieved a significantly lower GPA in comparison to the female population and boys with CP and CL achieved lower GPAs in comparison to the male population.

Conclusions: This study indicates that educational outcomes for girls with cleft are more negatively affected than for boys with cleft.

Keywords

cleft; cleft lip; palate; female; male; education; school performance; academic achievement

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Introduction

Educational attainment is a key area of interest for individuals and families affected by cleft lip and palate (James Lind Alliance, 2013) as a major concern warranting further research. Educational attainment is one of the strongest predictors of the extent to which an individual will thrive in life, especially in relation to aspects such as employment, income, health, and overall well-being (Keeley, 2007; OECD, 2006, 2007b). Current research has focused on educational attainment for individuals with cleft (Persson et al., 2012; Wehby et al., 2014) and in relation to type of cleft (Broder et al., 1998; McWilliams et al., 1972; Persson et al., 2008, 2012; Richman, 1980; Richman and Eliason, 1982, 1984; Richman et al., 1988), but there has been rather limited research on educational outcomes based on population-based comparisons of girls and boys by cleft type.

Research conducted in the general population in relation to educational attainment and gender indicates that girls outperform boys from kindergarten onward with higher grades (Buchmann et al., 2008). The Programme for International Student Assessment (PISA), which evaluates students that have almost finished their compulsory education in the Organization for Economic Cooperation and Development (OECD) and partner countries, found that on an average girls outperformed boys in reading by the equivalent of more than half a proficiency level; that roughly corresponds to an average of a school year's progress (OECD, 2010b). Girls are more likely to complete upper secondary education than boys (OECD, 2007a) and, for the age group 25-34 years, girls have higher attainment rates in both upper secondary and tertiary education than boys (OECD, 2014). These data indicated that currently girls have moved ahead of boys in education (OECD, 2010a).

In relation to educational attainment for individuals with cleft, studies have reported poorer performance trajectories in comparison to their otherwise healthy peers (Persson et al., 2012; Wehby et al., 2014). There is also a considerable amount of research which indicates that some individuals with cleft do not perform as well as nonaffected peers on standardized IQ tests (Eide et al., 2006; Persson et al., 2008). They also experience a higher frequency of reading disability, learning difficulties, lower school achievements, and/or higher use of special education services (Broder et al., 1998; Eide et al., 2006; Nopoulos et al., 2002; Persson et al., 2008, 2012; Richman and Eliason, 1982, 1984; Richman, Eliason, et al., 1988; Richman, Wilgenbusch, et al., 2005; Wehby et al., 2014; Yazdy et al., 2008). Research indicates that these deficiencies are often associated with type of cleft (Broder et al., 1998; McWilliams et al., 1972; Persson et al., 2008, 2012; Richman, 1980; Richman and Eliason, 1982, 1984; Richman et al., 1988). In the majority of studies, the group of individuals with cleft palate only (CP) have the most negative outcomes, followed by those with cleft lip and palate (CLP), and the least affected are the individuals with cleft lip only (CL).

The reasons why individuals with cleft achieve poorer educational outcomes are not clearly understood, but there are several potential explanations worthy of consideration. One is that young persons with cleft require prolonged treatment that involves hospitalization and attending clinical appointments, which results in school absence. They might have to contend with possible hearing and/or communication difficulties (Flynn and Lohmander,

2014; Sell et al., 2001), which can have an influence on their academic achievement. A higher prevalence of learning and reading disabilities has been reported in the population with cleft compared with the general population (Broder et al., 1998; Chapman, 2011; Collett et al., 2010). In addition, research in this area has shown both volumetric and neurocircuitry differences in the brains of children with cleft in comparison to healthy controls (Becker et al., 2008; Conrad et al., 2010; Nopoulos et al., 2007; Shriver et al., 2006), but the clinical relevance of these differences is largely unknown.

It is likely that a combination of the factors mentioned above interacts with each other and consequently increases the risk for negative educational outcomes seen in children with cleft.

When it comes to female and male differences for individuals with cleft in relation to educational achievement, there are limited studies. A Swedish study found that the risk of not receiving a certificate of compulsory school completion at age 16 was 2.50% for girls and 2.96% for boys in the general population. While the risk of not receiving their leaving certificate for girls with CP was 9.31%, CL 3.22%, and CLP 7.55%, for boys with CP it was 10.6%, CL 2.14%, and CLP 6.84% (Persson et al., 2012). Other studies have found that boys have a higher rate of learning disabilities, especially for boys with CP (Broder et al., 1998; Richman et al., 1988).

It is crucial to further examine outcomes in educational settings for girls and boys by cleft type in order to better understand the possible impact of the cleft experience on long-term outcomes. There may be differences due to sex, which denotes biological distinctions, or due to gender, which refers to cultural distinctions, between girls and boys. In this study, we compared girls with cleft versus girls without cleft and boys with cleft versus boys without cleft. Differences between girls and boys are seen in Swedish educational outcomes and may be related to gender cultural distinctions, as there are more apparent differences in the more subjective teacher-awarded grades than in the more objective national test results (Skolverket, 2006b). Grading in Sweden is decentralized, which means that grades are usually based upon classroom assessment by teachers, who judge the performance of the pupils (Lekholm and Cliffordson, 2008). The national tests in Sweden are considered as a tool for teachers to calibrate their grading (Aberg-Bengtsson and Erickson, 2006), and the National Agency for Education (2007) views them as an instrument to investigate equality in grades. In the last year of compulsory school, which is the age group we are looking at in the study, the national test focuses on Mathematics, English, and Swedish. Therefore, the corresponding subject grades were included in the analysis because they were calibrated with the national tests, which was intended to increase their objectivity. In addition, we included the overall grade point average (GPA), which represented all the subjects completed throughout compulsory school and was ranked on a scale 0 (lowest) to 5 (highest).

Patients and Methods

This study followed the principles of the Declaration of Helsinki and approval was given by the National Board of Health and Welfare to use the registers described below. The cases

analyzed were identified as children born 1973 to 1986 and registered in the Swedish medical birth register (MBR) (Cnattingius et al., 1990; National Board of Health and Welfare, 2003). The MBR contains data on pregnancy, delivery, and the neonatal period and links to information on deaths and migration. Additional cases and specification of cleft type, including if they are nonsyndromic or syndromic, was achieved by utilizing The Register of Congenital Malformations. The MBR was linked to the Swedish School-Grade Registry, which contains the final grades of all individuals graduating from compulsory school. This is usually the year in which they turn 16 years old (National Agency for Education, 2004). Participants with cleft were identified by the following characteristics: date of birth, hospital, birth time, and birth weight. The School-Grade Register was then linked to the cleft file; the analysis was conducted using data that have all personal identifiers removed.

This study looked at the academic outcomes from 1988 to 2003. During this period, 2 different grading systems were implemented. From 1988 to 1997, a relative grading system was applied. This system was based on the mathematical theory of normal distribution, and its main purpose was to rank students. In this system, a 5-level grade scale was used, with 1 indicating the lowest and 5 the highest. Grades were distributed so that 7% of students received grade 1,24% grade 2, 38% grade 3, 24% grade 4, and 7% grade 5 (Skolverket, 2007).

In 1998, a knowledge-related system was implemented in which grades were based on the number of criteria included in the syllabus that were met by students. The teacher assessed these criteria and the student could be awarded one of the following grades: Pass (P), Pass with Distinction (PD), and Pass with Excellence (PE). If students did not meet the requirements, no grade was issued in that subject. This situation is defined in this study as Not Passed (NP) (Skolverket, 2006a).

To be qualified to apply to upper secondary school in Sweden for the time points described, students need to have pass grades in Mathematics, English, and Swedish. In addition, students' GPA from compulsory school determined their acceptance into a national or specialized program of their choice (Skolverket, 2006a).

A strength of this study is that the sample represents 1992 eligible individuals (95.4%) from a total of 2087 eligible individuals born with cleft during this period (1973-1986). This equals about 149 children born with cleft per year for that time period and is similar to the birth frequency of 154 children with cleft in 2012 in Sweden (Socialstyrelsen, 2013). This analysis included the following nonsyndromic cases: 270 girls and 241 boys with CP, 222 girls and 429 boys with CL, and 299 girls and 531 boys with CLP. They were compared with the compulsory school population comprising 609,397 girls and 640,007 boys for the specified time period.

The following variables were analyzed in accordance to girl or boy (girls with cleft vs girls without cleft and boys with cleft vs boys without cleft):

1. Performance in the following subjects based on the Swedish school grading system as described earlier in the article: Mathematics, English, and Swedish.

The analyses are conducted on the combination of the grades; 1-2, 3, 4-5 and NP, P, PD-PE. For these analyses, the Mantel-Haenszel technique (Mantel and Haenszel, 1959) was implemented after adjusting for the following factors: child's birth year, the mother's age at child's birth, the mother's number of pregnancies, and the mother's educational level on a 7-grade scale. Risks (significance) are presented as odds ratios (ORs) with 95% confidence intervals (95% CIs) estimated by a test-based method (Miettinen, 1974).

2. Grade point average (based only upon the numerical grades 1988-1997). For the GPA analysis, after adjusting for the same control variables listed above (see above) a *t* value (with its sign) was determined for the difference between the youth with cleft and the population, based on the standard error of the mean of the youth with cleft (the population data had a negligible standard error). A series of *t* values was obtained and their means were tested against 0, with a final *t* test labeled *t**. Effect size was calculated by using Cohen *d* (Cohen, 1988, 1992).

Results

Subject Grades

Mathematics.—Table 1 presents the findings for girls and boys related to math performance. In Mathematics, girls with CP had significantly reduced odds of getting a pass with distinction or excellence (OR 0.49, 95% CI 0.32-0.76) in the knowledge-based system. Girls with CLP displayed significantly higher odds of receiving the lowest grade (OR 1.57, 95% CI 1.052.18) when the relative grading system was used, and they had significantly reduced odds of getting a pass with distinction or excellence (OR 0.62, 95% CI 0.39-0.96) in the knowledge-based system. For girls with CL together with the boys with CP, CL, or CLP, there were no significant differences in comparison to the control group in either grading system.

English.—Table 2 presents the findings for girls and boys related to English performance. In English, girls with CP displayed significantly higher odds of receiving the lowest grade (OR 1.70, 95% CI 1.09-2.65) in the relative system and had significantly reduced odds of getting a pass with distinction or excellence (OR 0.55, 95% CI 0.37-0.82) in the knowledge-based system. For the girls with CL or CLP and the boys with CP, CL or CLP, there were no significant differences in comparison to the control group in either grading system.

Swedish.—Table 3 presents the findings for girls and boys related to Swedish performance. In Swedish, girls with CP displayed significantly higher odds of receiving lowest grade OR 1.70 (95% CI 1.05-2.73) in the relative system and had significantly reduced odds of getting a pass with distinction or excellence OR 0.60 (95% CI 0.40-0.89) in the knowledge-based system. For the girls with CL or CLP, no significant difference was observed. No significant differences were observed for the boys with CP, CL, or CLP in either grading system.

Grade Point Average.—For girls, the analysis revealed that individuals with CP and CLP had significant lower GPA in comparison to the population (see Table 4). Nevertheless, for

boys, individuals with CP and CL had significantly lower GPA in comparison to the population (see Table 4).

Discussion

This study examined female and male differences in the Swedish population with cleft in relation to educational achievements based on subject grades and GPA when leaving compulsory school.

When it came to grades in the 3 subjects, Mathematics, English, and Swedish, the results showed a clear impact. For the boys with cleft, there was no difference in comparison to the male noncleft population, whereas for the girls with cleft, there was a significant difference in comparison to the female noncleft population. The outcome in math showed that girls with both CP and CLP were negatively affected, whereas in English and Swedish, only girls with CP were negatively affected.

When interpreting the outcome of the GPA, it is important to keep in mind that because of a limitation of this study, it is impossible to tell whether the effect was due to the group with cleft overall not performing as well as the control group or if there were outliers within the cleft group that significantly lowered the GPA for the whole group with cleft. Although the difference in grade point averages are *statistically* significant, they are minimal and may be less *clinically* significant. The key aspect is that there should not have been any difference between the population with cleft and the general population if there was no impact associated with having a cleft. Because there was a difference, we need to be aware when interpreting the results that as outliers some individuals in the group with cleft might have been skewing the overall group GPA lower.

For GPA, all girls (including those with cleft) had a higher GPA in comparison to boys (including those with cleft), which is consistent with research in the general population (Buchmann et al., 2008; OECD, 2010a). However, both girls and boys with CP had significantly lower GPAs in comparison to the female and male noncleft population, respectively. Furthermore, girls with CLP and boys with CL had a significantly lower GPA in comparison to the control groups. As stated previously, research indicates that some individuals with cleft do not perform as well on standardized IQ tests, experience reading disability, learning difficulties, lower school achievements, and/or higher use of special education services (Broder et al., 1998; Eide et al., 2006; Nopoulos et al., 2002; Persson et al., 2008, 2012; Richman and Eliason, 1982, 1984; Richman et al., 2005; Wehby et al., 2014; Yazdy et al., 2008) and that these differences are often associated with type of cleft (Broder et al., 1998; McWilliams et al., 1972; Persson et al., 2008, 2012; Richman, 1980; Richman and Eliason, 1982, 1984; Richman et al., 1988). The outcome on the GPA analysis supports previous findings that individuals with CP were negatively affected for both girls and boys. Regarding the other cleft types, girls with CLP exhibited a significant difference from the female population, whereas for boys those with CL showed a significant difference. The reason for this difference in relation to cleft type between girls and boys cannot be explained by this study, but it is not consistent with previous studies that found boys with CL had a significant difference. Individuals with CL do have to cope with a possible visible difference

because of reconstructive surgery but do not have the added risk factors of speech or audiology concerns that can be associated with a cleft palate.

A factor to take into consideration is that girls in the general population on average possess better social skills and classroom behavior (Buchmann et al., 2008) and are perceived as being less disruptive, possess better leadership, and self-discipline, and are more organized and attentive in comparison to boys (Downey and Vogt Yuan, 2005; Duckworth and Seligman, 2006; Farkas et al., 1990; Jacob, 2002; Silverman, 2003). Research on individuals with visible differences has indicated that one of the most common problem is difficulties with social interactions (Kapp-Simon et al., 1992; Kapp-Simon and McGuire, 1997; Slifer et al., 2004). A study by Pope and Synder (2004) showed some indication of relatively higher social concerns in the clinical range for adolescent girls with cleft. So consequently, it is possible that girls with cleft, especially with CP, may not live up to the expected female classroom norm in Sweden because of social inhibition and/or possible hearing and/or communication problems (Flynn and Lohmander, 2014; Sell et al., 2001). The result could be a potential negative influence on their grading, especially because the grading is partly based on classroom assessment by the teacher (Lekholm and Cliffordson, 2008).

The lack of grade differences between boys with and without a cleft may reflect the relatively lower impact of a cleft beyond the established risk factors seen in boys in the general population, such as higher rates of reading disabilities, antisocial behavior, attention disorders, and delayed speech compared to girls (Halpern, 1997; Moffitt et al., 2001; Muter, 2003; Rutter et al., 2004). As these risk factors are not as high for girls in the general population, it might be that the relative effect of the cleft was more apparent for girls than the boys. Our results have highlighted the need to include girls with a cleft in neurodevelopmental studies along with boys (Richman et al., 2012).

A strength of this study is that the data were adjusted for the following factors: child's birth year, the mother's age at child's birth, the mother's parity, and the mother's educational level on a 7-grade scale. To our knowledge, this is one of the few population-based studies in cleft that have presented adjusted data that includes 95.4% of the population of 16-year-olds with cleft in compulsory school for a specific time period compared against the whole population for the same time period.

A limitation of this study, as any retrospective case-control study, is that we cannot explain the differences; we can only observe them and offer potential explanations. It is also possible that some cases, particularly for CP, with associated syndromes are included (see Persson et al., 2012, for full details) that could influence the outcome. However, it does not change the fact that individuals with cleft (nonsyndromic or syndromic) in this study did not perform as well as their peers in the Swedish compulsory educational setting.

Another consideration is that there might be subgroups in the cleft population that could have additional conditions that could possibly influence the mentioned outcomes above. For example, a Norwegian study found that 240 (32%) of children in their sample of 754 10-year-olds with a cleft had known or suspected additional conditions, including developmental difficulties/delays (14.4%), learning difficulties (5.6%), attention-deficit

hyperactivity disorder (8.9%), dyslexia (4.9%), and specific language impairment (3.9%) (Feragen et al., 2014). These types of additional conditions could obviously have a significant impact on educational achievement and provide a possible explanation why we have observed lower grades in the cleft group in comparison to the general population (Persson et al., 2012). This aspect has also been observed in a study that looked at educational outcomes for individuals with isolated orofacial cleft (OFC) in elementary school. The parents of the children with OFC in the study reported more developmental disabilities, hearing and speech problems and were more likely to receive a lower school grades in contrast to the children in the control group (Knight et al., 2014).

These studies show that it is paramount to address additional conditions when examining academic achievement in individuals with cleft in order to get a more accurate perspective. The Norwegian study showed almost no differences between the girls and boys with the prevalence of additional conditions within the different cleft types, with the exception that boys with CLP had a significantly higher frequency of dyslexia than girls with CLP (Feragen et al., 2014). Therefore, as this study indicates, it is important to understand the role of gender for students with a cleft within the educational system and how gender might influence educational outcomes.

To better implement a proactive approach, it is important that health care and educational providers, together with families having children with cleft, are made aware of the possible negative effects on educational outcomes in relation to cleft type and the differences between girls and boys. For example, if a teacher and/or parent notice a negative effect on educational attainment for an individual with cleft, this should be conveyed to their health professionals. This could then lead to an assessment of the child in order to examine if an additional condition is present (Feragen et al., 2014), such as learning and reading disabilities (Broder et al., 1998; Chapman, 2011; Collett et al., 2010) or if the child is experiencing hearing and/or communication problems (Flynn and Lohmander, 2014; Sell et al., 2001). The use of educational outcomes as an indicator for conducting assessment could be a time and cost-effective approach for both families with cleft and health professionals. For those cleft centers that have limited resources for psychological provision of care, this could be a way to focus their capacity in this area.

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Table 1.

Mathematics: Odds Ratios With 95% CI, for Adolescents With Cleft Compared With the Noncleft Population.

Relative grading system: Girls					Knowledge-based grading system: Girls				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	39	78 979	1.42	0.95-2.13	NP	8	9833	1.19	0.59-2.40
3	59	160 572	1.00	Reference	P	70	108 160	1.00	Reference
4-5	44	144 962	0.83	0.56-1.23	PDE	28	86 084	0.49	0.32-0.76
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	28	78 979	0.89	0.57-1.39	NP	0	9833	–	–
3	61	160 572	1.00	Reference	P	39	108 160	1.00	Reference
4-5	58	144 962	1.08	0.76-1.54	PDE	27	86 084	0.84	0.51-1.38
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	51	78 979	1.57	1.05-2.18	NP	5	9833	0.75	0.30-1.86
3	66	160 572	1.00	Reference	P	65	108 160	1.00	Reference
4-5	59	144 962	0.99	0.69-1.42	PDE	29	86 084	0.62	0.39-0.96
Relative grading system: Boys					**Knowledge-based grading system: Boys**				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	45	102 200	1.46	0.97-2.21	NP	8	12 690	2.10	0.93-4.32
3	46	159 421	1.00	Reference	P	37	121 700	1.00	Reference
4-5	50	138 357	1.31	0.85-1.95	PDE	26	80 639	1.05	0.62-1.78
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	83	102 200	1.16	0.87-1.54	NP	8	12 690	1.01	0.49-2.08
3	110	159 421	1.00	Reference	P	75	121 700	1.00	Reference
4-5	93	138 357	1.09	0.70-1.34	PDE	50	80 639	1.01	0.70-1.45
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	71	102 200	0.83	0.62-1.11	NP	16	12 690	1.43	0.85-2.40
3	133	159 421	1.00	Reference	P	104	121 700	1.00	Reference
4-5	101	138 357	0.88	0.68-1.15	PDE	68	80 639	0.99	0.92-1.37

Abbreviations: NP, not passed; P, pass; PDE, pass with distinction or excellence.

Values after adjustment for year of birth, maternal age, parity, and maternal education. Reference group is youth who just passed.

Table 2.

English: Odds Ratios With 95% CIs, for Adolescents With Cleft Compared With the Noncleft Population.

Relative grading system: Girls					Knowledge based grading system: Girls				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	30	54 954	1.70	1.09-2.65	NP	6	6649	1.44	0.60-3.43
3	53	160 920	1.00	Reference	P	50	73 649	1.00	Reference
4-5	59	168 263	1.08	0.74-1.57	PDE	50	123 779	0.55	0.37-0.82
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	17	54 954	0.70	0.42-1.18	NP	1	6649	0.47	–
3	69	160 920	1.00	Reference	P	22	73 649	1.00	Reference
4-5	61	168 263	0.86	0.61-1.22	PDE	43	123 779	1.14	0.66-1.98
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	34	54 954	1.26	0.84-1.88	NP	3	6649	0.58	0.19-1.76
3	75	160 920	1.00	Reference	P	48	73 649	1.00	Reference
4-5	64	168 263	0.84	0.59-1.18	PDE	45	123 779	0.68	0.46-1.01
Relative grading system: Boys					**Knowledge based grading system: Boys**				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	45	95 804	1.30	0.73-1.28	NP	6	12 016	1.60	0.69-3.73
3	62	178 132	1.00	Reference	P	30	105 599	1.00	Reference
4-5	35	124 602	0.82	0.55-1.23	PDE	35	97 414	1.24	0.73-2.08
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	71	95 804	0.96	0.73-1.28	NP	5	12 016	0.63	0.26-1.57
3	135	178 132	1.00	Reference	P	73	105 599	1.00	Reference
4-5	79	124 602	0.87	0.65-1.15	PDE	55	97 414	0.81	0.58-1.16
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	75	95 804	0.97	0.93-1.30	NP	12	12 016	1.16	0.61-2.20
3	143	178 132	1.00	Reference	P	88	105 599	1.00	Reference
4-5	88	124 602	0.88	0.66-1.13	PDE	88	97 414	1.12	0.82-1.52

Abbreviations: NP, not passed; P, pass; PDE, pass with distinction or excellence.

Values after adjustment for year of birth, maternal age, parity, and maternal education. Reference group is youth who just passed.

Table 3.

Swedish: Odds Ratios With 95% CI, for Adolescents With Cleft Compared With Population.

Relative grading system: Girls					Knowledge-based grading system: Girls				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	25	41 202	1.70	1.05-2.73	NP	3	4437	0.97	0.29-3.25
3	53	149 138	1.00	Reference	P	43	63 743	1.00	Reference
4-5	64	191 842	0.86	0.58-1.26	PDE	57	134 241	0.60	0.40-0.89
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	17	41 202	1.21	0.70-2.08	NP	0	4437	–	–
3	54	149 138	1.00	Reference	P	21	63 743	1.00	Reference
4-5	74	191 842	1.15	0.81-1.62	PDE	44	134 241	0.96	0.55-1.67
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	27	41 202	1.36	0.88-2.12	NP	2	4437	0.68	0.18-2.59
3	65	149 138	1.00	Reference	P	38	63 743	1.00	Reference
4-5	80	191 842	1.02	0.73-1.43	PDE	59	134 241	0.90	0.60-1.36
Relative grading system: Boys					**Knowledge-based grading system: Boys**				
Grade	CP (n)	Population (n)	OR	95% CI	Grade	CP (n)	Population (n)	OR	95% CI
1-2	51	123 436	1.07	0.72-1.39	NP	5	10 576	1.64	0.65-4.16
3	66	176 793	1.00	Reference	P	34	122 372	1.00	Reference
4-5	24	96 676	0.66	0.42-1.03	PDE	32	79 834	1.45	0.87-2.44
Grade	CL (n)	Population (n)	OR	95% CI	Grade	CL (n)	Population (n)	OR	95% CI
1-2	89	123 436	0.92	0.70-1.22	NP	3	10 576	0.43	0.14-1.29
3	134	176 793	1.00	Reference	P	85	122 372	1.00	Reference
4-5	61	96 676	0.87	0.64-1.19	PDE	44	79 834	0.82	0.57-1.18
Grade	CLP (n)	Population (n)	OR	95% CI	Grade	CLP (n)	Population (n)	OR	95% CI
1-2	92	123 436	0.99	0.75-1.31	NP	9	10 576	0.85	0.41-1.76
3	131	176 793	1.00	Reference	P	107	122 372	1.00	Reference
4-5	80	96 676	1.15	0.87-1.53	PDE	72	79 834	1.06	0.77-1.40

Abbreviations: NP, not passed; P, pass; PDE, pass with distinction or excellence.

Values after adjustment for year of birth, maternal age, parity, and maternal education. Reference group is youth who just passed.

Table 4.

Grade Point Average (Based Only Upon the Numerical Grades 1988-1997).

Cleft type	n	Cleft	Population	Mean *t*	z-test	*P*	Cohen *d*
Girls							
CP	137	3.23 ± 0.06	3.37 ± 0.002	−0.25 ± 0.11	−2.29	.03	0.18
CL	143	3.38 ± 0.05	3.38 ± 0.002	−0.03 ± 0.11	−0.22	.38	0.00
CLP	173	3.19 ± 0.05	3.38 ± 0.002	−0.25 ± 0.09	−2.70	.01	0.23
Boys							
CP	134	2.88 ± 0.06	3.10 ± 0.002	−0.29 ± 0.10	−3.04	0.004	0.29
CL	284	3.01 ± 0.04	3.12 ± 0.001	−0.15 ± 0.07	−2.04	0.05	0.25
CLP	297	3.08 ± 0.04	3.11 ± 0.001	−0.005 ± 0.07	−0.063	0.40	0.06